Staff Summary for February 11-12, 2026

17. Mountain Lion

Today's Item **Information ☐** **Action ☒**

Consider and potentially act on the petition, the Department's status review report, and comments received to determine whether listing southern California/central coast evolutionarily significant unit (ESU) of mountain lion (*Puma concolor*) as endangered under the California Endangered Species Act is warranted.

Summary of Previous/Future Actions

• Received petition	June 2019
• Transmitted petition to Department	July 2019
• Public receipt of petition and approved Department's request for 30-day extension	August 2019
• Received Department's petition evaluation report	February 2020
• Determined petitioned action may be warranted, initiating Department's status review	April 2020
• Approved Department's request for six-month extension	April 2021
• Received Department's status review report	December 10-11, 2025
• **Today, potentially determine if listing is warranted**	**February 11-12, 2026**

Background

On June 25, 2019, the Commission received a petition from the Center for Biological Diversity and the Mountain Lion Foundation to list southern California/central coast mountain lion as endangered under CESA (Exhibit 1). At its April 2020 meeting, the Commission determined that listing may be warranted, and subsequently provided notice regarding southern California/central coast mountain lion's protected, candidate species status. The notice prompted the Department's status review of the species, as required by California Fish and Game Code Section 2074.6.

Petition

The petitioners propose listing mountain lion populations south of San Francisco Bay in the California Coast, Transverse, and Peninsular mountain ranges, the Sonoran Desert, part of the Central Valley, and part of the Mojave Desert; the petitioners identify those mountain lions as a single, evolutionarily significant unit (ESU), which petitioners refer to as the Southern California/Central Coast ESU. Alternatively, the petitioners propose the Commission determine whether one or more of the six genetic populations described in the petition comprise one or more ESUs and meet the criteria for listing as threatened or endangered.

Status Review Report

The Commission received the Department's status review report at the December 2025 Commission meeting (exhibits 2 and 3). The status review report represents the Department's final written review of the status of southern California/central coast mountain lion, delineates

each of the categories of information and required components, and incorporates additional relevant information provided, possessed, and received.

The Department finds that mountain lions within an area encompassing nearly all of the area identified by the petitioners represent discrete and biologically significant genetic populations, both individually and collectively. The Department evaluated the area where the populations exist and, informed by a federal policy for evaluating whether populations qualify for listing under the federal Endangered Species Act when below the taxonomic subspecies level, find that the southern California/central coast mountain lion population qualifies as a distinct population segment (DPS) using the federal standard. Evidence shows that mountain lion populations within this area are functionally (if not entirely) isolated; the population within the area is significant due to its markedly different genetic characteristics, large occupied area, and connectivity to Mexico and Arizona populations; and the populations within the DPS are small and could become extinct in the foreseeable future without habitat conservation and restored connectivity. Therefore, the Department recommends listing the southern California/central coast mountain lion population as threatened under CESA and identifies management recommendations and recovery measures.

At today's meeting, the Commission may consider the petition, the Department's written petition evaluation and status review report, written and oral comments received, and the remainder of the administrative record, to determine if listing southern California/central coast mountain lion as endangered under CESA is warranted. Findings will be adopted at a future meeting.

Significant Public Comments

1. An Amador County Fish and Wildlife Commission member shares concerns that mountain lions in California are increasingly losing their fear of humans, leading to rising depredations, vehicle strikes, and unreported removals. They suggest implementing a regulated, fee-based hunting system with quotas to improve management, data collection, and conservation while maintaining current mortality levels. (Exhibit 5)
2. Several members of the agricultural community express opposition to listing mountain lion as threatened, stating that population data from the status review report is inaccurate and manipulated, while restrictions on lethal depredation have led to rising livestock losses, urban attacks, and financial harm to ranchers. They argue that unmanaged lion populations diminish deer and other wildlife, create fire hazards from abandoned grazing lands, and require active management to protect communities, agriculture, and ecological balance. Samples of letters are included in Exhibit 6.
3. The California Farm Bureau opposes listing the southern California/Central oast mountain lion DPS as threatened, based on claims of unreliable population estimates, inappropriate boundary expansions, and rising human-lion conflicts driven by prey declines rather than extinction risk. It argues that a CESA listing would restrict management tools, increase depredation incidents and public safety risks, and should be limited to the originally petitioned area if approved. (Exhibit 7)
4. The California Cattlemen's Association (CCA) opposes listing mountain lion under CESA, contending the species is not threatened statewide and that listing would

violate Proposition 117, which provides a process for ranchers to obtain take permits for depredating lions. CCA asserts that CESA protections would conflict with Proposition 117, jeopardize livestock protection, impose costly regulatory burdens on construction and ranching, and create legal inconsistencies; if listing occurs, CCA urges the Commission to adopt regulations ensuring take permits remain available under Proposition 117 and to clarify that current non-lethal "pursuit/hazing" policies do not satisfy legal obligations. (Exhibit 8)

5. Tejon Ranch urges the Commission to recognize its extensive conservation efforts, including permanently protected habitat and connectivity measures that address key threats like fragmentation and barriers. The ranch states that the proposed DPS boundary is overly broad, encompassing unsuitable areas, and calls for science-based adjustments while ensuring listing decisions do not undermine successful private conservation commitments. (Exhibit 9)
6. The California Building Industry Association and the Building Industry Association of Southern California urge the Commission to address mapping inaccuracies before listing mountain lions as threatened. The association states that outdated habitat maps could wrongly classify urbanized areas as suitable habitat, leading to unnecessary and costly studies and mitigation for development projects, and asserts that the primary risk to mountain lions is genetic isolation caused by existing transportation infrastructure, rather than new development. (Exhibit 10)
7. Thirteen commenters oppose listing mountain lion, contending that listing would increase safety risks (i.e., expanded protections will worsen conflicts) and restrict management options for problem lions. They state that mountain lions are abundant and the methods used for population evaluation are too narrow, calling for practical strategies like relocation, connectivity solutions, or controlled hunting to balance conservation with public safety. Samples are provided in Exhibit 11.
8. The Center for Biological Diversity supports the Department's recommendation to list southern California and central coast mountain lions as threatened under CESA and has forwarded a letter co-signed by 70 conservation organizations. The letters assert that severe genetic isolation, inbreeding, and human-caused mortality are primary threats. They emphasize that maintaining connectivity through wildlife crossings, habitat preservation, and land-use planning is essential to prevent extinction and sustain ecosystem health. The organizations urge the Commission to adopt the Department's recovery recommendations, restrict harmful rodenticides, and implement measures that promote coexistence and biodiversity. (Exhibit 12)
9. Various organizations and wildlife experts support listing the mountain lion evolutionarily significant unit under CESA, citing severe threats like habitat fragmentation, road mortality, rodenticide poisoning, and inbreeding that put small, isolated populations at high risk of extinction. They emphasize the species' critical ecological role and call for science-based actions such as habitat protection, wildlife crossings, and connectivity improvements to ensure long-term survival. (Exhibit 13)
10. Supporters urge the Commission to list southern California and central coast mountain lions as threatened under CESA, citing urgent threats from habitat fragmentation, vehicle strikes, and development that isolate populations and increase extinction risk. They emphasize the species' ecological importance and advocate for science-based

protections, including habitat conservation, wildlife corridors, and crossings to maintain genetic diversity and ecosystem health. Samples are provided in Exhibit 14.

11. Three letter-writing campaigns were received urging the Commission to list southern California and central coast mountain lions as threatened, citing severe threats from habitat loss, fragmentation, and genetic isolation. They emphasize that protecting critical habitat and wildlife corridors is essential for connectivity, recovery, and long-term survival of these populations, and request science-based actions to safeguard California's ecosystems for future generations. Samples of the three letter campaigns are provided in Exhibit 15.
12. Rancho Mission Viejo (RMV) underscores its commitment to conservation through the Southern Subregion Habitat Conservation Plan (SSHCP), which permanently protects large habitat blocks and wildlife linkages vital for mountain lions. RMV states it has conserved over 20,000 acres and built wildlife crossings and fencing to support safe movement, and that the SSHCP already meets key management recommendations and should count toward mountain lion protection if listed under CESA. (Exhibit 16)

Recommendation

Commission staff: Determine that listing mountain lion as threatened is warranted, as recommended by the Department.

Department: List the Central Coast and Southern California Distinct Population Segment of mountain lions, as delineated in the Department's status review report, as threatened under CESA.

Exhibits

1. Petition, received June 25, 2019
2. Department memo, received December 10, 2025
3. Department status review report, dated December 2025
4. Department presentation
5. Email from Dan Epperson, District 2 Supervisor, Amador County Fish and Wildlife Commissioner, received January 2, 2026
6. Sample of letters of opposition from the agricultural community
7. Letter from Steven Fenaroli, Director of Policy Advocacy, California Farm Bureau, received January 29, 2026
8. Letter from Kirk Wilbur, Vice President of Government Affairs, California Cattlemen's Association, received January 29, 2026
9. Letter from Hugh McMahone, Executive Vice President, Real Estate, Tejon Ranch Company, received January 29, 2026
10. Cosigned Letter from Nick Cammarota, Senior Vice President & General Counsel, CBIA, and Jeff Montejano, Chief Executive Officer, BIA, received January 29, 2026
11. Sample of emails of opposition from members of the public
12. Letter from Tiffany Yap, PhD, Urban Wildlands Science Director, Center for Biological Diversity and cosigned letter from 70 conservation organizations, received January 29, 2026

13. Letters of support from various conservation organizations
14. Sample of emails of support
15. Sample of emails of support from three letter campaigns
16. Letter from Laura Coley Eisenberg, Senior Vice President, Regulatory Compliance & Open Space Management, Rancho Mission Viejo, received January 17, 2026

Motion

Moved by _____ and seconded by _____ that the Commission, pursuant to Section 2075.5 of the California Fish and Game Code, finds the information contained in the petition to list southern California/central coast ESU of mountain lion, and the other information in the record before the Commission, **warrants** listing the Central Coast and Southern California Distinct Population Segment of mountain lion, as delineated in the Department's status review report, as a threatened species under CESA, consistent with the Commission staff and Department recommendations. Findings will be adopted at a future meeting.

OR

Moved by _____ and seconded by _____ that the Commission, pursuant to Section 2075.5 of the California Fish and Game Code, finds the information contained in the petition to list southern California/central coast ESU of mountain lion, and the other information in the record before the Commission, **does not warrant** listing mountain lion as a threatened species under CESA.

BEFORE THE CALIFORNIA FISH AND GAME COMMISSION

A Petition to List the Southern California/Central Coast Evolutionarily Significant Unit (ESU) of Mountain Lions as Threatened under the California Endangered Species Act (CESA)



A Mountain Lion in the Verdugo Mountains with Glendale and Los Angeles in the background. Photo: NPS

Center for Biological Diversity and the Mountain Lion Foundation

June 25, 2019

Notice of Petition

For action pursuant to Section 670.1, Title 14, California Code of Regulations (CCR) and Division 3, Chapter 1.5, Article 2 of the California Fish and Game Code (Sections 2070 *et seq*.) relating to listing and delisting endangered and threatened species of plants and animals.

I. SPECIES BEING PETITIONED:

Species Name: Mountain Lion (*Puma concolor*). Southern California/Central Coast Evolutionarily Significant Unit (ESU)

II. RECOMMENDED ACTION: Listing as Threatened or Endangered

The Center for Biological Diversity and the Mountain Lion Foundation submit this petition to list mountain lions (*Puma concolor*) in Southern and Central California as Threatened or Endangered pursuant to the California Endangered Species Act (California Fish and Game Code §§ 2050 et seq., "CESA"). This petition demonstrates that Southern and Central California mountain lions are eligible for and warrant listing under CESA based on the factors specified in the statute and implementing regulations. Specifically, petitioners request listing as Threatened an Evolutionarily Significant Unit (ESU) comprised of the following recognized mountain lion subpopulations:

1. Santa Ana Mountains
2. Eastern Peninsular Range
3. San Gabriel/San Bernardino Mountains
4. Central Coast South (Santa Monica Mountains)
5. Central Coast North (Santa Cruz Mountains)
6. Central Coast Central

Alternatively, as detailed in the petition, in the event the Commission determines that these six populations collectively either do not comprise a single Southern California/Central Coast ESU or otherwise do not meet the criteria for listing as Threatened, petitioners request the Commission consider whether any of these populations, singularly or in combination, comprise one or more ESUs and meet the criteria for listing as Threatened or Endangered pursuant to CESA.

III. AUTHORS OF PETITION:

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I hereby certify that, to the best of my knowledge, all statements made in this petition are true and complete.

Signature:  Date: 6/25/19

Table of Contents

Executive Summary 1
1 Introduction 7
2 Life History 7
2.1 Species Description 7
2.2 Taxonomy and Population Genetics 8
2.2.1 Effective Population Size and Extinction Risk 11
2.2.2 Central Coast North (CC-N) Mountain Lion Population 13
2.2.3 Central Coast Central (CC-C) Mountain Lion Population 13
2.2.4 Central Coast South (CC-S) Mountain Lion Population 13
2.2.5 Santa Ana Mountains (SAM) Mountain Lion Population 14
2.2.6 San Gabriel/San Bernardino Mountains (SGSB) Mountain Lion Population 15
2.2.7 Eastern Peninsular Range (EPR) Mountain Lion Population 15
2.3 Reproduction and Growth 16
2.4 Diet and Foraging Ecology 17
2.5 Habitat Requirements 19
2.6 Survivorship and Mortality 21
3 Southern California and Central Coast Mountain Lions Comprise an Evolutionarily Significant Unit 22
3.1 CESA Provides for Listing of ESUs 22
3.2 Southern California and Central Coast Mountain Lions are Significantly Reproductively Isolated from Other Populations and Form an ESU 23
3.3 Proposed Boundary of the Southern California/Central Coast ESU 25
3.4 Southern California and Central Coast Mountains Lions are Essential to the Region's Biodiversity 28
3.5 Californians Derive Aesthetic, Recreational, and Economic Value from Southern California and Central Coast Mountain Lions 29
4 Historical and Current Distribution 30
4.1 Central Coast North (CC-N) Mountain Lion Population 32
4.2 Central Coast Central (CC-C) Mountain Lion Population 32
4.3 Central Coast South (CC-S) Mountain Lion Population 32
4.4 San Gabriel/San Bernardino Mountains (SGSB) Mountain Lion Population 33
4.5 Santa Ana Mountains (SAM) Mountain Lion Population 33

4.6 Eastern Peninsular Range (EPR) Mountain Lion Population 33
5 Abundance and Population Trends 34
5.1 Central Coast North (CC-N) Mountain Lion Population 35
5.2 Central Coast Central (CC-C) Mountain Lion Population 35
5.3 Central Coast South (CC-S) Mountain Lion Population 36
5.4 Santa Ana Mountains (SAM) Population 38
5.5 San Gabriel/San Bernardino Mountains (SGSB) Population 39
5.6 Eastern Peninsular Range (EPR) Population 39
6 Factors Affecting Ability to Survive and Reproduce 40
6.1 Low Genetic Diversity and Inbreeding Depression 42
6.2 Vehicle Strikes 44
6.3 Depredation and Illegal Kills 46
6.4 Intraspecific Strife 48
6.5 Abandonment 49
6.6 Poisoning from Rodenticides and Other Environmental Toxicants 50
6.7 Wildfires 51
6.8 Climate Change 52
7 Degree and Immediacy of Threat 53
8 Inadequacy of Existing Regulatory Mechanisms 54
8.1 State Regulatory Mechanisms 54
8.1.1 CDFW Departmental Bulletins 55
8.1.2 California Environmental Quality Act 56
8.1.3 Significant Natural Areas Program 58
8.1.4 Natural Community Conservation Planning Act 59
8.2 Federal Regulatory Mechanisms 61
8.2.1 National Environmental Policy Act 61
8.3 Regional and Local Plans and Policies 62
8.3.1 Santa Monica Mountains National Recreation Area General Management Plan 62
8.3.2 Ventura County Wildlife Connectivity Ordinance 63
8.3.3 Los Angeles County Significant Ecological Areas Program 63
8.4 Future Development Will Further Threaten the Survival of Southern California Mountain Lions 64
8.5 Future Development Will Further Threaten the Survival of Central Coast Mountain Lions.. 67

9 CESA Listing for Southern California and Central Coast Mountain Lions Would Supplement Proposition 117's Protections. 69
9.1 CESA listing is consistent with Proposition 117. 69
9.2 CESA listing would further the goals of Proposition 117. 69
10 Recommended Management and Recovery Actions 70
11 References 73

Executive Summary

The Center for Biological Diversity and the Mountain Lion Foundation submit this petition to list mountain lions (*Puma concolor;* cougar, puma) in Southern and Central Coastal California as "threatened" or "endangered" pursuant to the California Endangered Species Act (CESA) (California Fish and Game Code §§ 2050 et seq.). Following Section 670.1, Title 14, California Code of Regulations, petitioners present scientific information regarding life history, population trend, range, distribution, abundance, kind of habitat necessary for survival, factors affecting the ability to survive and reproduce, degree and immediacy of threat, impact of existing management efforts, suggestions for future management, availability of sources and information, and a detailed distribution map.

Specifically, petitioners request listing as a "threatened species" an evolutionarily significant unit (ESU) comprised of the following recognized mountain lion subpopulations:

1. Santa Ana Mountains
2. Eastern Peninsular Range
3. San Gabriel/San Bernardino Mountains
4. Central Coast South (Santa Monica Mountains)
5. Central Coast North (Santa Cruz Mountains)
6. Central Coast Central

As demonstrated in this petition, mountain lions in these areas comprise an ESU (referred to as the "Southern California/Central Coast ESU") and meet the statutory definition of a "threatened species."

The California Fish and Game Commission has long recognized that ESUs can be designated and listed under CESA, and this interpretation of CESA has been upheld by the courts. *See California Forestry Assn. v. California Fish & Game Com.* (2007) 156 Cal.App.4th 1535, 1540 ("Consistent with the policy of the CESA, we will hold that the term 'species or subspecies' includes evolutionarily significant units"); *Central Coast Forest Assn. v. Fish & Game Com.* (2018) 18 Cal.App.5th 1191, 1197, fn. 4 [*"CCFA II*"] ("An ESU is included within the term 'species or subspecies' in sections 2062 and 2067."). While the ESU concept has primarily been applied to fish, the Commission recently listed an ESU of a mammal, the Pacific Fisher, as a "threatened species." *See* 14 C.C.R. 670.5(b)(6)(J) ("Fisher (*Pekania pennant*) Southern Sierra Nevada Evolutionarily Significant Unit").

Under CESA, a "threatened species" is "a native species or subspecies of a … mammal… that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts . . . ." Cal. Fish & Game Code § 2067. An animal is an "endangered species" when it is "in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease." Cal. Fish & Game § 2062.

Certain populations of the Southern California/Central Coast mountain lion ESU are already "in serious danger of becoming extinct" (*e.g*. Santa Ana and Santa Monica mountains), and if assessed separately, would individually meet the definition of an "endangered species." When considered as a whole, the Southern California/Central Coast ESU is not at imminent risk of extinction but still faces significant and growing threats that ultimately threaten the viability of the entire ESU; it consequently meets the definition of a "threatened species."

Currently, there is no reliable estimate of mountain lion abundance in California. In 1984 the California Department of Fish and Wildlife (CDFW) estimated between 4,000-6,000 adult mountain lions in the state (Mansfield and Weaver 1984). However, CDFW acknowledges that this estimate is outdated and likely overestimates mountain lion abundance. CDFW is currently undertaking a large-scale research effort to estimate mountain lion numbers throughout California.

While reliable absolute abundance estimates are unavailable, recent genetic research has led to estimates of effective population size for California mountain lion populations.[1] These estimates highlight the genetic isolation among California mountain lion populations and raise significant concerns for the continued viability of mountain lions in Southern California and along the Central Coast.

Researchers have recently identified 10 genetically distinct mountain lion populations in California (Figure ES-1) (derived from Gustafson et al. 2018). Nine of these populations occur almost exclusively in California, while one is centered in Nevada but extends into the northeastern corner of California.

The abundance of mountain lions in the North Coast and inland populations (Western Sierra Nevada, Eastern Sierra Nevada, and the genetic cluster centered in the state of Nevada) is not well established; however, these populations are better connected than Southern California and Central Coast mountain lions, and they show relatively high levels of genetic diversity. Gustafson et al. (2018) suggest that these four populations may comprise an ESU. While these populations should be monitored and managed to ensure their continued viability, petitioners do not seek protection of these populations as an ESU under CESA at this time.

Considering the genetic source-sink dynamics among the remaining six populations, petitioners demonstrate that the populations along the Central Coast and in Southern California collectively comprise an ESU that warrants protection under CESA.[2] The Southern California/Central Coast ESU is comprised of six genetically distinct mountain lion populations: Central Coast North (CC-N, which includes mountain lions in the Santa Cruz Mountains and East Bay), Central Coast

[1] At its simplest, effective population size is the number of animals contributing offspring to the next generation. It is an important measure of the genetic health of a population.

[2] As explained *infra* at Section 3.0, these remaining populations can be grouped into one or several potential ESUs. Petitioners believe that for purposes of listing under CESA, treating them as a single ESU is supported by the best available science. Moreover, a single ESU also is the most pragmatic from a management perspective, as recovery of the individual populations ultimately depends upon maintaining and/or reestablishing connectivity between them. *See CCFA II,* 18 Cal.App.5th 1191, 1237 ("[T]he nature of the ESU designation is such that genetics alone are not determinative: One must look beyond genetics to questions of policy to determine which populations to include in an ESU.")(quotations omitted).

Central (CC-C), Central Coast South (CC-S, which includes the mountain lions in the Santa Monica Mountains), San Gabriel/San Bernardino Mountains (SGSB), Santa Ana Mountains (SAM), and Eastern Peninsular Range (EPR) (Gustafson et al. 2018).

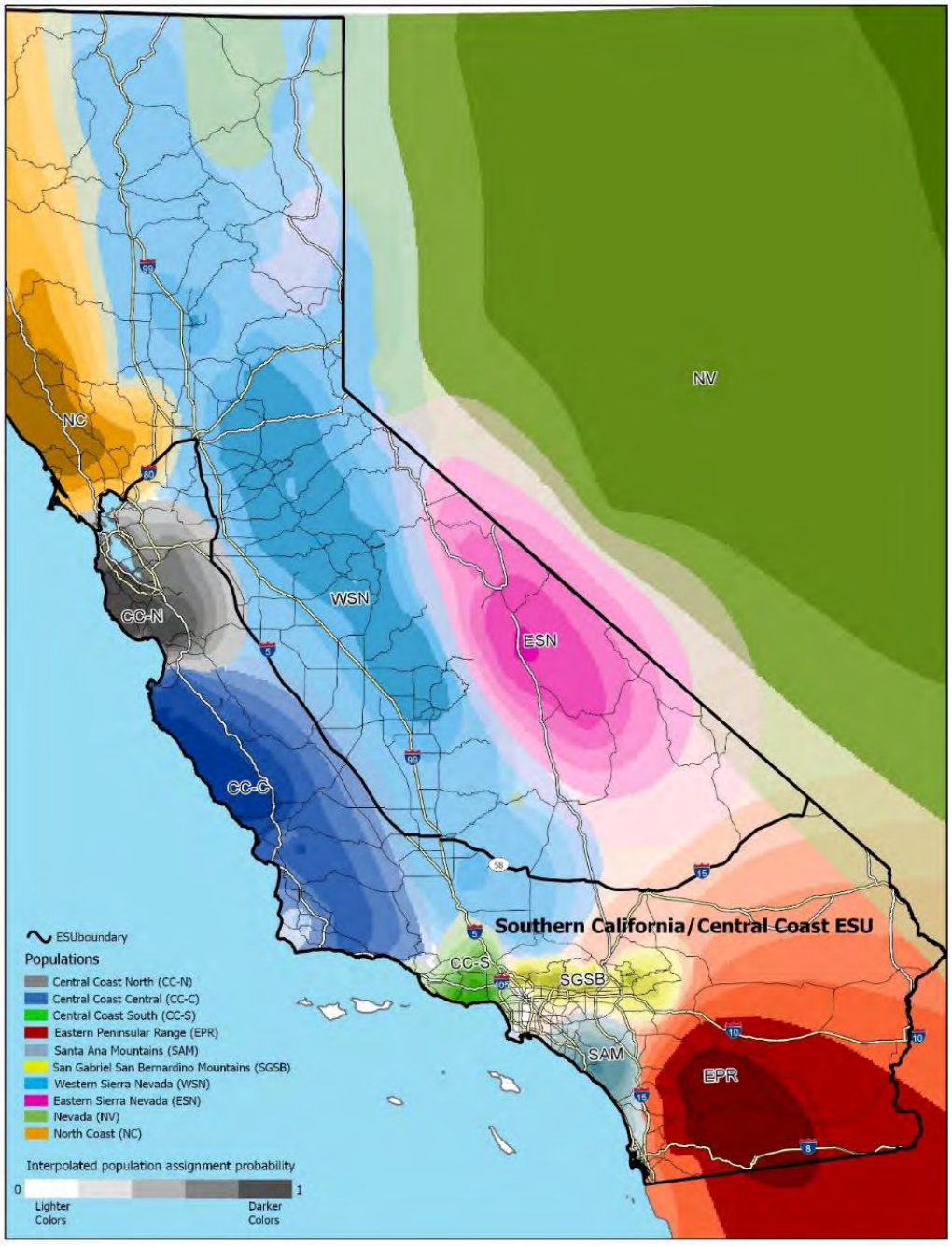


Figure ES-1. Map of genetically distinct mountain lion populations and major roadways in California based on data collected from 1992-2016 (the division and status of these populations could change over time and with further research). The black lines show the proposed Southern California/Central Coast ESU boundary. Derived from Gustafson et al. (2018). Genetics data source: Kyle Gustafson, PhD, Department of Biology and Environmental Health, Missouri Southern State University, and Holly Ernest, DVM, PhD, Department of Veterinary Sciences, Program in Ecology, University of Wyoming, Laramie. Roads data source: ESRI.

The boundary of the Southern California/Central Coast ESU is proposed in Figure ES-1, and includes mountain lions that occur south of the San Francisco Bay and I-80, west of I-5 to the intersection of I-5 and SR-58, south of SR-58 to I-15, south of the I-15 from the SR-58 intersection to the California-Nevada border, and, for the purposes of CESA, as far south as the California-Mexico border. These boundaries are recommended as they include virtually all mountain lions associated with the six populations comprising the ESU and are also unambiguous and readily discernable for purposes of management. We recommend including mountain lions in the Tehachapi and Sierra Pelona Mountains south of SR-58 in this ESU. While most mountain lions sampled from this region share some genetic affinities with Western Sierra Nevada (WSN) animals, many also show genetic connections with CC-S, SAM, EPR and SGSB mountain lions. This area serves not just as a connecting link between mountain lion populations comprising the Southern California/Central Coast ESU, but also between this ESU and all other California mountain lions and is therefore essential for the overall genetic health of mountain lions in the state.

While Southern California and Central Coast mountain lions face a multitude of threats, the greatest challenges stem from habitat loss and fragmentation and the consequent impact on their genetic health. Most of the populations comprising the ESU have low genetic diversity and effective population sizes, which puts them at increased risk of extinction (Ernest et al. 2003; Ernest et al. 2014; Riley et al. 2014; Vickers et al. 2015; Benson et al. 2016; Gustafson et al. 2018; Benson et al. 2019). The populations most at risk are the SAM, CC-S, SGSB, and CC-N populations. Due to extreme isolation caused by roads and development, the SAM and CC-S, populations exhibit high levels of inbreeding, and, with the exception of the endangered Florida panther, have the lowest genetic diversity observed for the species globally (Ernest et al. 2014; Riley et al. 2014; Gustafson et al. 2018; Benson et al. 2019). The SGSB and CC-N similarly have low observed genetic diversity and effective population sizes, and they reside in areas of significant isolation and habitat fragmentation, which also puts them at increased risk (Gustafson et al. 2018). And although the CC-C and EPR populations have slightly higher levels of genetic diversity and effective population sizes, high rates of development, habitat loss and fragmentation, and human-caused mortalities in both areas could lead to a similar fate of isolation, genetic drift, low effective population size, and increased risk of extinction in the foreseeable future.

Although minimum viable effective population size has been found to vary depending on the species (Frankham 1995; Traill et al. 2010), general conservation management practice over the past few decades has followed a 50/500 rule, under which an effective population size of 50 is assumed sufficient to prevent inbreeding depression in the short term (over the duration of five generations) and an effective population size of 500 is sufficient to retain evolutionary potential in perpetuity (Traill et al. 2010; Frankham et al. 2014). It is clear that Central Coast and Southern California mountain lion populations are genetically compromised and face significant risk of extinction in both the short- and long-term. Five of the six populations have effective population sizes well below 50 (from lowest to highest: CC-S, SGSB, SAM, CC-N, EPR), and one population (CC-C) is just barely above that threshold at $N_e = 56.6$ (Table ES-1) (Gustafson et al. 2018).

Table ES-1. Effective population size from Gustafson et al. (2018) and estimated total adult population of Central Coast and Southern California Mountain Lion Populations.

Population	Effective Population Size (N_e)	Estimated Total (Adult) Population (N)[1]
Central Coast North (CC-N)	16.6	33-66
Central Coast Central (CC-C)	56.6	113-226
Central Coast South (CC-S)	2.7[2]	5-10
Santa Ana Mountains (SAM)	15.6[3]	31-62
San Gabriel/ San Bernardino Mountains (SGSB)	5	10-20
Eastern Peninsular Range (EPR)	31.6	63-126
Total		255-510

[1]Calculations are based on the estimated ratio of effective to total adult population size (N_e/N) of Florida panthers being 0.25 to 0.5 (Ballou et al. 1989). This ratio was used in the USFWS Florida Panther Recovery Plan (USFWS 2008). Petitioners recognize that these derived population estimates, while informative, are not definitive and will likely be superseded by new population estimates being developed by CDFW.
[2]Benson et al. (2019) calculated an N_e of 4 for the Santa Monica Mountains population within the CC-S. Applying the Ballou et al. (1989) factors would lead to an estimate of 8-16 mountain lions in this area, which is roughly consistent with current estimates of this well-monitored population.
[3]Several studies provide N_e calculation for the SAM population. Ernest et al. (2014) calculated an N_e of 5.1 and Benson et al. (2019) calculated an N_e of 6. Applying the Ballou et al. (1989) factors to the most recent calculation would lead to an estimate of 12-24 mountain lions in the SAM, which is roughly consistent with current estimates.

Although low effective population sizes standing alone are cause for conservation concern for Southern California and Central Coast mountain lion populations, there are other human-caused factors that further limit their long-term persistence. Habitat loss and fragmentation due to roads and development have led to extreme levels of isolation and high mortality rates. With low genetic diversity and high risk of inbreeding depression due to genetic isolation, vehicle strikes on roads, increased conflicts with humans that lead to depredation kills, high levels of intraspecific strife likely due to limited space and lack of connectivity, rodenticide and other environmental toxicant poisoning, and impacts of more frequent human-caused wildfires and climate change, the small isolated mountain lion populations of Southern California and the Central Coast will likely not persist without the restoration and enhancement of functional connectivity between populations and large blocks of heterogeneous habitats**.**

Loss of mountain lions in Southern California and the Central Coast would be devastating not just for the mountain lions themselves but also the many species that directly and indirectly rely on them. These top predators are important ecosystem engineers that facilitate healthy ecosystems and allow biodiversity to thrive (Ripple and Beschta 2006; Ripple and Beschta 2008;

Ripple et al. 2014; Ruth and Elbroch 2014; Barry et al. 2019; Elbroch and Quigley 2019). As keystone species mountain lions help support plant recruitment in riparian areas, stabilize stream banks, and sustain healthy habitats for a myriad of aquatic and terrestrial species, including plants, invertebrates, fish, amphibians, reptiles, birds, and mammals (Ripple and Beschta 2006; Ripple and Beschta 2008; Ripple et al. 2014). Their kills are also an important source of food for multiple terrestrial and avian scavengers (Ruth and Elbroch 2014; Barry et al. 2019; Elbroch and Quigley 2019).

Existing laws and regulations have proven to be inadequate to protect Southern California and Central Coast mountain lions. Although the California Wildlife Protection Act of 1990 (Proposition 117) prohibits hunting of mountain lions and has funded the acquisition of important habitat for preservation, the Act alone does not ensure that core habitats and connectivity are protected from development, highways, or other threats. Moreover, numerous mountain lions are killed each year pursuant to depredation authorizations issued under this regime, and there is no limit to the number of depredation permits a property owner can request or any limit to the number of depredation permits which can be issued for any population. And while CDFW has proactively issued a bulletin detailing a new depredation policy for mountain lions in the CC-S and SAM that requires property owners to first implement non-lethal measures prior to being issued a kill permit, this policy does not apply to other vulnerable populations.

Other environmental laws also are insufficient. State and local agencies continue to interpret the California Environmental Quality Act (CEQA) as allowing for the construction of highways and other development in mountain lion habitat and essential corridor areas without adequate mitigation despite severe impacts of such projects on mountain lions. Agencies likewise have generally interpreted CEQA and the federal National Environmental Policy Act as not requiring implementation of connectivity measures when projects fragment or destroy mountain lion habitat. And perhaps most importantly, Caltrans lacks a clear affirmative mandate to design, build, or improve crossings for mountain lions on existing highways, despite the undisputed role of transportation infrastructure in preventing connectivity and gene flow.

Future human population growth and associated development will further diminish and fragment remaining mountain lion habitat, driving Southern California and Central Coast mountain lions closer to extinction and undermining any chance of recovery. Should state and local agencies continue to build and expand roads and highways and permit construction in wildlife habitat and corridors without ensuring adequate habitat connectivity, the genetic health of mountain lion populations will continue to decline while the number of mountain lions killed by vehicle strikes and other human activity will increase.

Ultimately, without a reversal of these trends, mountain lions will disappear from Southern and Central Coastal California in the coming decades, representing a loss of the species from a significant portion of its range in the state. Nevertheless, most of the threats facing mountain lions can be halted or sufficiently reduced if CDFW is provided with adequate resources and all relevant state and local agencies sufficiently prioritize mountain lion conservation in their decision-making. Legal protection of mountain lions under CESA, along with the attention and resources that such listing will generate, can help ensure the long-term survival of this iconic and ecologically significant species in Southern and Central Coastal California.

The Southern California/Central Coast Evolutionarily Significant Unit (ESU) of Mountain Lions Warrants Listing as Threatened under the California Endangered Species Act (CESA)

1 Introduction

This petition summarizes available scientific information regarding the natural history of mountain lions, their distribution and abundance in California, population trends and threats, describes the proposed ESU, and discusses the limitations of existing management measures in protecting the species. As demonstrated below, mountain lions in Southern California and along the Central Coast meet the criteria for protection as a threatened species under the California Endangered Species Act (CESA), and would benefit greatly from such protection.

2 Life History

2.1 Species Description



Adult female mountain lion (left) and kittens (right). Photos: NPS.

The mountain lion (*Puma concolor*) is also commonly called a puma (from the Inca language Quechua) or cougar (corrupted from cuguacuarana from the indigenous Guarani people in Paraguay, Argentina, Bolivia, and Brazil). Adults are large, slender cats with short, muscular limbs and a long tail that is about one third of the animal's total length. Their hind limbs are longer than their fore limbs, which makes them highly adapted for jumping through rugged terrain or pouncing on their prey. They have tawny pelage that can be lighter/whitish on their belly and the undersides of their legs and they have areas of white around the muzzle, throat and chest. They have black fur on the backs of their rounded ears, the tip of their tail, and outlining their muzzle. Their eyes are a grayish brown to golden color, and the nose is pink with a black outline.

Adult body size and weight can vary depending on the geographic range (Iriarte et al. 1990). Mountain lions are smaller and weigh less near the equator and are larger and heavier towards the poles, which likely reflects the size of available prey and the presence of sympatric carnivores (Iriarte et al. 1990). Males are typically larger than females. Males generally weigh 55-65kg with a length of 2.2-2.3m from the nose to the tip of the tail, and females generally weigh 35-45kg with a length of 2.0-2.1m (Currier 1983).

Mountain lion kittens are born weighing approximately 400g, and their eyes and ear canals remain closed for one to two weeks after birth (Currier 1983). They have light coats with dark spots and a white muzzle, chest, and belly. Like the adults, they have black fur on the backs of their rounded ears, the tip of their tail, and outlining their muzzle. Their eyes are initially blue, change to mostly brown within four months, and then change to a golden color at around nine months (Currier 1983). The dark spots on their coat start to fade at 12-14 weeks of age, presumably when a kitten starts to accompany its mother on hunts, but the spots are still distinguishable until the animal is about one year old (Currier 1983). Adult weight is typically reached between the second and fourth year.

2.2 Taxonomy and Population Genetics

The mountain lion is in the order Carnivora and is a member of the cat family Felidae. Unlike the large, roaring cats of the subfamily Pantherinae (*e.g.*, lions, tigers, and leopards), mountain lions are categorized with small, purring cats in the subfamily Felinae (*e.g.*, bobcats, lynxes, ocelots, cheetahs, and jaguarundi). Their scientific name is *Puma concolor*, formerly called *Felis concolor*. Based on molecular and morphological features, it is thought that mountain lions share a common ancestor with cheetahs (*Acinonyx jubatus*) and jaguarundi (*Puma yaguaroundi*).

Mountain lion fossil records in North America date back 300,000 years (Pierce and Bleich 2003); however, they were likely extirpated during a massive extinction event at the end of the Pleistocene, which eliminated about 80% of large vertebrates in North America (Culver et al. 2000; Caragiulo et al. 2013). Genetic studies suggest that after this extinction event, a small number of Central and South American mountain lions migrated north and repopulated North America (Culver et al. 2000; Caragiulo et al. 2013). As a result, existing North American mountain lions exhibit founder effects and have less genetic diversity compared to mountain lions in Central and South America (Culver et al. 2000; Caragiulo et al. 2013).

There is some debate regarding the number of subspecies of mountain lions. Two subspecies are "tentatively" recognized by the International Union for Conservation of Nature (IUCN) Species Survival Commission (SSC) Cat Specialist Group: *Puma concolor concolor* (Linnaeus, 1771) in South America and *Puma concolor couguar* (Kerr, 1792) in North and Central America and possibly northern South America west of the Andes Mountains (Kitchener et al. 2017). However, there are various studies that suggest the divergence of multiple subspecies of mountain lions. About 30 subspecies of mountain lions throughout the Americas have been referenced in the literature, with about 15 subspecies in North America (Young and Goldman 1946; Currier 1983; Pierce and Bleich 2003).

Based on more recent genetic analyses of mitochondrial DNA (mtDNA) from mountain lions throughout the Americas, Caragiulo et al. (2013) found that the mountain lions they sampled could be separated into three broad groupings: North America, Central America, and South America, with North American mountain lions having the least variation in mtDNA compared to populations in Central and South America. Although that study genotyped 601 specimens, the distribution of sampling within the broad geographic range was limited compared

to a study conducted by Culver et al. (2000), which analyzed mtDNA from 315 mountain lions sampled from more locations throughout the species' geographic distribution. Culver et al. (2000) found six phylogeographic groupings or subspecies throughout the Americas.

Despite this ongoing debate, the United States Fish and Wildlife Services (USFWS) has long recognized mountain lion subspecies under the federal Endangered Species Act (ESA). Two of these subspecies have been protected under the ESA due to low population sizes: the eastern cougar (*Puma concolor couguar*), which was listed as endangered and is now thought to be extinct, with the last recorded occurrence in 1938 (USFWS 2018), and the endangered Florida panther (*Puma concolor coryi*), which is an isolated population that is now restricted primarily to the cypress swamps of southern Florida. In addition, the California mountain lion (*Puma concolor californica*) was recognized by USFWS in response to a 1994 petition by the Mountain Lion Foundation to list the population of California mountain lions in the Santa Ana Mountains as endangered, as those populations that occur within most of California, southern Oregon, western Nevada, and northern Baja California, Mexico (USFWS 1994). Additionally, the California Department of Fish and Wildlife (CDFW) recognizes the Yuma Puma (*Puma concolor browni*) as a (sub)species of special concern that occurs in the desert plains and low mountains along the Colorado River in southeastern California, southwestern Arizona, northeastern Baja California, Mexico, and northwestern Sonora, Mexico (CDFW 1990).

In California, researchers have recently identified 10 genetically distinct mountain lion populations in California and Nevada, nine of which have core areas in California (Figure 1) (Gustafson et al. 2018). In the study, 992 mountain lions from throughout California and Nevada were genotyped using 42 microsatellite loci to identify regional populations and evaluate functional connectedness between the populations (Gustafson et al. 2018). The divergence of these populations is likely the result of habitat fragmentation caused by roads and development (Ernest et al. 2003; Ernest et al. 2014; Riley et al. 2014; Vickers et al. 2015; Benson et al. 2016a; Gustafson et al. 2017; Gustafson et al. 2018; Benson et al. 2019). According to Gustafson et al. (2018), mountain lions in the North Coast and inland populations (Nevada, Eastern Sierra Nevada, Western Sierra Nevada) appear to be better-connected than those in the south and along the central coast, with relatively larger effective population sizes and higher levels of genetic diversity. The authors suggest that these populations may comprise an evolutionarily significant unit (ESU). Considering the genetic source-sink dynamics among the remaining populations (Gustafson et al. 2018), petitioners demonstrate that the populations in Southern California and along the Central Coast collectively comprise an ESU (referred to as the "Southern California/Central Coast ESU"). See *Section 3.0 Southern California and Central Coast Mountain Lions Comprise and Evolutionarily Significant Unit* for more discussion.

The Southern California/Central Coast ESU is comprised of six genetically distinct mountain lion populations: Central Coast North (CC-N, which includes mountain lions in the Santa Cruz Mountains), Central Coast Central (CC-C), Central Coast South (CC-S, which includes mountain lions in the Santa Monica Mountains), San Gabriel/San Bernardino Mountains (SGSB), Santa Ana Mountains (SAM), and Eastern Peninsular Range (EPR) (Figure 1) (Gustafson et al. 2018). Most of these populations appear to be struggling with low genetic diversity and effective population sizes, which puts them at increased risk of extinction (Ernest et al. 2014; Riley et al. 2014; Vickers et al. 2015; Benson et al. 2016a; Gustafson et al. 2018;

Benson et al. 2019). The populations struggling the most include the SAM, CC-S, SGSB, and CC-N populations. Although the CC-C and EPR have slightly higher levels of genetic diversity and effective population sizes, high rates of development in both areas could lead to a similar fate of isolation, genetic drift, low effective population size, and increased risk of extinction in the foreseeable future.

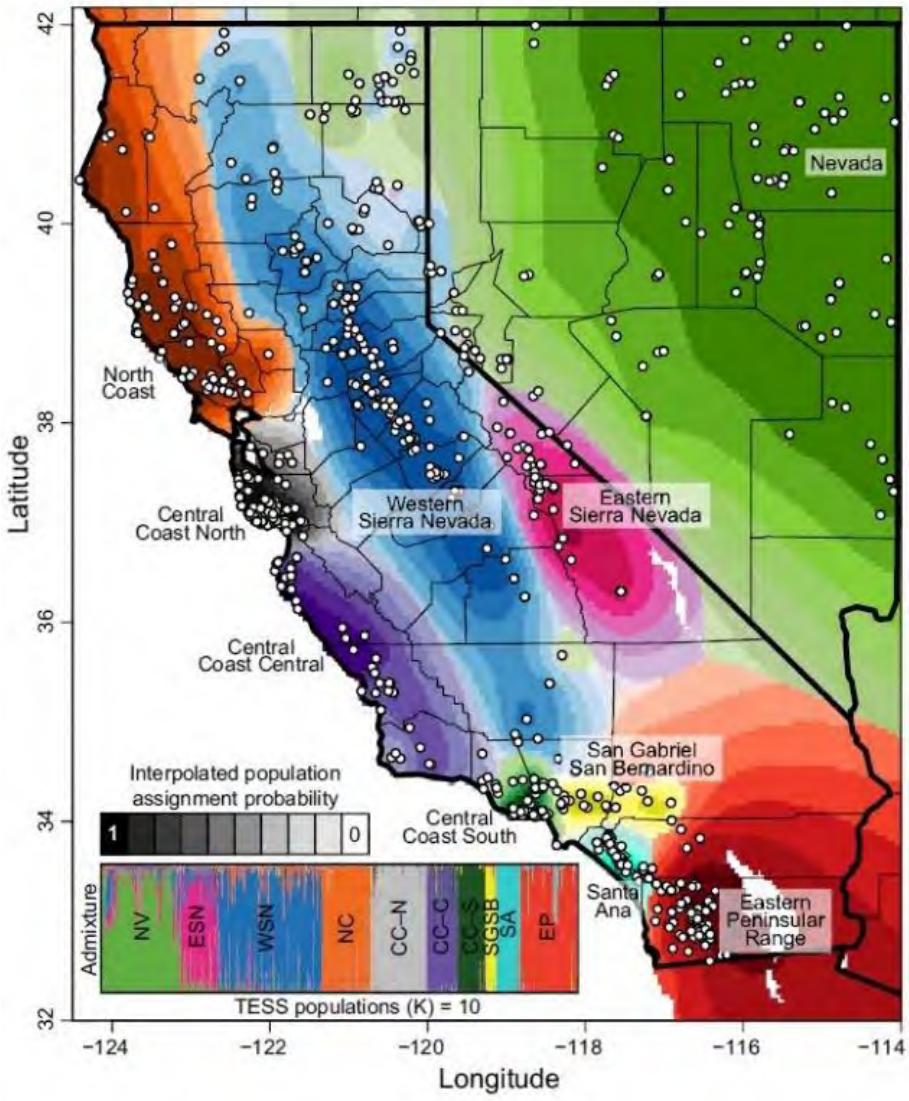


Figure 1. Map of genetically distinct mountain lion populations in California. The Central Coast North (CC-N), Central Coast Central (CC-C), Central Coast South (CC-S), San Gabriel/San Bernardino (SGSB), Santa Ana Mountains (SAM), and Eastern Peninsular Range (EPR) mountain lion populations should be considered an evolutionarily significant unit (ESU). Each color represents a genetically distinct mountain lion population. White dots are individual animals sampled. Source: Gustafson et al. (2018).

Although discrete populations have been identified in Southern California mountain ranges, other mountain lions have been regularly observed outside of the CC-S, SAM, SGSB, and EPR core areas, including transient and resident mountain lions in the Mojave and Colorado deserts and along the Lower Colorado River (*i.e.*, Yuma mountain lion [*Puma concolor browni*], a recognized subspecies of special concern). These populations presumably occur in low

densities due to limited resources, such as lower prey abundance/vulnerability or less suitable habitat. In fact, Kucera (1998) states that habitat within the Yuma mountain lion range is generally considered to be of low or no suitability for mountain lions. Relatively low density populations are inferred by the larger ranges of mountain lions in desert environments; four individual Yuma mountain lions had home ranges of 389km^2 to 1621km^2, which is much larger than other California mountain lion home ranges (Grigione et al. 2002; Riley et al. 2014; Zeller et al. 2017; see *Section 2.5 Habitat Requirements* for more details) but similar to those estimated for other desert mountain lions (Kucera 1998). This petition considers these low-density transients and resident lions as included within the Southern California/Central Coast ESU.

2.2.1 Effective Population Size and Extinction Risk

It has been established that genetic factors play a critical role in extinction risk. Inbreeding depression, loss of genetic diversity, and accumulation of deleterious mutations can lead to elevated extinction risk due to reduced reproductive fitness and evolutionary potential (*i.e.*, the ability to adapt to change) (Spielman et al. 2004; Frankham 2005; Traill et al. 2010). Effective population size (N_e) is a key metric used to assess a population's genetic viability and its chances of long-term persistence. Effective population size is an estimate of the size of an idealized population that would lose heterozygosity (*i.e.*, genetic diversity) at the same rate as the observed population; it indicates a population's rates of inbreeding and genetic drift (changes in allele frequencies over generations based purely on chance). A lower effective population size indicates a higher risk of inbreeding depression. Factors that affect effective population size include census population size (*i.e.*, the total number of individuals within a population), breeding sex ratio, variance in reproductive success, and population density. Several characteristics of these mountain lion populations, including small census population size, low density, female-biased sex ratios, and skewed male reproductive success, reduce effective population size, which suggests that these populations have an increased risk of inbreeding depression and extinction (Ernest et al. 2014; Riley et al. 2014; Vickers et al. 2015; Benson et al. 2016a; Gustafson et al. 2018; Benson et al. 2019).

The minimum effective population size for a population to persist has been debated (*e.g.*, Jamieson and Allendorf 2012; Frankham et al. 2014). Although minimum viable effective population size has been found to vary depending on the species (Frankham 1995), general conservation management practice over the past few decades has followed a 50/500 rule, which purports that an effective population size of 50 is sufficient to prevent inbreeding depression in the short term (over the duration of five generations) and an effective population size of 500 is sufficient to retain evolutionary potential in perpetuity (Frankham et al. 2014). In a 2012 review, Jamieson and Allendorf (2012) concluded that the 50/500 rule is a useful guiding principle in conservation management when genetic concerns are likely to affect the short- and long-term viability of populations. However, Frankham et al. (2014) later revised the 50/500 rule and recommended an effective population size of 100 to limit the loss of total fitness to <10% in the short-term and an effective population size of 1,000 to retain evolutionary potential for fitness in perpetuity, while recognizing that fragmented populations should be evaluated on a case-by-case basis.

Whether the 50/500 or 100/1,000 rule is considered, it is clear that Central Coast and Southern California mountain lion populations are genetically imperiled and face extinction in both the short- and long-term. Five of the six populations have effective population sizes well below 50 (from lowest to highest, according to Gustafson et al. 2018: CC-S, SGSB, SAM, CC-N, EPR), and the remaining population (CC-C) is just barely above that threshold at $N_e = 56.6$ (Table 1) (Ernest et al. 2014; Riley et al. 2014; Benson et al. 2016a; Gustafson et al. 2018; Benson et al. 2019). Although the ratio of effective to total adult population size (N_e/N) varies by species, the effective population size is often much lower than the total adult population size (Frankham 1995). Several studies indicate that the N_e/N in wild vertebrate populations ranges from 0.2 to 0.5 (Ballou et al. 1989; Mace and Lande 1991; Spong et al. 2000; Laundré and Clark 2003). Ballou et al. (1989) estimated the N_e/N to be 0.25-0.5 in their population viability assessment of the Florida Panther, which aligns with other studies on big cats (Frankham 1995; Spong et al. 2000). This range was used in the USFWS's Florida Panther Recovery Plan (USFWS 2008), and, if applied to the Central Coast and Southern California mountain lion populations, the total number of mountain lions in the areas combined would be 255 to 510 individuals (Table 1). This is well below the recommended minimum viable population size of at least 5,000 adult individuals for the long-term persistence of a population (Frankham 1995; Reed et al. 2003; Traill et al. 2010).

Table 1. Effective population size and estimated total adult population of Central Coast and Southern California Mountain Lion Populations from Gustafson et al. (2018).

Population	Effective Population Size (N_e)	Estimated Total (Adult) Population (N)[1]
Central Coast North (CC-N)	16.6	33-66
Central Coast Central (CC-C)	56.6	113-226
Central Coast South (CC-S)	2.7[2]	5-10
Santa Ana Mountains (SAM)	15.6[3]	31-62
San Gabriel/ San Bernardino Mountains (SGSB)	5	10-20
Eastern Peninsular Range (EPR)	31.6	63-126
Total		255-510

[1]Calculations are based on the estimated ratio of effective to total adult population size (N_e/N) of Florida panthers being 0.25 to 0.5 (Ballou et al. 1989). This ratio was used in the USFWS Florida Panther Recovery Plan (USFWS 2008). Petitioners recognize that these derived population estimates, while informative, are not definitive and will likely be superseded by new population estimates being developed by CDFW.

[2]Benson et al. (2019) calculate an N_e of 4 for the Santa Monica Mountains population within the CC-S. Applying the Ballou et al. (1989) factors would lead to an estimate of 8-16 mountain lions in this area, which is roughly consistent with current estimates of this well-monitored population.

[3]Several studies provide N_e calculation for the SAM population. Ernest et al. (2014) calculated an N_e of 5.1 and Benson et al. (2019) calculated an N_e of 6. Applying the Ballou et al. (1989) factors to the most recent calculation would lead to an estimate of 12-24 mountain lions in the SAM, which is roughly consistent with current estimates

Habitat loss and fragmentation due to roads and development have led to extreme levels of isolation in these populations, which have lowered their effective population sizes and, ultimately, their ability to survive and reproduce with a diverse gene pool (Ernest et al. 2014; Riley et al. 2014; Benson et al. 2016a; Gustafson et al. 2018; Benson et al. 2019). However, re-establishing gene flow among isolated subpopulations of a species can increase effective population size and reduce extinction risk (Frankham et al. 2014). Thus, the implementation of wildlife crossing infrastructure at existing barriers along with the preservation of intact, heterogeneous habitats would facilitate connectivity among Central Coast and Southern California mountain lion populations and significantly improve their chances of long-term survival.

2.2.2 Central Coast North (CC-N) Mountain Lion Population

In a statewide study, Gustafson et al. (2018) found that the CC-N population clustered genetically with the CC-C and CC-S populations. The population exhibited evidence of a previous genetic bottleneck and was found to have low genetic diversity and a low effective population size (N_e = 16.6). There is some evidence, though weak, that suggests the CC-N population is a source population, with limited gene flow with the other Central Coast populations and the Western and Eastern Sierra Nevada populations (Gustafson et al. 2018). CDFW has identified that the Santa Cruz Mountains population, which occurs within the CC-N area, is struggling due to fragmentation from roads and development as well as lack of protected habitat (Dellinger 2019). The low genetic diversity and effective population size threaten both the short- and long-term survival of the CC-N population.

2.2.3 Central Coast Central (CC-C) Mountain Lion Population

The CC-C mountain lion population has been found to exhibit a previous genetic bottleneck (Gustafson et al. 2018). It has intermediate levels of genetic diversity and the highest effective population size (N_e = 56.6) among the Central Coast and Southern California populations (Gustafson et al. 2018). Although this effective population size exceeds the older standard of 50 to prevent in-breeding depression in the short-term, it falls well below the recommended newer standard of 100 and is insufficient for the long-term persistence of the population. This population was found to be clustered genetically with the CC-N and CC-S populations and identified as a source population with limited gene flow with other Central Coast populations, the Western and Eastern Sierra Nevada populations, and the SGSB population (Gustafson et al. 2018). Although the CC-C population appears to be the healthiest population in the Central Coast and Southern California, the lack of sufficient protected lands and high rates of development and habitat fragmentation in the area threaten the persistence of this population (Dellinger 2019).

2.2.4 Central Coast South (CC-S) Mountain Lion Population

The CC-S mountain lion population has been found to exhibit a prior genetic bottleneck, with low genetic diversity and an extremely low effective population size (N_e = 2.7 to 4) (Riley et al. 2014; Benson et al. 2016a; Gustafson et al. 2018; Benson et al. 2019). This population was

found to be clustered genetically with the CC-N and CC-C populations and identified as a genetic sink population, with limited gene flow from mountain lions along the Central Coast and in the Sierra Nevada (Gustafson et al. 2018).

A recent population viability analysis focused on the Santa Monica Mountains population, a subpopulation within the CC-S that has been severely isolated due to roads and development, found that if the population remains isolated with little or no immigration (similar to what is currently being observed in the area), the population could experience high levels of genetic erosion, with 40-57% loss of predicted heterozygosity within 50 years (Benson et al. 2016a). When considering just demographic processes with little or no immigration and no inbreeding depression, the population was predicted to have a 15-22% chance of extinction within 50 years (Benson et al. 2016a; Benson et al. 2019). However, if inbreeding depression occurs, which is a strong possibility given the predicted substantial loss of genetic diversity and the documentation of father-daughter, grandfather-granddaughter, and grandmother-grandson inbreeding within the population (*e.g.*, Riley et al. 2014)[3], population growth will likely decline and chances of extinction within 50 years is predicted to be 99.7%, with a median time to extinction of 15.1 years (Benson et al. 2016a; Benson et al. 2019).

2.2.5 Santa Ana Mountains (SAM) Mountain Lion Population

The SAM mountain lion population has been found to have the lowest genetic diversity of all populations in California, with levels nearly as low as the endangered Florida panther (Ernest et al. 2014; Gustafson et al. 2017; Gustafson et al. 2018; Benson et al. 2019). This population is also estimated to have a low effective population size (N_e = 5.1 to 15.6) and high levels of relatedness and inbreeding (Ernest et al. 2014; Gustafson et al. 2018; Benson et al. 2019). The SAM population was found to be a genetic sink population, with limited gene flow with the EPR population (Gustafson et al. 2018). In a 16-year study (2001-2016) seven migrants (out of 146 sampled animals), were detected via genetics and GPS collar tracking to have crossed the I-15 between the EPR and SAM (three males from the EPR to SAM, four males from the SAM to the EPR); only one migrant is known to have reproduced (Gustafson et al. 2017). Low genetic diversity and effective population size in the SAM are indicative of a genetic bottleneck that is estimated to have occurred 40-80 years ago, around the time when urban development and multi-lane highway construction boomed in Southern California (Ernest et al. 2014; Gustafson et al. 2018). This population was also found to be largely disconnected from all the other California populations, along with the EPR population.

A recent population viability analysis found that if the population remains isolated with little or no immigration (similar to what is currently being observed in the area), the population could experience further genetic erosion, with 28-49% loss of predicted heterozygosity within 50 years (Benson et al. 2019). When considering just demographic processes with little or no immigration and no inbreeding depression, the population was predicted to have a 16-21% chance of extinction within 50 years. However, to avoid inbreeding depression in wild populations, loss in heterozygosity should be less than 5-10% over 100-200 years (Soule et al. 1986; Benson et al. 2016a), which suggests that inbreeding depression in the SAM population is

[3] Inbreeding has been documented in the SMM population in Riley et al. 2014 and in ongoing studies by the NPS. More information from the NPS is available here: https://www.nps.gov/samo/learn/nature/puma-profiles.htm

a strong possibility. In addition, evidence of potential inbreeding depression has been observed in the population (*e.g.*, kinked tails coupled with low genetic diversity, Figure 2, Ernest et al. 2014). When inbreeding depression was considered in the population viability analysis, population growth will likely decline and chances of extinction within 50 years is predicted to be 100%, with a median time to extinction of 11.7 years (Benson et al. 2019).

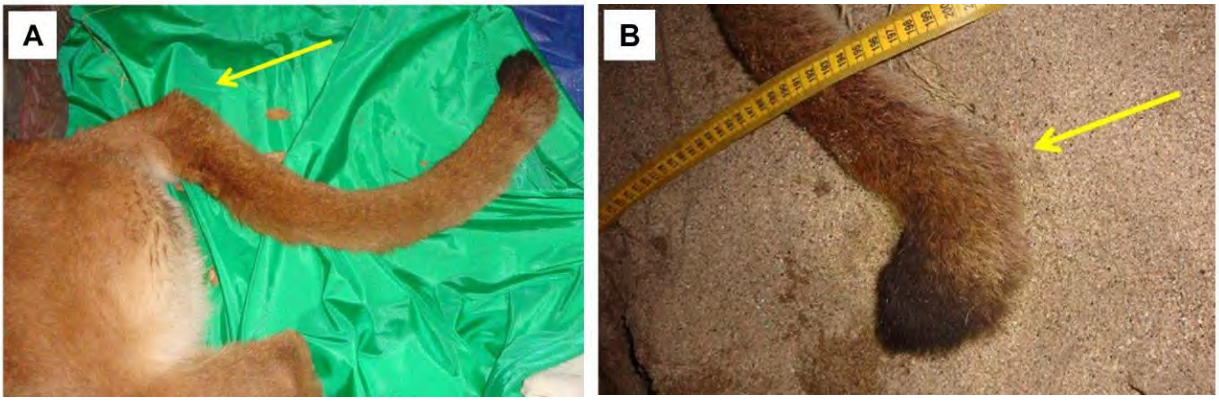


Figure 2. Two SAM mountain lions with a kink at the base of the tail (A) and near the tip of the tail (B). These individuals had among the lowest genetic diversity measured in the study. Source: Ernest et al. 2014.

2.2.6 San Gabriel/San Bernardino Mountains (SGSB) Mountain Lion Population

According to Gustafson et al. (2018), the SGSB mountain lion population exhibits extremely low genetic diversity and effective population size ($N_e = 5$), though the sample size from SGSB was low. They were also found to be a sink population, with limited gene flow with populations in the Western Sierra Nevada, CC-C, and the EPR (Gustafson et al. 2018). Although genetic studies on this population are limited, patterns of isolation, loss of genetic diversity, and low effective population size are similar to those of the SAM and CC-S populations and likely indicate a high risk of extinction. Not only is the population's long-term survival at stake, but the geographic location of the SGSB population is paramount. Despite only limited gene flow between the SGSB population and the Western Sierra Nevada, CC-C, and EPR, this population represents a critical linkage between mountain lion populations in the northern, central coast, and southern mountain ranges of California (Gustafson et al. 2018). Restoration and enhancement of connectivity is key for the continued survival of the SGSB population as well as the Central Coast and Southern California mountain lion populations.

2.2.7 Eastern Peninsular Range (EPR) Mountain Lion Population

Gustafson et al. (2018) found that the EPR population exhibits a prior genetic bottleneck. Although the population was found to have a higher effective population size than the other Southern California mountain lion populations ($N_e = 31.6$), this is still well below the older standard of 50 to prevent in-breeding depression in the short-term and is insufficient for the long-term persistence of the population. In addition, the EPR population was found to be largely disconnected from all the other California populations, with limited gene flow and low connectivity with the SAM and SGSB populations (Gustafson et al. 2018). With continued development in San Diego, Riverside, and Imperial Counties, the EPR population could have a

similar fate of isolation, genetic drift and inbreeding, and risk of extinction as the other Central Coast and Southern California populations.

As mentioned previously, there are records for mountain lions outside of the core mountain ranges in Southern California, which are likely transients or residents of smaller populations. For example, the Yuma mountain lion has been recognized by CDFW as a subspecies of special concern, and likely occurs in low density in the desert plains and low mountains of the Colorado River Valley. Genetic studies on the Yuma mountain lion are limited, and no samples were obtained from that area for the study conducted by Gustafson et al. (2018). However, the low densities of transients and smaller populations in areas where roads and development threaten connectivity make them part of the EPR and larger Southern California population, and as such, they are considered a conservation concern and are included in this petition.

2.3 Reproduction and Growth



Dens are often in rocky outcrops (left) or in dense vegetation (right). Photos: NPS.

Mountain lions are polygamous breeders, and mates likely locate each other with auditory and olfactory signals (Currier 1983). They may reproduce at any time of year, though seasonal pulses have been documented and the timing of reproduction may be affected by prey abundance or climate (Pierce and Bleich 2003). In North America, kitten births are most common between April and September (Currier 1983; Beier 1995; Pierce and Bleich 2003).

Pairs generally mate for about 2-5 days (Beier et al. 1995), though there are instances in which pairs have been recorded traveling together for up to 16 days (Seidensticker et al. 1973). During this time they vocalize frequently, travel little, will sometimes share a kill, and copulate up to 70 times per day (Seidensticker et al. 1973; Beier et al. 1995; Pierce and Bleich 2003). Female estrous cycles last an estimated 4-12 days, and it is hypothesized that numerous acts of copulation stimulate ovulation and improve chances of successful fertilization (Pierce and Bleich 2003, Kitchener 1991). If the litter is born dead or removed within 24 hours of birth, females will go into estrous within a few weeks (Currier 1983). In addition, competing males have been

known to commit infanticide[4], presumably to trigger estrous in females, though scientists are still investigating what drives this behavior.

Gestation lasts 82-96 days (Young and Goldman 1946; Currier 1983). Litter size ranges from 1-6, though 2-4 kittens per litter are typical (Pierce and Bleich 2003; Beier et al 2010; Riley et al. 2014). Females average larger litters during their first year of reproduction and tend towards smaller litters when they are older (Pierce and Bleich 2003). The sex ratio of litters has generally been found to be equal (Pierce and Bleich 2003). Females keep their kittens in dens located in rocky terrain or in dense vegetation that provide cover (Young and Goldman 1946), and they may move their young to several different dens until the young are weaned at about 2-3 months old (Pierce and Bleich 2003). Denning mountain lions have been found to avoid roads and stay at a distance from human disturbance four times greater (~600m) than non-reproductive mountain lions (~150m) (Wilmers et al. 2013).

Females care for their young for 1-2 years, at which point the mother comes into estrous and either abandons the cubs or acts aggressively towards them to prevent them from following her, as older males will kill cubs (Young and Goldman 1946; Seidensticker et al. 1973; Currier 1983; Beier 1995; Pierce and Bleich 2003). Newly independent young have been found to stay in the area where the mother leaves them for 2-3 weeks, and then disperse away from the direction their mother left (Beier 1995). Typically 50% of females stay in their natal range and 50% disperse while all males disperse, and siblings sometimes travel for a short time together (Pierce and Bleich 2003; Logan and Sweanor 2010). Subadult mountain lions may disperse up to 500km from their natal home ranges as they explore and establish their own territories (Pierce and Bleich 2003).

Mountain lions reach sexual maturity at 2-4 years of age. Although they are rarely known to mate until they have an established home range, transient males may occasionally breed with resident females (Hornocker 1970; Seidensticker et al. 1973; Currier 1983).

2.4 Diet and Foraging Ecology



Mountain lion cub feasting on a deer kill in the Santa Monica Mountains. Photo: NPS.

[4] Infanticide has been documented in the Santa Monica Mountains mountain lion population. More information from the NPS is available here: https://www.nps.gov/samo/learn/nature/puma-profiles.htm

Large ungulates, especially deer, are the preferred prey of mountain lions, making up about 70% of their diet (Currier 1983; Iriarte et al. 1990). Hornocker (1970) estimated that the average adult mountain lion consumes 860-1,300kg of large prey annually. However, mountain lions are opportunistic predators, and they have been documented eating a wide variety of other large and smaller prey, including moose, elk, wild horses, burros, pronghorn, bighorn sheep, mountain goats, wild hogs, coyotes, bobcats, porcupines, badgers, rabbits, raccoons, rodents, turkeys, and livestock (Currier 1983; Iriarte et al. 1990; Garcelon unpublished data).

Their diet can vary by prey availability, prey vulnerability, the presence of sympatric carnivores, the season, and the age and sex of the mountain lion (Currier 1983; Iriarte et al. 1990; Knopff et al. 2010; Allen et al. 2014a). For example, deer have been found to make up >90% of the diet in mountain lions in the Santa Monica Mountains and in Northern California (Allen et al. 2014a; Riley et al. 2014), while in Florida wild hogs were found to be the most common prey (Maehr et al. 1990), and in northwestern Sonora, Mexico bighorn sheep were found to be the primary prey (Rosas-Rosas et al. 2003). These observed patterns were likely due to the availability of different prey in different geographic regions. A study conducted in Alberta, Canada, Knopff et al. (2010) found that while adult females were more likely to kill small ungulates (*e.g.*, deer), adult males were more likely to kill larger ungulates (*e.g.*, elk), and subadults relied on both small ungulates and nonungulate prey (*e.g.*, beavers, snow hares). A similar pattern was found in a mountain lion population in the Greater Yellowstone Ecosystem, in which older, larger individuals hunted larger prey and younger, smaller individuals hunted smaller prey (Elbroch and Quigley 2019). In addition, mountain lions were found to prey upon female ungulates in the spring before and during the birthing period, and they would more often prey upon male ungulates in the fall during the rut, highlighting that prey vulnerability may play a role in mountain lion predation (Knopff et al. 2010).



Mountain lion preying on a coyote in Joshua Tree, California. Photo: Brendan Cummings

Mountain lions roam through expansive home ranges in search of prey, often hunting between dusk and dawn. Although they are generally most active at dusk and dawn, their peak activities have been observed to shift to more nocturnal patterns when they are closer to human

disturbance (Van Dyke et al. 1986). Mountain lions are primarily solitary animals and will repeatedly move and wait as they stalk and ambush their prey (Beier et al. 1995). Once within close proximity, mountain lions will lunge at their prey and kill the animal by crushing the trachea and suffocating it or by breaking its neck at the base of the skull with a bite (Currier 1983; Pierce and Bleich 2003). Instead of eating their kill right away, mountain lions drag their kill to a secluded spot to feed. They cover it with brush and other debris and return to feed at night for up to five days (Currier 1983; Beier et al. 1995). However, the presence or perceived presence of humans has been found to reduce overall feeding time (Smith et al. 2015; Smith et al. 2017).

Deer kill rates vary depending on the sex of the mountain lion, whether or not the female has cubs, and surrounding human land use. Male kill rates have been found to range from 35 to 47 ungulates per year, regardless of housing density (Anderson , Jr . and Lindzey 2003; Cooley et al. 2008; Knopff et al. 2010; Smith et al. 2015). However, kill rates for females differ depending on human disturbance. In lower density housing areas, kill rates of solitary females and females with kittens have been found to be 52-60 and 57-68 ungulates per year, respectively, while females in high density housing areas were found to have a kill rate of 81 ungulates per year (Anderson , Jr . and Lindzey 2003; Cooley et al. 2008; Knopff et al. 2010; Smith et al. 2015). This pattern could be driven by reduced time spent at kill sites in more developed areas, indicating that females are not consuming as much of each carcass and therefore need to kill more prey (Smith et al. 2015). This may reflect a trade-off made by females to choose feeding sites closer to human-disturbed areas and expend more energy killing prey in order to reduce potential encounters with males that pose a threat to themselves or their kittens (Benson et al. 2016b). Another factor that may be contributing to higher kill rates in developed areas is that mountain lions expend more energy traveling faster and farther in human-dominated landscapes and therefore require increased caloric intake compared to mountain lions away from developed areas (Wang et al. 2017).

2.5 Habitat Requirements

Mountain lions are primarily solitary (except in certain situations, such as when breeding, when females are rearing cubs, or when dispersing with siblings), territorial cats that occur in low density. They require large areas of relatively undisturbed habitats with adequate connectivity to allow for dispersal and gene flow. They have large home ranges that include heterogenous habitats. In the United States these often consist of pine forests, riparian and oak woodlands, streams, chaparral, and grasslands, though they are also known to occur in desert habitats (*e.g.*, Figure 3).

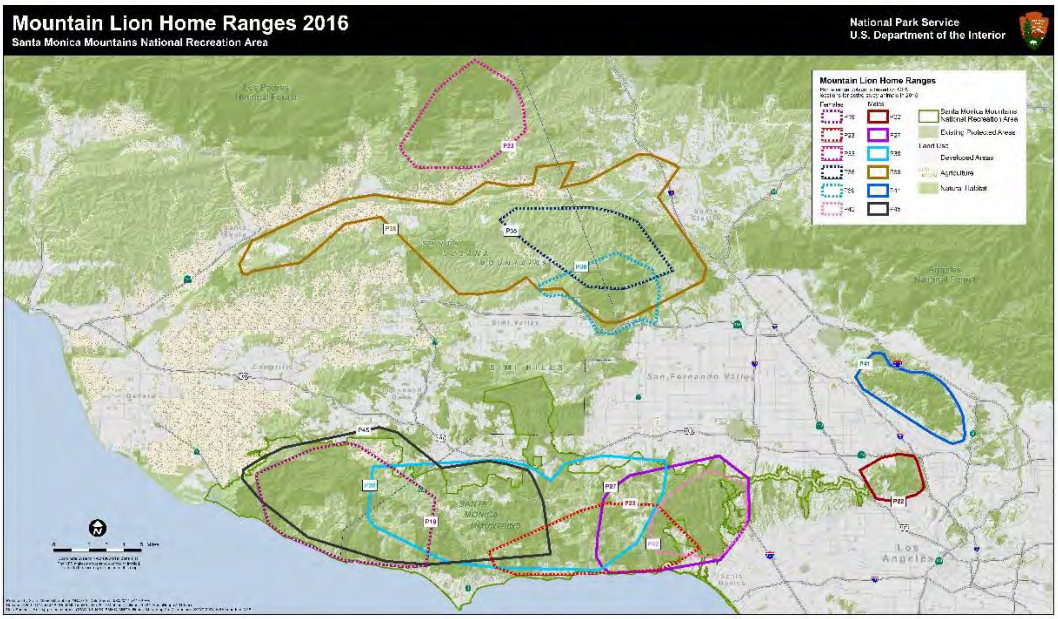


Figure 3. Home ranges of mountain lions being actively studied in 2016 by NPS in and near the Santa Monica Mountains. Source: NPS.

Mountain lions have been found to utilize different habitats within a 24-hour period (Dickson and Beier 2002; Dickson et al. 2005; Dickson and Beier 2006; Kertson et al. 2011; Zeller et al. 2017). Riparian habitats were found to be preferred over grasslands and human-disturbed areas during the day, which likely represents the animals resting in areas with understory vegetation for cover (Dickson and Beier 2002; Dickson et al. 2005). However, nocturnal movement patterns showed that mountain lions utilize a broad range of habitats as they travel through their home ranges and hunt (Dickson et al. 2005). Although riparian vegetation was the highest ranked habitat for nocturnal use, usage of riparian areas was not statistically different from the use of scrub, chaparral, grasslands, or woodlands (Dickson et al. 2005).

Nocturnal patterns of movement and stasis suggest that mountain lions generally avoid areas with human disturbance (*i.e.*, residential developments and two-lane paved roads) and use a variety of habitats to stalk and pursue their prey (Dickson and Beier 2002; Dickson et al. 2005). In addition, Dickson and Beier (2006) found that when mountain lions were traveling or hunting, they preferred canyon bottoms and gentle slopes and used steeper slopes and ridgelines to a lesser extent. And Benson et al. (2016b) found that mountain lions tend to choose feeding sites on steeper slopes in habitats with dense understory vegetation, such as chaparral, scrub, and upland forest. Although mountain lions will use moderately disturbed areas as they travel and hunt (Wilmers et al. 2013; Gray et al. 2016), occupancy is lower in developed areas and they are more likely to use developed areas if they border open spaces (Wang et al. 2015). Thus, mountain lions require a habitat mosaic that provides sufficient room to roam away from human-disturbed areas and connected to expansive, intact, heterogeneous habitats (Beier 1995; Dickson and Beier 2002; Dickson et al. 2005; Kertson et al. 2011; Zeller et al. 2017).

Home range size can vary depending on geographic area, season, sex, reproductive status, and prey density (Currier 1983; Grigione et al. 2002; Riley et al. 2014). Males generally have

much larger home ranges than females, and females with cubs tend to have even smaller home ranges (Beier et al. 1995; Grigione et al. 2002). Male home ranges tend to include partially or entirely overlapping female home ranges, and to a limited extent, they may partially overlap with other male home ranges (Figure 3) (Seidensticker et al. 1973; Currier 1983; Pierce and Bleich 2003). Mountain lions mark their home ranges with scrapings in the ground, often containing urine or feces (Seidensticker et al. 1973). Males make scrapings more often than females (Allen et al. 2014b), and females may only make scrapings when they are in estrous (Seidensticker et al. 1973; Currier 1983; Pierce and Bleich 2003).

Seasonal variation in home range size can differ depending on geographic area. Grigione et al. (2002), found strong influences of seasonality in average mountain lion home ranges in the Sierra Nevada mountains, with much larger home ranges in the summer (541km^2 for females, 723km^2 for males) compared to those in the winter (349km^2 for females, 569km^2 for males). These patterns likely reflect the abundance and distribution of deer – during the winter deer would be concentrated at lower elevations, which allowed mountain lions to reduce their home ranges, while in the summer deer could disperse to higher elevations and the mountain lions would expand their ranges accordingly (Grigione et al. 2002). However, seasonal variation was not as pronounced and had the reverse trend in Coastal California mountain ranges, including in the SAM, where the average area of winter home ranges was slightly larger (100km^2 for females, 350km^2 for males) than summer home ranges (90km^2 for females, 300km^2 for males) (Grigione et al. 2002). These differences were not statistically significant, and this pattern is likely due to the moderate year-round climate in the coastal ranges, where prey abundance and distribution does not exhibit as extreme shifts as those in the Sierra Nevada (Grigione et al. 2002). This generally aligns with Zeller et al. (2017), who found that mountain lion home ranges in the SAM and EPR ranged from 41-497 km^2, with mean home range sizes of 188km^2 for females and 316 km^2 for males. And Riley et al. (2014) found that CC-S mountain lions had home ranges similar in size to the SAM and EPR mountain lions, with female home ranges being 100-200km^2 and male home ranges being 300-500 km^2. According to the Santa Cruz Puma Project, in the Santa Cruz Mountains female home ranges are on average about 100 km^2 and male home ranges are about 230 km^2 (Santa Cruz Puma Project 2015). Although studies are limited regarding the home range size of the CC-C and SGSB mountain lions, given their close proximity and similar seasonality to other Central Coast and Southern California populations, they are likely similar.

2.6 Survivorship and Mortality

According to the National Park Service (NPS), mountain lions can live up to 13 years in the wild. As a top carnivore with no natural predators, conspecifics and humans are the main drivers of mountain lion survivorship and mortality. Although studies regarding kitten (<18 months), subadult (18-30 months), and adult (>30 months) survivorship are limited, some long-term studies of radio-collared mountain lions on the CC-S, SAM, and EPR provide valuable insights for these Central Coast and Southern California populations (Beier and Barrett 1993; Riley et al. 2014; Vickers et al. 2015).

In a study conducted in the CC-S area (which encompasses the Santa Monica Mountains, Simi Hills, and Santa Susana Mountains) that included 42 mountain lions from 2002 to 2012, Riley et al. (2014) found an annual adult survival of ≥ 75%, though Benson et al. (2016a) found

lower subadult survival rates. Although adult survival in the CC-S is similar to previous studies conducted in California and the southwestern US (Beier 1993; Logan and Sweanor 2001), it is higher than what was found in the SAM and EPR populations during the same time period. From following 74 radio-collared mountain lions from 2001 to 2013, Vickers et al. (2015) found an annual survival rate across all age groups of 56.5% and 55.4% in the SAM and EPR, respectively.



In the Santa Monica Mountains: Female mountain lion P-23 hunted down a deer on Mulholland Drive (left). In 2018 she was killed by a vehicle strike on Malibu Canyon Road. An uncollared mountain lion killed by a vehicle strike on Malibu Canyon Road in 2004 (right). Photos: NPS

Vehicle strikes, depredation kills, and intraspecific strife (including male aggression towards conspecifics and infanticide) are the primary causes of mortality in the Central Coast and Southern California populations (Beier 1993; Riley et al. 2014; Vickers et al. 2015). Other known causes of death in California mountain lion populations include rodenticide poisoning, disease, poaching/illegally killing, starvation/abandonment, public safety removal, and human-caused wildfires (Beier 1993; Riley et al. 2014; Vickers et al. 2015). Causes of mortality will be discussed more in depth in *Section 5.0 Abundance and Population Trends* and *Section 6.0 Factors Affecting Ability to Survive and Reproduce*.

3 Southern California and Central Coast Mountain Lions Comprise an Evolutionarily Significant Unit

3.1 CESA Provides for Listing of ESUs

CESA defines an "endangered species" as a species or subspecies of animal or plant that is in serious danger of becoming extinct through either all or "a significant portion" of its range. (Cal. Fish & Game Code § 2062.) A "threatened species" is likely to become an endangered species in the foreseeable future in the absence of special protection and management efforts. (Cal. Fish & Game Code § 2067.) CDFW has concluded—and appellate courts have upheld—that the term "range" is construed to refer to the range of a species or subspecies *within* California, not the worldwide range of the species or subspecies. (*California Forestry Assn. v. California Fish & Game Com.* (2007) 156 Cal.App.4th 1535, 1550-551.) This means that a species or subspecies which may not be endangered in other states or countries may still be endangered within California. Courts also have confirmed that the phrase "significant portion" of

a range authorizes CDFW to designate certain populations of a species or subspecies as "evolutionarily significant units" or "ESUs" and list such populations as endangered under CESA. (*Id.* at 1549; *Central Coast Forest Assn. v. Fish & Game Com.* (2018) 18 Cal.App.5th 1191, 1236-37 [*"CCFA II*"].) In other words, ESUs are a population of a species or subspecies "that is considered distinct for purposes of conservation." (*Central Coast Forest Assn. v. Fish & Game Com*. (2012) 211 Cal.App.4th 1433, 1439 fn 5 [depublished] ["*CCFA I*"].)

CDFW has confirmed that the use of ESUs to evaluate the status of species pursuant to CESA is appropriate.[5] In the *Status Review of Fisher*, CDFW designated fishers in northern California and the southern Sierra Nevada as two separate ESUs based upon the reproductive isolation of these fisher populations and the degree of genetic differentiation between them. In designating these ESUs, CDFW highlighted the need to maintain "geographically widespread and genetically diverse" populations of the species.

3.2 Southern California and Central Coast Mountain Lions are Significantly Reproductively Isolated from Other Populations and Form an ESU

Southern California and Central Coast mountain lion populations could be grouped into one or several potential ESUs. However, petitioners believe that for purposes of listing under CESA, treating the CC-N, CC-C, CC-S, SAM, SGSB, and EPR populations as a single Southern California/Central Coast ESU is both supported by the best available science and makes sense from a management perspective. Gustafson et al. (2018) suggest that the North Coast and inland populations (Nevada, Eastern Sierra Nevada, and Western Sierra Nevada) may form an ESU (hereinafter "North Coast/Inland ESU") given that they were found to be genetically diverse and well-connected. Due to extreme isolation and high levels of human-caused mortalities, functional connectivity between Southern California and Central Coast mountain lion populations and the healthier North Coast/Inland ESU has become severely impaired (Gustafson et al. 2018, see further discussion in *Section 2.2 Taxonomy and Population Genetics* and *Section 6.0 Factors Affecting Ability to Survive and Reproduce*). There is a tenuous link made up of small mountain ranges (*i.e*., Tehachapi and Sierra Pelona Mountains) that connect the North Coast/Inland ESU with the proposed Southern California/Central Coast ESU. Thus, although there is some (limited) connectivity between the North Coast/Inland ESU and the proposed ESU, as a practical matter under current management the two ESUs are functionally isolated.

Southern California and Central Coast populations have lower levels of genetic diversity and are relatively disconnected from each other compared to North Coast and inland populations. The Central Coast populations form a genetic cluster while the SAM and EPR populations form a second, less connected genetic cluster (Figure 4) (Gustafson et al. 2018). The SGSB population, though isolated, is most genetically similar to the Western Sierra Nevada, CC-C, and EPR populations, which indicates that it is an important intersection for statewide genetic connectivity (Figure 4) (Gustafson et al. 2018).

Genetic source-sink dynamics are informative in determining gene flow among the populations and how they are connected. Five genetic source populations were identified: the

[5] California Department of Fish and Wildlife, *Status Review of Fisher* (June 10, 2015), available at https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=101470.

Eastern and Western Sierra Nevada populations, CC-N, CC-C, and EPR (Gustafson et al. 2018). The Sierra Nevada populations were the greatest genetic source populations and the CC-N population had only weak evidence of being a source population (Gustafson et al. 2018). The CC-S, SGSB, and SAM were identified as genetic sink populations with limited connectivity to source populations (Figure 4) (Gustafson et al. 2018). Maintaining and reestablishing genetic connectivity with source populations like the CC-C, EPR, and Western Sierra Nevada populations are important for the long-term viability of Southern California and Central Coast populations (Ernest et al. 2014; Riley et al. 2014; Vickers et al. 2015; Benson et al. 2016a; Gray et al. 2016; Gustafson et al. 2017). This underscores the importance of the Tehachapi and Sierra Pelona Mountains as the key remaining linkage, though tenuous, for statewide genetic connectivity.

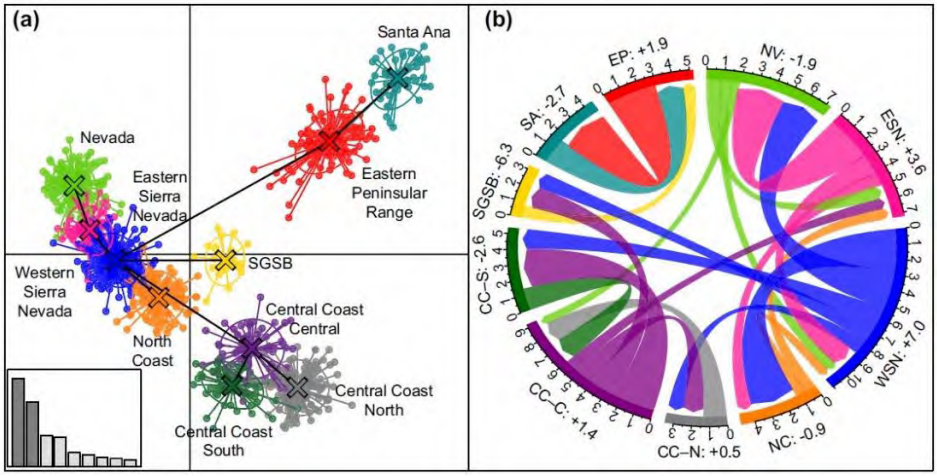


Figure 4. Functional connectedness of California mountain lion populations. Each color represents a genetically distinct population. In (a), the results of the discriminant analysis of principal components shows connectivity among California mountain lions. The x-axis represents latitude with north to the left and south to the right. The y-axis represents longitude, separating the Central Coast populations from Southern California populations. In (b), estimated migration rates between populations are shown. Source-sink dynamics are indicated by positive (source) or negative (sink) net migration rates. Source: Gustafson et al. (2018).

While genetics as currently understood could support several different ESU formulations, petitioners believe a single Southern California/Central Coast ESU is the most pragmatic from a management perspective, as recovery of the individual subpopulations ultimately depends upon maintaining and/or reestablishing connectivity between them. *See CCFA II,* 18 Cal.App.5th 1191, 1237 ("[T]he nature of the ESU designation is such that genetics alone are not determinative: One must look beyond genetics to questions of policy to determine which populations to include in an ESU.") (quotations omitted). Designating Southern California and Central Coast mountain lions as an ESU would help ensure "geographically widespread and genetically diverse" populations of mountain lions in California.

While petitioners believe that listing of a single Southern California/Central Coast ESU as threatened is both a permissible and prudent course of action for the Commission, petitioners also request that as additional data become available over the course of CDFW conducting its status review that the agency also assess other possible ESU formulations for Southern California and Central Coast mountain lions. One such formulation would be to group all three Central Coast populations (CC-N, CC-C and CC-S) into one ESU, with the remaining three

populations placed into a second ESU (SAM, EPR and SGSB). Alternatively, the Central Coast populations could be treated as one ESU, SAM and EPR as a second ESU, and SGSB separately listed as a third ESU. Petitioners believe the genetic data in Gustafson et al. (2018) could support each of these alternative formulations. Lastly, given each of the six populations at issue are themselves already genetically distinguishable and occupy significant portions of the range of mountain lions in California, each could be separately treated as an ESU. Under this formulation, the SAM and CC-S populations would clearly warrant endangered listing, the CC-C and EPR populations would warrant threatened listing, and the CC-N and SGSB populations would warrant at least threatened and likely endangered listing.

3.3 Proposed Boundary of the Southern California/Central Coast ESU

We propose the Southern California/Central Coast ESU to include mountain lions that occur in areas east of the Pacific Ocean, south of the San Francisco Bay Area waters and I-80, west of I-5 to the intersection of I-5 and SR-58 at Bowerbank/Buttonwillow, south of SR-58 to I-15, south of the I-15 from the SR-58 intersection to the California-Nevada border, and, for the purposes of CESA, north of the California-Mexico border (Figure 5). These boundaries are recommended as they include virtually all mountain lions associated with the six populations comprising the ESU and are also unambiguous and readily discernable for purposes of management.[6]

[6] In the event the Commission determines that the proposed ESU should instead be treated as separate Southern California (SAM, EPR, SGSB) and Central Coast (CS-N, CS-C, CS-S) ESUs, we propose the boundary between them to be delimited by I-5 and I-710.

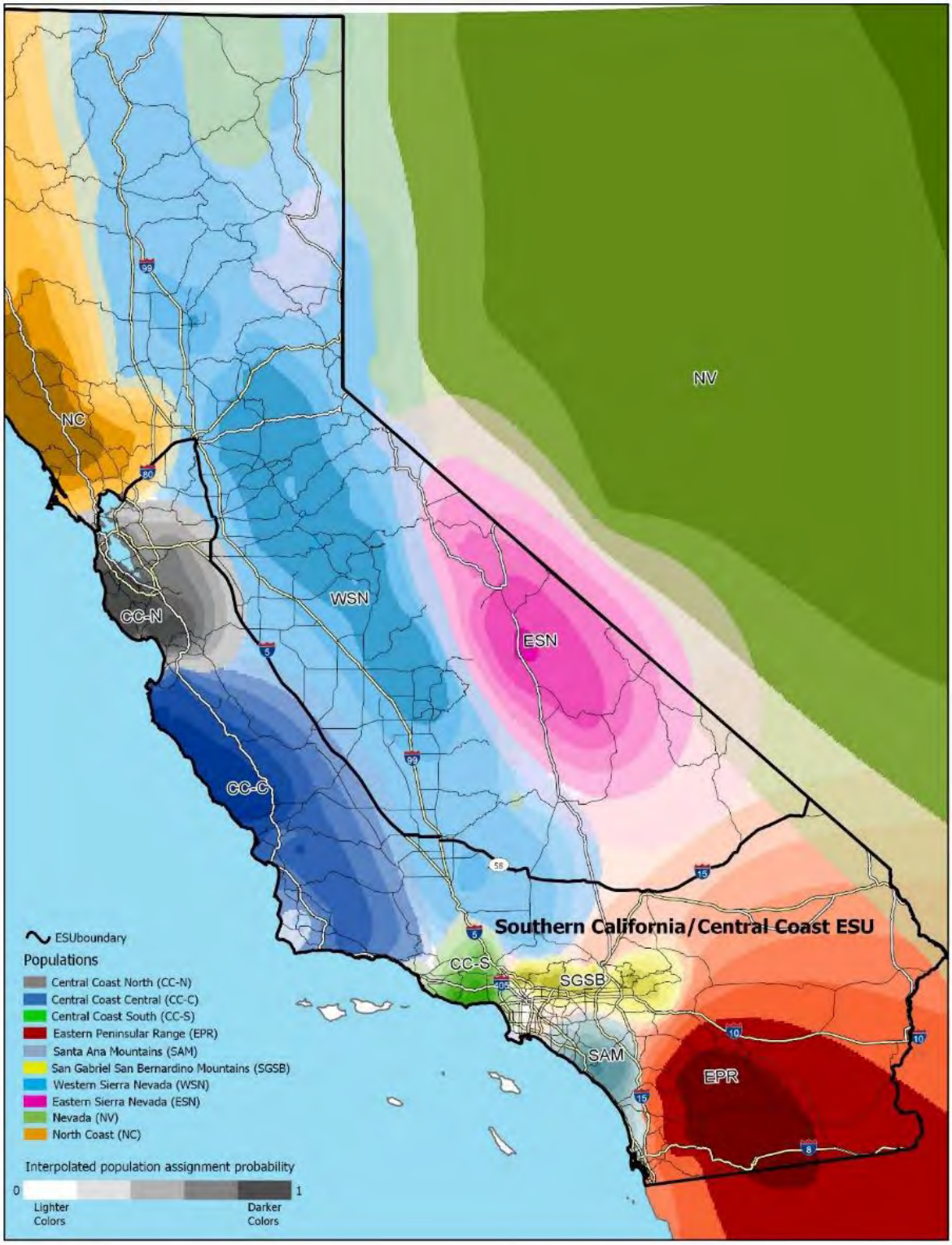


Figure 5. Map of the Southern California/Central Coast ESU boundary. Derived from Gustafson et al. (2018). Genetics data source: Kyle Gustafson, PhD, Department of Biology and Environmental Health, Missouri Southern State University, and Holly Ernest, DVM, PhD, Department of Veterinary Sciences, Program in Ecology, University of Wyoming, Laramie. Roads data source: ESRI.

We recommend including mountain lions in the Tehachapi and Sierra Pelona Mountains south of SR-58 in the Southern California/Central Coast ESU. While most mountain lions sampled from this region share some genetic affinities with Western Sierra Nevada (WSN) animals, individuals sampled in the Tehachapi Mountains and surrounding areas, including the Sierra Pelona Mountains in the Angeles National Forest and the Los Padres National Forest, had genetic structures made up of multiple genetic populations from the northern, central coastal, and southern populations (Figure 6). This area serves not just as a connecting link between mountain lion populations comprising the Southern California/Central Coast ESU, but also between this ESU and all other California mountain lions. The Tehachapi and Sierra Pelona Mountains are the last remaining linkages for statewide genetic connectivity and are critical for the overall genetic health of Southern California and Central Coast mountain lions. Consequently, mountain lions in these areas should be considered part of the listed entity.

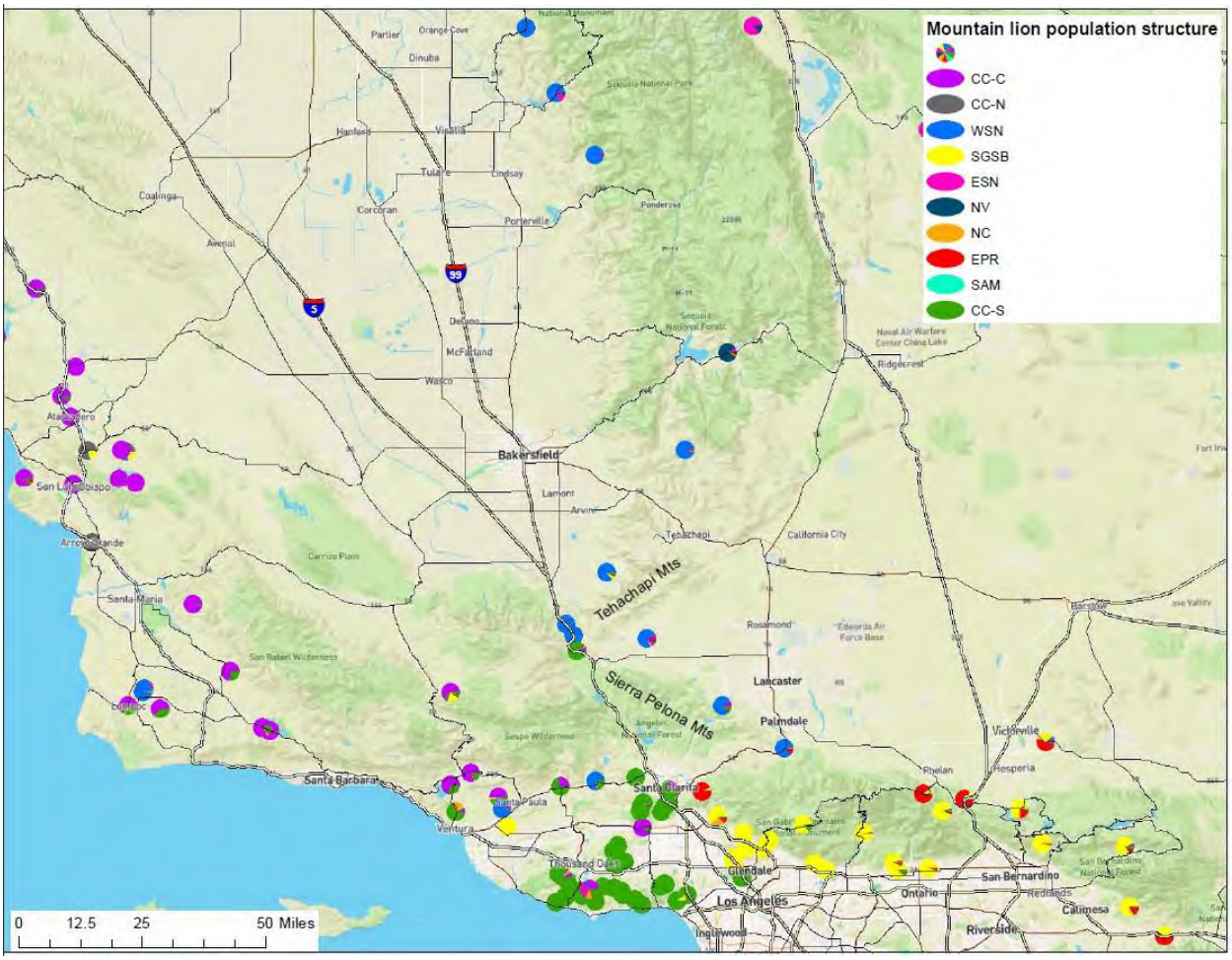


Figure 6. Map of mountain lion genetic structure in and surrounding the Tehachapi and Sierra Pelona Mountains, the last remaining linkage between the coastal, southern, and northern populations. Data source: Kyle Gustafson, PhD, Department of Biology and Environmental Health, Missouri Southern State University, and Holly Ernest, DVM, PhD, Department of Veterinary Sciences, Program in Ecology, University of Wyoming, Laramie.

3.4 Southern California and Central Coast Mountains Lions are Essential to the Region's Biodiversity

Additional support for designation of a Southern California/Central Coast ESU is provided by the fact that mountain lions are a keystone species critical to maintaining biodiversity in coastal California's ecosystems. The loss of these mountain lions—which are the only remaining large predator in the region—would lead to a trophic cascade wherein deer populations would increase and overgraze vegetation due to the lack of predation and lack of risk of predation, causing other repercussions to other species and habitats (Ripple and Beschta 2006; Ripple and Beschta 2008; Ripple et al. 2014). In addition, their kills are an important source of food for multiple terrestrial and avian scavengers (Ruth and Elbroch 2014; Elbroch et al. 2017; Barry et al. 2019).

Ripple and Beschta (2006) highlighted the critical role of mountain lions in western ecosystems by comparing habitat quality and the levels of biodiversity in two separate areas of Zion National Park – Zion Canyon, which mountain lions generally avoid due to high human presence, and North Creek, which mountain lions inhabit due to less human presence. The sustained lack of mountain lions in Zion Canyon has led to an unnaturally high density of deer, which has had profound impacts on Zion Canyon ecosystems. Ripple and Beschta (2006) observed Zion Canyon had low numbers of hydrophytic plants, wildflowers, amphibians, lizards, and butterflies while North Creek had significantly higher numbers in each of these categories.

North Creek riparian areas had well vegetated and stable banks while Zion Canyon lacked bank vegetation and its banks were continuing to erode (Ripple and Beschta 2006). The study noted that such geomorphic transformation of stream channels where mountain lions were absent were caused by plant loss on stream banks, which led to high levels of erosion and sedimentation, less shading and higher water temperatures, a larger width:depth ratio in streams, loss of hydrologic connectivity with historical floodplains, and loss of a wide variety of species, including native plants, benthic invertebrates, butterflies, fish, amphibians, and reptiles (Ripple and Beschta 2006).

The study concluded that removing a large carnivore from an ecosystem "appears to have [] profound effects on lower trophic levels, as well as multiple indicators of ecosystem status and native species abundance." (Ripple and Beschta 2006.) A similar study found that in Yosemite Valley—where mountain lions are largely absent due to high human presence—deer populations have expanded leading to a lack of oak recruitment and a decrease in biodiversity (Ripple and Beschta 2008). And their kills support disproportionately high levels of mammal, bird, and invertebrate diversity (Ruth and Elbroch 2014; Elbroch et al. 2017; Barry et al. 2019) and may even play a role in tree and other vegetation growth (Ruth and Elbroch 2014). In sum, extinction of Southern California and Central Coast mountain lions would result in degraded habitats and reduced abundance and diversity of other species, likely undermining the biological diversity, ecosystem function, and resilience of California's coastal regions.

3.5 Californians Derive Aesthetic, Recreational, and Economic Value from Southern California and Central Coast Mountain Lions

The people of California derive aesthetic, recreational, economic, spiritual, scientific, educational, and emotional value from Southern California and Central Coast mountain lions. For instance, the City of Los Angeles has designated October 22 as "P-22 day" to honor a young (and mate-less) male mountain lion that lives in Griffith Park and to acknowledge the importance of Southern California mountain lions to the region. Many people view mountain lions as a symbol of wildness and cherish landscapes that still are home to these predators. People from within and beyond the region choose to recreate, hike, bike, camp, fish, and hunt in California's wildlands in part because they enjoy exploring and sharing landscapes with mountain lions. And these activities are a significant economic driver for the state: A report commissioned for California State Parks found that direct outdoor recreation expenditures for Los Angeles, Southern California, the Central Coast and the San Francisco Bay Area totaled nearly $15 billion per year.[7] The Outdoor Industry Association concluded that outdoor recreation in California generates $92 billion of consumer spending annually and directly employs 691,000 Californians—more jobs than the wine and television industry combined.[8]

Mountain lions also provide an economic and social benefit because, by controlling deer populations, they reduce collisions between deer and automobiles. There are 1.2 million deer-vehicle collisions in the United States per year, incurring an estimated $1.66 billion in damages, 29,000 injuries, and 200 deaths (Gilbert et al. 2016). Impacts of deer-vehicle collisions are particularly severe in the eastern United States where white-tailed deer are overabundant. Gilbert et al. (2016) determined that if mountain lions recolonized the eastern United States, their presence would result in a 22 percent decline in deer-vehicle collisions over thirty years.

It is estimated that 7,000 to 23,000 wildlife vehicle collisions have occurred annually on California roads (Shilling et al. 2017; Shilling et al. 2018; State Farm Insurance Company 2016, 2018). These crashes result in human loss of life, injuries, emotional trauma, and property damages that can add up to $300-600 million per year (Shilling et al. 2018). If Southern California and Central Coast mountain lions became extinct, there would likely be a significant increase in deer-vehicle collisions in the region, along with associated human fatalities, injuries, and property damage.

An overabundance of deer in the eastern United States is also linked to an increase in ticks, which has led to increased incidences of Lyme disease among humans (Telford 2017; Côté et al. 2004). Lyme disease is now the most common vector-borne illness in the United States, with over 30,000 cases per year, primarily in the eastern United States.[9] Increases in deer abundance and attendant increases in ticks and tick-borne disease among humans would be

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[7] BBC Research & Consulting, *California Outdoor Recreation Economic Study: Statewide Contribution and Benefits* (2010), available at https://www.parks.ca.gov/pages/795/files/ca%20outdoor%20rec%20econ%20study-statewide%2011-10-11%20for%20posting.pdf.

[8] Outdoor Industry Association, *California Recreation Report*, available at https://outdoorindustry.org/wp-content/uploads/2017/07/OIA_RecEcoState_CA.pdf.

[9] Centers for Disease Control and Prevention, *Lyme Disease Data and Surveillance*, available at https://www.cdc.gov/lyme/datasurveillance/index.html?CDC_AA_refVal=https%3A%2F%2Fwww.cdc.gov%2Flyme%2Fstats%2Findex.html.

expected if Southern California and Central Coast mountain lions became extinct. Loss of Southern California and Central Coast mountain lions would have far-reaching effects not only on California's ecology, but also on public health and the region's economy.

Protection of Southern California and Central Coast mountain lions under CESA would confirm that this species is a vital member of our ecosystems which is worthy of protection. Conservation of these mountain lions would provide compelling evidence that large carnivores and abundant human populations can co-exist, even in densely populated landscapes (Benson et al. 2019).

4 Historical and Current Distribution

Mountain lions once had the most expansive range of any New World terrestrial mammal (Seidensticker 1991). They roamed most of the Americas (excluding most of Alaska and the northern areas of Canada) from approximately 50º N to 50ºS latitude and could be found from sea level to about 4,000m elevation (Young and Goldman 1946, Pierce and Bleich 2003) in habitats varying from dense forests, to dry deserts, savannahs, and swamp lands.

Due to habitat loss and hunting after the arrival of European colonists, the mountain lion's current range has been reduced to one third of its historical range in North America (Figure 7) (Culver et al. 2000; Pierce and Bleich 2003). In the United States, the species' range has been reduced to 15 western states and a small remnant population in Florida (endangered Florida panthers [*Puma concolor coryi*]), with isolated animals occasionally appearing in additional states. Continued hunting pressure and changes in land management practices have pushed most populations into mountainous, relatively unpopulated areas, though isolated populations are known to occur in more urban areas (Currier 1983; Gustafson et al. 2018).

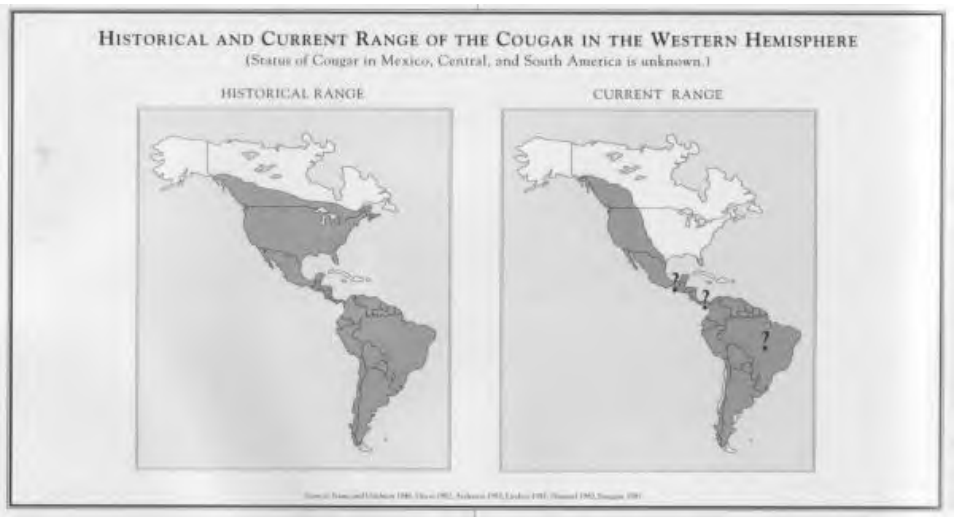


Figure 7. Historical and current range of mountain lions. Source: Hansen 1992.

In California, habitat fragmentation from roads and development has led to highly fragmented, divergent populations (Ernest et al. 2003; Ernest et al. 2014; Riley et al. 2014; Vickers et al. 2015; Gustafson et al. 2018). As mentioned in *Section 2.2 Taxonomy and Population Genetics*, nine genetically distinct populations have been identified within California

(Gustafson et al. 2018), with Southern California and Central Coast populations being the most constrained populations (and a tenth population centered in Nevada but extending slightly into California). Those located in highly urbanized areas of Southern California coastal mountain ranges, including the CC-S, SAM, and SGSB populations are especially restricted (Figure 8) (Vickers et al. 2015; Benson et al. 2016a; Gustafson et al. 2018; Benson et al. 2019).

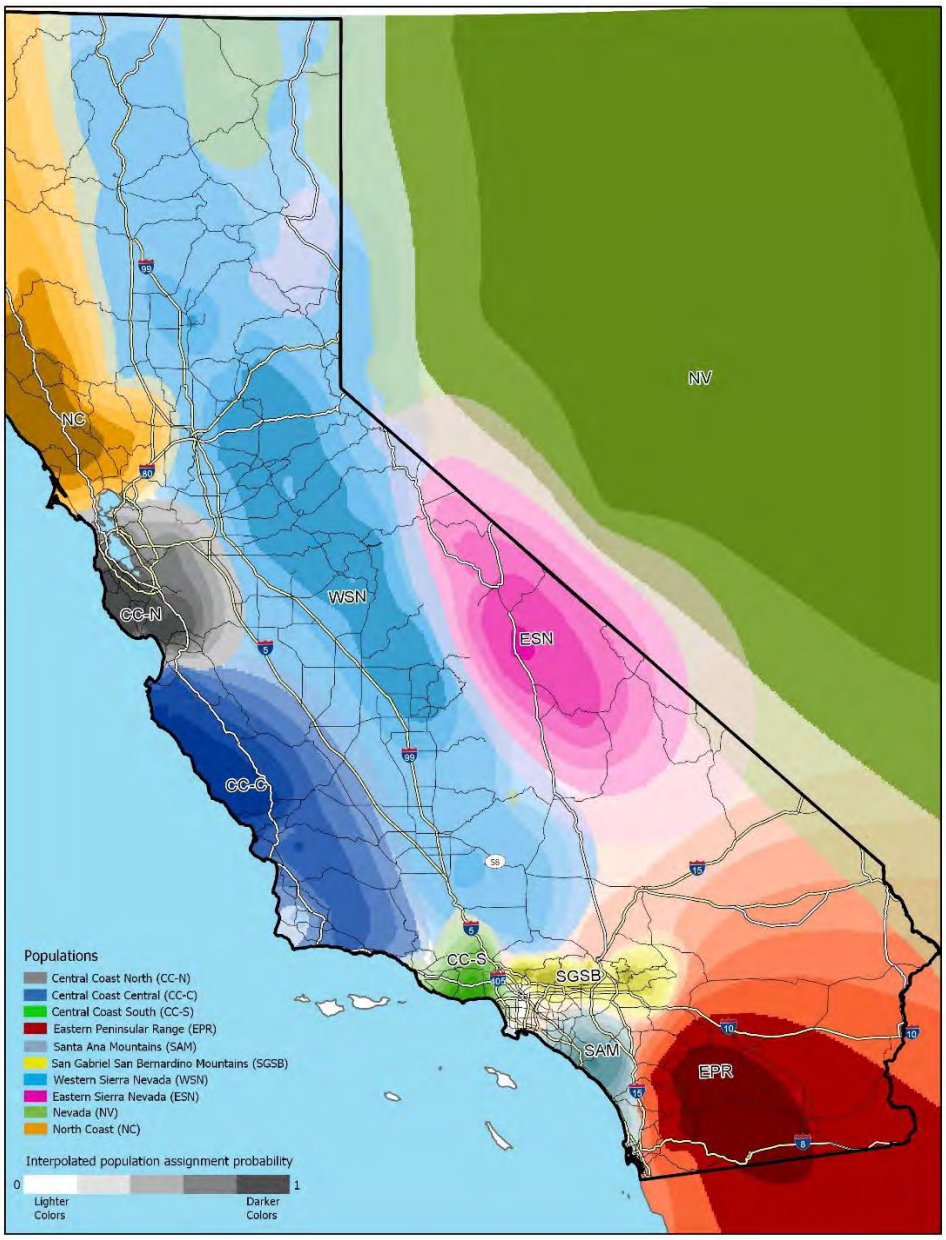


Figure 8. Map of genetically distinct mountain lion populations and major roads in California. The CC-S (which includes the Santa Monica Mountains), SGSB, and SAM populations are exceptionally constrained. The map is based on data collected from 1992-2016 (the division and status of these populations could change over time and with further research. Derived from Gustafson et al. (2018). Genetics data source: Kyle Gustafson, PhD, Department of Biology and Environmental Health, Missouri Southern State University, and Holly Ernest, DVM, PhD, Department of Veterinary Sciences, Program in Ecology, University of Wyoming, Laramie. Roads data source: ESRI.

4.1 Central Coast North (CC-N) Mountain Lion Population

The CC-N mountain lion population occurs mostly within the counties of Alameda, Contra Costa, San Mateo, Santa Clara, and Santa Cruz (Figure 8). The area is almost divided into two portions: an eastern half and a western half. The Santa Cruz Mountains make up the core area of the CC-N, bound by the Pacific Coast to the west, development lining the San Francisco Bay to the north and north west, and Highway 101 to the south. The eastern portion of the CC-N consists of various open space and nature preserves in the Berkeley Hills and Diablo Range bound by development lining the San Francisco Bay and Highway 101 and associated developments to the west, San Pablo Bay and Suisun Bay and associated developments to the north, I-5 to the east, and State Route 130 (SR-130) to the south. Interestingly, the CC-N seems almost bisected by the San Francisco Bay and Highway 101 and associated developments.

4.2 Central Coast Central (CC-C) Mountain Lion Population

The CC-C mountain lion population occurs mostly within the counties of Monterey, San Benito, San Luis Obispo, and Santa Barbara. The area encompasses the central and southern portions of the Southern Coast Ranges, including the Santa Lucia Range, Sierra de Salinas, the Temblor Range, and the Sierra Madre Mountains. It is bound by the Pacific Ocean to the west, Highway 101 and SR-156 and associated development to the north, the I-5 and San Joaquin Valley to the east, and SR-126 and associated developments to the south (Figure 8).

4.3 Central Coast South (CC-S) Mountain Lion Population

The CC-S mountain lion population is limited to the Santa Monica Mountains, Simi Hills, and the Santa Susana Mountains in Ventura and Los Angeles Counties (Figure 8). The Santa Monica Mountains population has the isolated area with about 660 km^2 within the Santa Monica Mountains National Recreation Area (Riley et al. 2014). The Pacific Ocean lies to the south while the cities of Oxnard, Thousand Oaks, San Fernando Valley, Los Angeles, and Santa Monica and major freeways including Highway 101, Interstate 5 (I-5) and Interstate 405 surround the area and create major movement barriers.

The Simi Hills is a smaller area of open space located north of the Santa Monica Mountains; the areas are bisected by Highway 101. This open space is mostly surrounded by development, including Simi Valley to the northwest, Thousand Oaks to the west, Agoura Hills to the southwest, Calabasas to the southeast, and Woodland Hills, Canoga Park, and Chatsworth to the east.

The Santa Susana Mountains are located north of the Santa Monica Mountains and Simi Hills. The area is generally bordered by freeways and the edges of development and agriculture. SR-118 borders the south and southwest, SR-126 borders the north and northwest, and I-5 borders the east.

4.4 San Gabriel/San Bernardino Mountains (SGSB) Mountain Lion Population

The SGSB mountain lion population occurs within the Transverse Ranges located northwest of the City of Los Angeles within Los Angeles, Kern, and San Bernardino Counties (Figure 8). The western and southern boundaries of the San Gabriel and San Bernardino Mountains are lined with urban developments and major freeways, including the San Fernando Valley, cities of San Bernardino, Rancho Cucamonga, and West Covina, and the I-5, I-210, and I-10 freeways. The northern and eastern boundaries of the area are abutted by agriculture, suburban development, high desert, and roads.

4.5 Santa Ana Mountains (SAM) Mountain Lion Population

The SAM mountain lion population inhabits about 1,533km^2 of undeveloped areas of the SAM within Orange, Riverside, and San Diego Counties (Beier and Barrett 1993; Benson et al. 2019). The area is mostly bound by major freeways and development (Figure 8). SR-241 creates the western boundary, SR-91 borders the northwest boundary, I-5 creates the eastern boundary, and agriculture and development border the southern extent. The closest intact habitat known to be used by other mountain lions is to the east/southeast, in the Peninsular Ranges.

4.6 Eastern Peninsular Range (EPR) Mountain Lion Population

The EPR mountain lion population occurs in mountain ranges east of the SAM and south of the San Bernardino Mountains. The EPR is a predominantly north to south range that runs through San Diego, Riverside, and Imperial Counties and the California-Mexico border. They include the San Jacinto, Laguna, and San Ysidro Mountains in California and continue south into the mountain ranges of Baja California, Mexico. The western boundary of the EPR population is lined with roads and urban development, including areas around the cities of Escondido, San Diego, and Chula Vista. Studies regarding the northern, southern, and eastern extent of the population are limited; however, movement patterns documented by Vickers et al. (2015) and Vickers et al. (2017) between 2001 and 2016 suggest that EPR mountain lions generally stay north of the U.S. – Mexico border, along the edges of the desert that borders the east side of the EPR, and south of I-10. Although the EPR population has been found to be largely disconnected from all other California populations, some mountain lion movement was documented traversing between the EPR and SGSB (Vickers et al. 2015), which would have occurred at the northern boundary of the EPR, and there is evidence of limited genetic exchange between the two populations (Gustafson et al. 2018). In addition, one young male mountain lion was documented to the south using the Parque-to-Park Linkage to cross the US-Mexico border several times (where the terrain is too rugged to install a border wall), but he was eventually killed in Mexico in a collision with a vehicle (Vickers et al. 2015; W. Vickers *unpublished data*). Little is known about the mountain lions south of the border, but the movement patterns of EPR mountain lions suggest that they may form a discrete population within the EPR north of the US-Mexico border (Vickers et al. 2015; Vickers et al. 2017).

5 Abundance and Population Trends

According to the International Union for Conservation of Nature (IUCN), mountain lion populations are decreasing throughout their remaining range (Nielsen et al. 2015). Mountain lion population densities are generally low, which may be driven by prey density, competition between males for access to females, and mutual avoidance (Pierce and Bleich 2003). In the United States, population densities for mountain lions have been found to range from 0.4 to 4.3 resident adults per 100km^2 and 0.4 to 7.1 total mountain lions per 100km^2, though it varies by population and the presence of human-induced pressures (*e.g.*, hunting) (Pierce and Bleich 2003). In California, where hunting has been outlawed but other anthropogenic pressures such as roads and development are present, resident adult and total population densities have been found to be 1.1 and 3.6 per 100 km^2, respectively (Pierce and Bleich 2003). Adult sex ratio has been reported to be about 2-3:1 in favor of females (Hornocker 1970; Seidensticker et al. 1973; Beier 1993; Santa Cruz Puma Project 2015). These low population densities and female-biased sex ratios further highlight the species' need for expansive, connected, heterogeneous habitats to support viable populations.

It has been estimated that 4,000 to 6,000 adult mountain lions roam California (Mansfield and Weaver 1989). However, CDFW acknowledges that this estimate from 1984 is outdated and relied on density estimates from regional studies to derive a statewide abundance. The agency has since declared that the number of mountain lions throughout the state is unknown, and they have embarked on an intensive statewide research project to better understand mountain lion numbers regionally and throughout the state.[10] Working with other agencies, academic institutions, and non-profits, CDFW plans to have statewide and region-specific mountain lion population estimates by 2022 (Vaughan 2018).

As mentioned in *Section 2.2 Taxonomy and Population Genetics*, one way in which the abundance of mountain lions can be estimated is with the ratio of effective to total adult population size (N_e/N) of 0.25 to 0.5, as was used by USFWS to generate an abundance estimate for the endangered Florida panther (Ballou et al. 1989; USFWS 2008). Using this method with the estimated effective population sizes of the nine genetically distinct mountain lion populations centered in California from Gustafson et al. (2018) and Benson et al. (2019), the statewide total population would be 818 to 1,634 individuals (255 to 510 in the Central Coast and Southern California populations [Table 1], and 563 to 1,124 in the remaining Eastern Sierra Nevada, Western Sierra Nevada, and North Coast populations), which is much lower than the 4,000 to 6,000 estimate. This is also well below the recommended minimum viable population size of at least 5,000 adult individuals for the long-term persistence of a population (Frankham 1995; Reed et al. 2003; Traill et al. 2010). Petitioners recognize that the N_e/N methodology has limitations and is but one method of generating an overall abundance estimate. More studies are needed to determine regional and statewide mountain lion abundance, including CDFW's ongoing efforts which should produce a more scientifically robust statewide abundance estimate.

[10] CDFW 2018 - Commonly Asked Questions About Mountain Lions. Accessed on 11 April 2019 at: https://www.wildlife.ca.gov/Conservation/Mammals/Mountain-Lion/FAQ#359951241-how-many-mountain-lions-are-in-california

Despite unknown statewide population estimates, researchers have been closely tracking several of the Central Coast and Southern California populations. Through their published studies and reports they provide some insights regarding abundance and population trends for these populations.

5.1 Central Coast North (CC-N) Mountain Lion Population

Studies on the CC-N mountain lion population are limited, and abundance and population trends are unknown. However, with an effective population size of 16.6 (Gustafson et al. 2018), and an N_e/N of 0.25 to 0.5 (Ballou et al. 1989; USFWS 2008), the estimated total adult population would be 33 to 66 individuals (see Table 1). As mentioned previously in *Section 2.2 Taxonomy and Population Genetics*, these numbers are grossly insufficient to prevent inbreeding depression in the short term or maintain evolutionary potential in the long term (Jamieson and Allendorf 2012; Frankham et al. 2014).

Gustafson et al. (2018) found that this population has low genetic diversity and a low effective population size, which suggests that it is at increased risk of inbreeding depression within five generations and eventual extinction. Ongoing studies in the Santa Cruz Mountains highlight high levels of human-caused mortalities. Depredation kills are the leading cause of death in collared mountain lions in the Santa Cruz Mountains (Wang et al. 2017), and CDFW reported 34 depredation kills between 2010 and 2016 in the CC-N counties of Alameda, Contra Costa, San Mateo, Santa Clara, and Santa Cruz (see Appendix A[11]). In addition, at least six mountain lions have been killed by vehicle strikes on Highway 17 in the Santa Cruz Mountains between 2008 and 2018 (Midpensinsula Regional Open Space 2017; Slade 2018) and news outlets reported at least three mountain lions killed by vehicle strikes on the I-280 in San Mateo County between 2014 and 2016 (Wilmers 2014, CBS SF 2015, Kamala 2016). The poor genetic health of the CC-N population is likely due to habitat fragmentation and isolation caused by roads and development combined with high levels of human-caused mortalities. CDFW has identified the Santa Cruz Mountains population as at risk due to current habitat and genetic concerns, at-risk internal habitat and connectivity, limited external connectivity, and lack of protected habitat (Dellinger 2019). Poor connectivity and continued development in the CC-N will likely lead to further isolation, increased human-caused mortalities, decreased genetic diversity, and increased risk of extinction in the foreseeable future.

5.2 Central Coast Central (CC-C) Mountain Lion Population

Studies on the CC-C mountain lion population are limited, and abundance and population trends are unknown. However, with an effective population size of 56.6 (Gustafson et al. 2018), and an N_e/N of 0.25 to 0.5 (Ballou et al. 1989; USFWS 2008), the estimated total adult population would be 113 to 226 individuals (see Table 1).

Although Gustafson et al. (2018) found that this population has intermediate levels of genetic diversity and the highest effective population size among the Central Coast and Southern

[11] These data were downloaded from the CDFW website; however, they no longer appear to be available online. These numbers have been shown to be low by a factor of two in some areas, likely due to incomplete reporting, and therefore should be considered absolute minimums (W. Vickers, *pers comm*).

California mountain lion populations, with an effective population size of 56.6, it just barely exceeds the older standard of 50 to prevent inbreeding depression in the short-term (Frankham et al. 2014; Gustafson et al. 2018). In addition, it falls well below the recommended newer standard of 100 and is insufficient for the long-term viability of the population (Frankham et al. 2014). And the lack of sufficient protected lands and high rates of development in the area threaten the persistence of this population (Dellinger 2019). Thus, although the CC-C population appears to be the healthiest population in the Central Coast and Southern California, it is still at increased risk of inbreeding depression and extinction, and connectivity to smaller adjacent areas should be improved (Dellinger 2019).

5.3 Central Coast South (CC-S) Mountain Lion Population

The NPS has been studying the CC-S population since 2002, though most studies regarding population dynamics focus on the Santa Monica Mountains mountain lions (Riley et al. 2014; Benson et al. 2019). Since 2002, NPS has collected data from 55 mountain lions within the Santa Monica Mountains and 19 mountain lions from the Simi Hills and Santa Susana Mountains.[12] There are currently 20-25 live mountain lions being tracked in the Santa Monica Mountains, 7-12 of which are adults (born in 2014 or earlier, the status of 5 adults are unknown) and 13 of which are juveniles or subadults (born in 2015 or later).[13] Given that the Santa Monica Mountains area is relatively small, adult survival rate is high (≥ 75%), and juvenile/subadult survival is low due to intraspecific strife and the inability to disperse, the Santa Monica Mountains population is likely space-limited and these numbers may represent the Santa Monica Mountains' carrying capacity (Riley et al. 2014; Benson et al. 2019). As mentioned previously in *Section 2.2 Taxonomy and Population Genetics*, the extremely low effective population size and total adult population size are grossly insufficient to prevent inbreeding depression in the short term or maintain evolutionary potential in the long term (Jamieson and Allendorf 2012; Frankham et al. 2014). And CDFW has identified the CC-S population as at risk due to current habitat and genetic concerns, at-risk internal habitat and connectivity, limited external connectivity, and lack of protected habitat (Dellinger 2019).

The long-term survival of the Santa Monica Mountains population is severely threatened due to extreme habitat fragmentation and isolation caused by surrounding roads and development that impede movement in or out of the area (Riley et al. 2014). Limited space and lack of connectivity with suitable mountain lion habitat inhibit dispersal for subadults and likely drive unusually high levels of intraspecific strife, which is the most common cause of mortalities in the

[12] The NPS provides puma profiles (last updated August-November 2018) of the marked animals (*i.e.*, tagged or radio-collared) they have been studying in the CC-S, which includes those studied in Riley et al. (2014). Some data presented in this section take these data into account. Accessed on 3 April 2019 at: https://www.nps.gov/samo/learn/nature/puma-profiles.htm.

[13] The adult population in the Santa Monica Mountains is generally consistent with the estimated 0.25 to 0.5 N_e/N; the Santa Monica Mountains was estimated to have an effective population size of four (Benson et al. 2019), which would suggest a total adult population size of 8 to 16. Interestingly, Gustafson et al. (2018) estimated an effective population size of 2.7 for the greater CC-S population, which would indicate a total adult population of 5 to 10 individuals throughout the Santa Monica Mountains, Simi Hills, and Santa Susana Mountains (see Table 1). There are currently 10 to 17 adult mountain lions being tracked throughout the CC-S area, which would put their N_e/N ratio at 0.16 to 0.27, which is still within the range of other species' N_e/N ratios (Frankham et al. 1995; Ballou et al. 1989; Mace and Lande 1991; Spong et al. 2000; Laundré and Clark 2003).

area (Riley et al. 2014). Although intraspecific strife is known to occur among mountain lions, there have been multiple cases of aggressive adult males killing their siblings, female offspring, and previous mates documented in the Santa Monica Mountains population, and researchers noted that "clearly this is rarely a sound evolutionary strategy as the survivorship of offspring or siblings is traded against the probability of future reproduction" (Riley et al. 2014). For 23 radio-collared individuals within the Santa Monica Mountains for which the cause of death is known, nine deaths were the result of instraspecific strife. Eight of the nine deaths (89%) were of animals less than four years old. In addition, three uncollared mountain lions in the Santa Monica Mountains less than four years old were found dead by intraspecific strife, which brings the total to 12 deaths by intraspecific strife documented in the Santa Monica Mountains between 2002 and 2018.

Although all subadult males and half of subadult females typically disperse from their natal areas (Logan and Sweanor 2010), only one subadult successfully dispersed from the Santa Monica Mountains between 2002 to 2012 – P-22, the famous male mountain lion who successfully crossed Highway 101 and I-405 freeways and established his home range in Griffith Park (Riley et al. 2014). Unfortunately, P-22 is extremely isolated with the smallest home range ever reported for an adult male ($26km^2$), and he has not had any opportunities to mate (Riley et al. 2014). In addition, vehicle strikes account for 17% (4/23) of known radio-collared mountain lion deaths in the Santa Monica Mountains. According to the NPS, most males in the Santa Monica Mountains do not live past the age of two. Thus, many healthy, young animals are not able to disperse from the Santa Monica Mountains, establish their own home ranges, and successfully reproduce.

Conversely, lack of connectivity also inhibits migrants coming from outside the Santa Monica Mountains and contributing to the population's gene pool. Only two outside mountain lions have been known to immigrate into the Santa Monica Mountains since 2002: P12 (from Simi Hills, alive as of August 2018, age 12) and P45 (from north of Highway 101, status unknown, age would be 6-7 if alive). While there has been no sign of P-45 since February, 2019 and no offspring from him have been detected, P-12 has been fairly prolific in the Santa Monica Mountains, fathering at least eight litters. Although P-12's appearance initially improved genetic diversity in the Santa Monica Mountains population, consistent immigration in small populations is needed so that the genetic diversity gains of immigrant mountain lions are not lost (Riley et al. 2014; Benson et al. 2016a; Benson et al. 2019). Subsequent inbreeding by P-12 with his daughters and granddaughters and inbreeding already occurring with other breeding adults in the Santa Monica Mountains have led to dangerously low genetic diversity (Riley et al. 2014; Benson et al. 2016a; Gustafson et al. 2018; Benson et al. 2019). With continued isolation, inbreeding, and loss of genetic diversity, there is increasing risk of inbreeding depression and extinction. With inbreeding depression, the probability of extinction within 50 years is predicted to be 99.7 %, with a median time to extinction of 15.1 years (Benson et al. 2016a; Benson et al. 2019).

5.4 Santa Ana Mountains (SAM) Population

Restricted habitat availability and high mortality rates in the SAM likely limits population size, and Benson et al. (2019) estimated that the SAM population is likely comprised of 16 adults and 13 juveniles (kittens and subadults). These numbers are slightly lower than the 31 to 62 adult mountain lions estimated from the SAM population's effective population size of 15.6 (Gustafson et al. 2018) (see Table 1). According to (Benson et al. 2019), high levels of human-caused adult mortalities may limit growth potential in the SAM, and it is uncertain if the population could be larger without as many anthropogenic pressures. In fact, although hunting is illegal in California, mountain lions in Southern California have a lower annual survival than many hunted populations (Vickers 2014). Interestingly, other studies calculated a much lower effective population size of 5.1 (Ernest et al. 2014) and four (Benson et al. 2019), which would align with the suggested carrying capacity. Regardless of which effective population size is used, they are all well below the frequently-used threshold of 50 and insufficient to prevent inbreeding depression in the short-term.

Although population trends are unclear, two long-term studies on radio-collared mountain lions in the SAM provide some insight (Beier 1993; Vickers et al. 2015). In a study that consisted of 32 radio-collared animals in the SAM from 1988 to 1993, researchers found a 75% adult survival rate (Beier and Barrett 1993), which is similar to adult survival rates in other populations, like the CC-S population (Riley et al. 2014). However, in a second, more recent study conducted in the area consisting of 31 marked mountain lions from 2001 to 2013, researchers found a 56.5% survival rate across all sexes and age groups (Vickers et al. 2015). The marked decrease in adult survival rate between the two studies coincides with an increase in the proportion of mortalities caused by vehicle strikes, with the 1988-1993 and the 2001-2013 studies resulting in 32% (10/31) and 46% (6/13) of deaths caused by vehicle strikes, respectively (Beier 1993; Vickers et al. 2015). It also parallels an upward trend of mountain lion mortalities caused by vehicle strikes throughout Southern California over time (Vickers et al. 2015). Other causes of death in the SAM population included depredation kills, illegal killing, disease, intraspecific strife, and human-caused wildfires (Beier and Barrett 1993; Vickers et al. 2015). Depredation kills were found to be 3.4 times more likely with males compared to females (Vickers et al. 2015).

The SAM mountain lion population's high adult mortality rates combined with isolation, small size, low genetic diversity, low effective population size, and limited immigration of new individuals cause demographic instability and put the population at high risk of extinction (Beier 1993; Beier and Barrett 1993; Ernest et al. 2014; Vickers et al. 2015; Gustafson et al. 2017; Gustafson et al. 2018; Benson et al. 2019). As mentioned previously in *Section 2.2 Taxonomy and Population Genetics*, the extremely low effective population size and total adult population size are insufficient to prevent inbreeding depression in the short term or maintain evolutionary potential in the long term (Jamieson and Allendorf 2012; Frankham et al. 2014). Roads and development prevent dispersal and sustained immigration in the SAM, and lack of consistent gene flow has led to high levels of inter-relatedness and inbreeding (Ernest et al. 2014; Gustafson et al. 2017; Gustafson et al. 2018; Benson et al. 2019). Further genetic erosion is likely without improved connectivity to facilitate immigration (Benson et al. 2019). CDFW has identified the SAM population as at risk due to current habitat and genetic concerns, at-risk internal habitat and

connectivity, limited external connectivity, and lack of protected habitat (Dellinger 2019). If inbreeding depression occurs within this population, population growth will likely decline and the probability of extinction within 50 years is predicted to be 100%, with a median time to extinction of 11.7 years (Benson et al. 2019).

In 13 years, only one radio-collared individual crossed I-15, the major barrier between the SAM and the EPR, and that animal was killed 25 days after his crossing for depredating domestic sheep (Vickers et al. 2015). And although Gustafson et al. (2017) documented three males immigrating into the SAM from the EPR and four males emigrating from the SAM to the EPR over a 15-year period, only one of the males (M86, an immigrant to the SAM) is known to have successfully bred. While M86 improved the SAM population's genetic diversity (Gustafson et al. 2017), high levels of mortalities due to vehicle strikes and depredation/illegal killings likely reduce the number of immigrants that can successfully establish as breeding adults (Vickers et al. 2015). With high levels of adult mortalities due to vehicle strikes, depredation kills affecting 3.4 times more males than females, and a small population with a female-biased adult sex ratio, there is potential for occasional male extinction in the SAM, which could severely limit the short- and long-term viability of the population (Beier and Barrett 1993; Benson et al. 2019).

5.5 San Gabriel/San Bernardino Mountains (SGSB) Population

Studies on the SGSB mountain lion population are limited, and the abundance and population trends are unknown. However, with an effective population size of 5 (Gustafson et al. 2018), and an N_e/N of 0.25 to 0.5 (Ballou et al. 1989; USFWS 2008), the estimated total adult population would be 10 to 20 individuals (see Table 1). As mentioned previously in *Section 2.2 Taxonomy and Population Genetics*, these numbers are grossly insufficient to prevent inbreeding depression in the short term or maintain evolutionary potential in the long term (Jamieson and Allendorf 2012; Frankham et al. 2014). And CDFW has identified the SGSB population as at risk due to current habitat and genetic concerns, at-risk internal habitat and connectivity, limited external connectivity, and lack of protected habitat (Dellinger 2019).

Although a population viability study has not been conducted for the SGSB population, given its low genetic diversity, low effective population size, and patterns of isolation due to roads and development creating movement barriers (Gustafson et al. 2018), the SGSB mountain lion population likely has high risk of inbreeding depression and extinction. The loss of this population could undermine genetic connectivity for mountain lions statewide because the SGSB population, along with the Tehachapi and Sierra Pelona Mountains, represents a critical linkage between mountain lion populations in the northern and southern mountain ranges of California (Gustafson et al. 2018). Restoration and enhancement of connectivity in the SGSB and surrounding mountain ranges are key for the continued survival of the SGSB population as well as all of the Central Coast and Southern California mountain lion populations.

5.6 Eastern Peninsular Range (EPR) Population

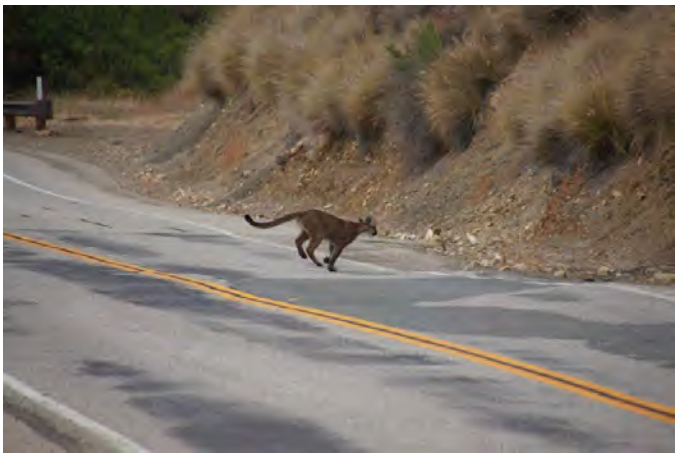
Studies on the EPR mountain lion population are limited and the abundance and population trends are unknown. However, with an effective population size of 31.6 (Benson et al. 2019), and an N_e/N of 0.25 to 0.5 (Ballou et al. 1989; USFWS 2008), the estimated total adult

population would be 63 to 126 individuals (see Table 1). As mentioned previously in *Section 2.2 Taxonomy and Population Genetics*, these numbers are insufficient to prevent inbreeding depression in the short term or maintain evolutionary potential in the long term (Jamieson and Allendorf 2012; Frankham et al. 2014).

Vickers et al. (2015) followed 43 marked mountain lions in the EPR from 2001 to 2013, and their study provides some insight regarding survival rate and causes of mortality. Annual survival rate was found to be 55.4% in the EPR, which is similar to the SAM population (Vickers et al. 2015). The primary causes of death of marked mountain lions were depredation kills (26% [6/23]) and vehicle strikes (17% [4/23]). When assessing mountain lion death data from CDFW from 1981 to 2013, depredation and vehicle strikes accounted for about 70% of mountain lion deaths in the EPR: 40% (62/154) by depredation kills and 30% (46/154) by vehicle strikes (Vickers et al. 2015).

Although the EPR population was found to have the highest genetic diversity and effective population size among the Southern California mountain lion populations (Gustafson et al. 2018), movement and genetic studies have shown that the EPR population is largely disconnected from all other California populations (Ernest et al. 2014; Vickers et al. 2015; Vickers et al. 2017; Gustafson et al. 2018). And CDFW has identified the EPR population as at risk due to current habitat and genetic concerns, at-risk internal habitat and connectivity, limited external connectivity, and lack of protected habitat (Dellinger 2019). Thus, high human-caused mortality rates combined with continued development in San Diego, Riverside, and Imperial Counties could lead to further isolation, decreased genetic diversity, increased inbreeding depression, and increased risk of extinction.

6 Factors Affecting Ability to Survive and Reproduce



Female mountain lion, P-23, crossing a road in the Santa Monica Mountains. She was struck by a vehicle and found dead near Malibu Canyon Road in January 2018. Photo: NPS

Most, if not all, factors affecting the ability of the Southern California and Central Coast mountain lion populations to survive and reproduce are caused by humans. Lack of wildlife connectivity is the primary driver of their potential demise. Habitat loss and fragmentation due to roads and development have led to extreme levels of isolation and high mortality rates, which are driving these populations towards extinction. Continued development in current suitable

mountain lion habitat further threatens these populations. With low genetic diversity and high risk of inbreeding depression due to genetic isolation, vehicle strikes on roads, increased conflicts with humans that lead to depredation kills, high levels of intraspecific strife likely due to limited space and lack of connectivity, rodenticide and other environmental toxicant poisoning, and impacts of more frequent wildfires and climate change, Southern California and Central Coast mountain lions will likely not persist unless there is a concerted effort to restore and enhance functional connectivity between populations and large blocks of heterogeneous habitats.

The populations in Southern California are especially vulnerable to extinction, which is reflected in a 2005 review conducted by the US Forest Service regarding Land Management Plans in the National Forests of Southern California that states the "greatest concern for the long-term health of mountain lion populations on the national forests of southern California is loss of landscape connectivity between mountain ranges and large blocks of open space on private land." [14] The review emphasizes that continued development along with new and wider roads degrade habitat linkages and create movement barriers, and "[w]ithout the national forests and linkages between the mountain ranges and other large habitat preserves, there is not much long term potential for mountain lions in southern California."

Ultimately, the persistence of mountain lions in the Central Coast and Southern California requires maintenance and restoration of connectivity between subpopulations and adequate habitat. The extreme isolation, dangerously low genetic diversity, high levels of inbreeding, and high rates of human-caused mortalities (*e.g.*, vehicle strikes, depredation kills, intra-specific strife due to limited space, rodenticide poisoning, etc.) underscore the urgent need for proactive measures to enhance connectivity (Ernest et al. 2014; Riley et al. 2014; Vickers et al. 2015; Benson et al. 2016a; Gustafson et al. 2017; Benson et al. 2019).



Male mountain lion M110 in San Diego County was euthanized by a CDFW warden because he was severely injured and for stated public safety concerns (he was found in a neighborhood close to homes). This occurred days after he was illegally shot by a livestock owner (open wound on right flank). Necropsy results indicated he had two broken legs consistent with a vehicle strike and four different compounds of anticoagulant rodenticides in his blood. Had he not been euthanized, he likely would have died from starvation due to his injuries. Source: Vickers (2014).

[14] Forest Service, U.S. Department of Agriculture, *Final Environmental Impact Statement, Land Management Plans, Angeles National Forest Cleveland National Forest Los Padres National Forest San Bernardino National Forest* (Sept. 2005), available at https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5166889.pdf.

Measures to conserve core habitat areas and functional wildlife corridors, like the recently adopted Habitat Connectivity and Wildlife Movement Ordinances in Ventura County,[15] are vital to the preservation of Central Coast and Southern California mountain lion populations, but just protecting land is not enough to ensure their survival. Conserving natural habitats on both sides of freeways and constructing effective crossing infrastructure (*e.g.*, culverts, underpasses, vegetated overpasses, and exclusionary fencing) at existing roads and barriers would facilitate movement and gene flow while reducing mortalities due to vehicle strikes (Riley et al. 2014; Vickers et al. 2015; Benson et al. 2019). Promoting wider implementation of predator-proof enclosures for domestic animals would further reduce human-caused mortalities by limiting opportunities for potential conflict and reducing the use of depredation permits (Vickers et al. 2015). In addition, changes in depredation permit policy could further reduce mortalities. For example, CDFW adopted a new depredation permit policy based on a 2017 bulletin for mountain lions in the CC-S and SAM areas, which requires affirmative non-lethal alternatives and improved husbandry before kill permits are issued when mountain lion depredations occur in those areas (CDFW 2017; see *Section 8.1.1 CDFW Departmental Bulletins*). Expanding these policies in conjunction with enforceable implementation and reporting requirements across the state, or at least into the SGSB, EPR, CC-N, and CC-C, population areas, would reduce mortalities from this source. Prohibiting the use of second-generation anticoagulants, rodenticides, and other environmental toxicants in California (*i.e.*, with AB 1788, sponsored by Assembly Member Richard Bloom in 2019) would even further reduce human-caused mortalities of mountain lions, as toxicants bioaccumulate up the food chain and can kill mountain lions or weaken their immune systems and make them more susceptible to disease or more vulnerable to conspecifics (Riley et al. 2003; Riley et al. 2007; Serieys et al. 2015). A combination of habitat conservation, implementation of effective road/barrier crossing infrastructure, and outreach and education to property owners and owners of domestic animals combined with depredation permit policy change could save these populations from extinction (Vickers et al. 2015).

6.1 Low Genetic Diversity and Inbreeding Depression

As detailed in *Section 2.2 Taxonomy and Population Genetics* and *Section 5.0 Abundance and Population Trends*, inbreeding is a serious threat to the persistence of the Central Coast and Southern California mountain lion populations. Inbreeding depression, loss of genetic diversity, and accumulation of deleterious mutations can lead to elevated extinction risk due to reduced reproductive fitness and evolutionary potential (*i.e.*, the ability to adapt to change) (Spielman et al. 2004; Frankham 2005; Traill et al. 2010). Decades of isolation due to roads and development fragmenting habitat and limiting connectivity has led to low genetic diversity and effective population sizes, high levels of inter-relatedness, and dangerous levels of inbreeding, especially in the CC-S, SAM, SGSB, and CC-N populations (Ernest et al. 2014; Riley et al. 2014; Vickers et al. 2015; Benson et al. 2016a; Gustafson et al. 2017; Gustafson et al. 2018; Benson et al. 2019). Although demographic and environmental stochasticity (*e.g.*, a disease outbreak, wildfire, drought or flooding) can increase risk of extinction, especially in small populations, inbreeding has also been shown to be an indicator of extinction risk and may impact how populations are able to respond to stochastic events (Frankham and Ralls 1998). In addition, endangered species

[15] More information regarding the Habitat Connectivity and Wildlife Movement Ordinances available at: https://vcrma.org/habitat-connectivity-and-wildlife-movement-corridors

tend to have lower genetic diversity than non-endangered species, which suggests that inbreeding and low genetic variation may have an important role in a species' risk of extinction (Frankham and Ralls 1998). Thus, genetic factors should be considered when assessing the status of these populations.

The CC-S, SAM, SGSB, and CC-N populations have been found to have low genetic diversity, with the SAM population's genetic variation nearly as low as the endangered Florida panther's (*Puma concolor coryi*) (Ernest et al. 2014; Riley et al. 2014; Gustafson et al. 2017). And, as mentioned previously in *Section 2.2 Taxonomy and Population Genetics*, the CC-S, SGSB, SAM, CC-N, and EPR populations have effective population sizes well below the older and less conservative threshold of 50, while the CC-C population's effective population size is just barely above that threshold at $N_e = 56.6$ (Ernest et al. 2014; Riley et al. 2014; Benson et al. 2016a; Gustafson et al. 2018; Benson et al. 2019). These numbers suggest that inbreeding depression could occur within the short-term (over the duration of five generations) and these populations are at increased risk of extinction.

Without improved connectivity, the SAM and Santa Monica Mountains (within the CC-S) populations are predicted to experience continued genetic erosion and losses in heterozygosity of 28-49% and 40-57%, respectively, within 50 years (Benson et al. 2016a; Benson et al. 2019). This could lead to inbreeding depression, which could cause reduced fitness in a variety of ways. In Florida panthers, inbreeding depression led to reproductive issues (*e.g.*, poor sperm quality, low testosterone levels, poor fecundity and recruitment, failure of testes to descend), increased susceptibility to parasites and disease, and physical issues (*e.g.*, atrial septal defect, a deadly congenital heart defect; kinked tails) (Roelke et al. 1993; Johnson et al. 2010). Suffering from shrinking, fragmented habitats, high mortality rates from hunting, and inbreeding depression, the Florida panther population declined to less than 30 individuals, and genetic restoration via the translocation of eight female mountain lions from Texas (*Puma concolor stanleyana*) was needed to prevent their extinction (Johnson et al. 2010).

The SAM and CC-S populations are severely constrained in fragmented habitats with similar numbers as the Florida panther population prior to genetic rescue (Beier and Barrett 1993; Johnson et al. 2010; Riley et al. 2014; Vickers et al. 2015). Although the fragmented populations appear to be stable, high levels of inbreeding have been documented in the Santa Monica Mountains (Riley et al. 2014) and evidence of inbreeding depression (*i.e.*, low genetic diversity and kinked tails) has been observed in the SAM (Ernest et al. 2014). If these populations remain isolated, they will inevitably have the same fate as the Florida panthers. Researchers predict that with inbreeding depression, the SAM and Santa Monica Mountains populations have a 100% and 99.7% chance of becoming extinct within 50 years, with median time to extinction of 11.7 and 15.1 years, respectively (Benson et al. 2019).

The SGSB population was also found to have low genetic diversity and effective population size (Gustafson et al. 2018), which suggests that the population experienced a prior genetic bottleneck and inbreeding is likely. Although genetic studies on this population are limited, it is clear that continued development in and around the SGSB will further isolate the population and lead to more inbreeding and even lower genetic diversity, which will drive the population faster towards extinction. It is important to note that despite only limited gene flow

between the SGSB population and the Western Sierra Nevada, CC-C, and the EPR (Gustafson et al. 2018), this population represents a critical linkage between mountain lion populations in the northern and southern mountain ranges of California. Restoration and enhancement of connectivity is key for the continued survival of the SGSB population as well as all of the other the Central Coast and Southern California mountain lion populations.

Gustafson et al. (2018) found that the EPR population also exhibits a prior genetic bottleneck. The EPR population was found to be largely disconnected from all the other California populations, with limited gene flow and low connectivity with the SAM and SGSB populations (Gustafson et al. 2018). Movement patterns and genetics indicate potential isolation from other populations (Vickers et al. 2015; Gustafson et al. 2017; Gustafson et al. 2018), and continued development in these areas will likely lead to further isolation, genetic drift, and risk of extinction similar to what is being observed in the CC-S, SAM, and SGSB populations.

Although genetic studies are limited for the CC-N population, it was found to have low genetic diversity and low effective population size (Gustafson et al. 2018), which forewarns of inbreeding depression and increased risk of extinction. CDFW has identified the Santa Cruz Mountains mountain lion population, which occurs within the CC-N area, as vulnerable to decline and extinction due to fragmentation from roads and development as well as lack of protected habitat (Dellinger 2019).

Studies suggest that one immigrant every 1-2 years would reduce extinction risk in the SAM and Santa Monica Mountains populations (Beier and Barrett 1993; Gustafson et al. 2017; Benson et al. 2019). This may apply to the other populations with low genetic diversity and effective population size (Gustafson et al. 2018). Increasing connectivity throughout the Central Coast and Southern California would address issues of inbreeding by facilitating movement between populations, increasing effective population size, and reducing high mortality rates driven by vehicle strikes and depredation. Thus, proactive measures to effectively restore and enhance connectivity are needed to minimize risk of inbreeding depression and extinction in Central Coast and Southern California populations.

6.2 Vehicle Strikes

In California, an estimated 100 mountain lions are killed every year by vehicle strikes (Pollard 2016). In the Central Coast and Southern California, vehicle strikes represent a significant threat to the persistence of mountain lion populations, though Southern California has more documentation regarding this issue. The number of mortalities caused by vehicle strikes has been increasing in Southern California since the 1980s, and vehicle strikes account for a high proportion of deaths in mountain lions in the SAM, CC-S, and EPR (Beier and Barrett 1993; Riley et al. 2014; Vickers et al. 2015:Vickers et al. 2017). From 1981 to 2013 vehicle strikes accounted for 53% (50/94) of mountain lion deaths in the SAM and 30% of mountain lion deaths in the EPR (46/154) (Vickers et al. 2015). Riley reported that 14% (2/14) of collared mountain lion deaths from 2002 to 2012 were due to vehicle strikes, and the NPS reported that 18 mortalities from vehicle strikes occurred between July 2002 and January 2018 in the CC-S (Figure 9). Although the CC-N population is less studied, there is evidence that vehicle strikes are a significant cause of mortalities in this population; at least six mountain lions have been

killed by vehicle strikes on Highway 17 in the Santa Cruz Mountains between 2008 and 2018 (Midpeninsula Regional Open Space 2017; Slade 2018) and news outlets reported at least three vehicle strikes killing mountain lions on the I-280 in San Mateo County between 2014 and 2016 (Wilmers 2014; CBS San Francisco 2015; Kamala 2016). Similarly, in 2018 at least two mountain lions were reported to have been killed by vehicle strikes in San Luis Obispo County in the CC-C (Tanner 2018). Clearly, vehicle strikes are an important cause of mortality for the Central Coast and Southern California mountain lion populations.

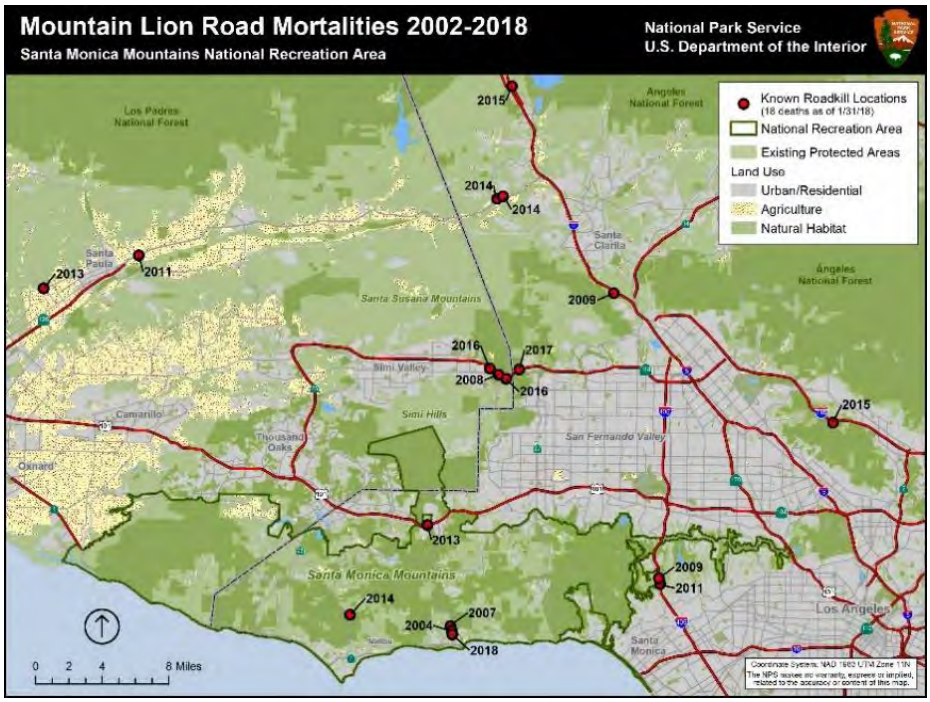


Figure 9. Locations of 18 mountain lion vehicle strikes in the Santa Monica Mountains and surrounding areas from July 2002 to January 2018. Source: NPS

High adult mortality rates can have severe consequences, particularly for small populations with female-biased adult sex ratios and low effective population sizes (Beier and Barrett 1993; Benson et al. 2019). Vehicle strikes have been found to affect males and females equally, regardless of age, which can result in relatively high adult male mortalities (Vickers et al. 2015). Low male adult survival increases the risk of extinction, as it could result in occasional extinctions of breeding males and therefore reduced reproductivity (Benson et al. 2019), which has been previously observed in the SAM (Beier and Barrett 1993). In the Santa Monica Mountains, where adult survival is high, vehicle strikes (along with intraspecific strife) make it more difficult for subadults to successfully disperse, which limits breeding opportunities for mountain lions born in the Santa Monica Mountains (Riley et al. 2014; Benson et al. 2019). Freeways and vehicle strikes also limit the ability for immigrants to enter the Santa Monica Mountains and contribute to the population's gene pool (Riley et al. 2014; Benson et al. 2019). These patterns highlight the dire outlook for Central Coast and Southern California mountain lion populations due to lack of connectivity between populations and suitable habitat. The continued construction of roads and development and inaction to enhance connectivity threatens the survival of these struggling populations.

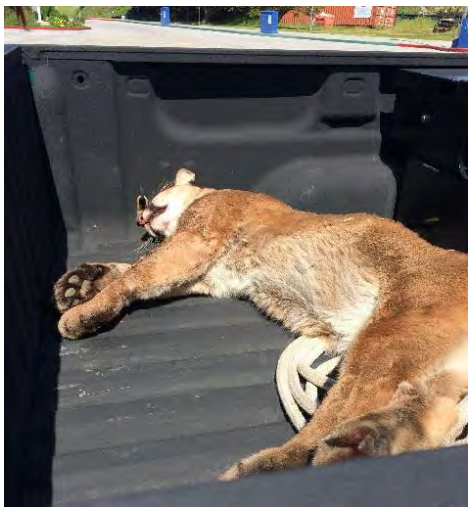
6.3 Depredation and Illegal Kills



Mountain lions killed on depredation permits (and one killed by vehicle strike) in San Diego County in 2015. Source: Vickers et al. (2017).

In 1990 California voters passed The California Wildlife Protection Act (Proposition 117), making the mountain lion a "specially protected species" and outlawing mountain lion sport-hunting in California. However, the law requires CDFW to issue depredation permits that allow people to "take" mountain lions when a mountain lion kills or injures domestic animals such as livestock or pets or damages property. The legal definition of "take" is to "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill" (Cal Fish & Game Code, *§86*), and the vast majority of permits to take in the three decades since the passage of Proposition 117 have authorized killing one or more mountain lions. The number of depredation permits issued and the number of reported kills has varied over time, and on average over 40% of permits result in reported kills. Since 1990 there has been an average of 97 reported depredation kills every year; however, these estimates are likely low due to underreporting and incomplete records (W. Vickers, *pers comm*). Depredation kills (along with vehicle strikes) account for the majority of mountain lion mortalities in the SAM and EPR (Vickers et al. 2015; Vickers et al. 2017). Although less is known about depredation kill impacts in the CC-N and CC-C, there is evidence that suggests depredation kills could be a significant source of mortality in these populations. In the Santa Cruz Mountains in the CC-N, depredation kills are the leading cause of death in collared mountain lions (Wang et al. 2017), and CDFW reported 34 depredation kills between 2010 and 2016 in the CC-N counties of Alameda, Contra Costa, San Mateo, Santa Clara, and Santa Cruz (see Appendix A[16]). Although population dynamics are even less studied in the CC-C, between 2010 and 2016 there were 46 reported depredation kills in the counties of Monterey, San Benito, San Luis Obispo, and Santa Barbara (See Appendix A*[Id.]*).

[16] These data were downloaded from the CDFW website; however, they no longer appear to be available online. These numbers have been shown to be low by a factor of two in some areas, likely due to incomplete reporting, and therefore should be considered absolute minimums (W. Vickers, *pers comm*).



An illegally killed mountain lion in San Mateo County. Photo: Tiffany Yap

Depredation kills result in more deaths in male mountain lions compared to female mountain lions. Statewide, of mountain lions killed for depredation in 2017, 68% were males (CDFW 2018), and from 1981 to 2013, there were 3.4 times more male than female mountain lions killed for depredating in the SAM and EPR (Vickers et al. 2015). The majority of lions reported killed for depredating were of subadult (1-2 years old) and adult mountain lions (>2 years old) (CDFW 2018), many of which were likely dispersers that may have not yet established home ranges. Dispersing lions often come up against roads and development as they search to establish home ranges (Beier 1995, Vickers 2015, Riley 2014). This suggests that even if individuals are able to navigate across roads and freeways without being struck by vehicles, they often come into conflict with humans, which threatens their survival. This was reflected in the EPR, when the only GPS collared immigrant to have crossed I-15 from 2001 to 2013 arrived from the SAM only to be killed on a depredation permit 25 days after his arrival for depredating a sheep (Vickers et al. 2015). Not only do lions killed for depredating diminish the total abundance of these populations, but because males are predominantly killed, the number of animals that are the primary gene dispersers are also greatly reduced, which further inhibits adequate genetic connectivity (Vickers et al. 2017).

Reported depredation kills do not include mountain lions that are illegally poached or killed, many of which likely go undocumented (Beier and Barrett 1993; Vickers et al. 2015). Illegal kills have been observed in the CC-S, SAM, and EPR (Beier and Barrett 1993; Riley et al. 2014; Vickers et al. 2015) as well as in the CC-N (Yap 2018 *pers observation*), and although 80 mountain lions were reported as being killed under depredation permits in 2017, 89 deaths were being investigated (CDFW 2018).

As mentioned in *Section 6.2 Vehicle Strikes*, high levels of mortalities among male breeders or potential male breeders (*i.e*., dispersers) can have severe impacts on small, isolated mountain lion populations with female-biased adult sex ratios and low effective population sizes (Beier and Barrett 1993; Benson et al. 2019). Low survival of breeding males increases extinction risk, as occasional breeding male extinctions can occur and therefore reduce reproductivity throughout the population (Beier and Barrett 1993; Benson et al. 2019). And low survival of subadults and adults may limit both dispersers and immigrants from successfully

breeding and increasing genetic diversity (Vickers et al. 2015; Benson et al. 2019). Thus, depredation and illegal kills in conjunction with lack of connectivity between populations and suitable habitat in the Central Coast and Southern California severely limit the potential for these populations to survive and reproduce. Continued development and lack of connectivity will likely push mountain lions into more conflicts with humans, which could increase depredation and retributory kills and further drive these populations towards extinction.

6.4 Intraspecific Strife



Intraspecific strife: a female mountain lion, P-7, was killed by her father, P-1. Photo: NPS

As detailed in *Section 5 Abundance and Population Trends*, intraspecific strife is the leading cause of mortality in the Santa Monica Mountains (Riley et al. 2014). Although intraspecific strife is a common source of mortality in mountain lion populations, (Beier and Barrett 1993; Logan and Sweanor 2001; Allen 2014), unusually high levels of intraspecific strife have been observed in this population (Riley et al. 2014). About 41% (9/22) of deaths in radio-collared mountain lions being tracked from 2002 to 2018 were from intraspecific strife,[17] with multiple cases of aggressive adult males killing their siblings, offspring (male and female), and previous mates (Riley et al. 2014). While males are likely to have larger home ranges to protect food resources and access to females, killing offspring or potential mates has no apparent evolutionary benefit, as it reduces chances of future reproduction (Riley et al. 2014). In addition, infanticide has been documented in the Santa Monica Mountains (Riley et al. 2014), perhaps to trigger the female to come into estrous. These high levels of intraspecific strife are likely due to limited space in the Santa Monica Mountains caused by dispersal barriers (Riley et al. 2014; Benson et al. 2019). As roads and development further encroach on Central Coast and Southern California mountain lion populations, intraspecific strife could become more common; this was

[17] The NPS provides puma profiles (last updated August-November 2018) of the marked animals (*i.e.*, tagged or radio-collared) they have been studying in the CC-S, which includes those studied in Riley et al. (2014). Some data presented in this section take these data into account. Accessed on 3 April 2019 at: https://www.nps.gov/samo/learn/nature/puma-profiles.htm.

documented in the SAM on two occasions (one GPS-collared, one previously GPS-collared) since the publication of Vickers et al. (2015) (W. Vickers *unpublished data*). Enhanced connectivity between populations and suitable habitat would facilitate dispersal, which would reduce and/or prevent high levels of intraspecific strife (Riley et al. 2014; Benson et al. 2019) and improve the survival and reproduction rates, especially for the most struggling populations.

6.5 Abandonment



Santa Monica Mountains mountain lion kittens P-57 and P-58 were abandoned by their mother, P-42, a first-time mother who left with male P-27 and never returned. Photo: NPS

Abandonment of kittens is fairly common in the Santa Monica Mountains and accounts for about 23% (5/22) of the known causes of death for marked/collared animals.[18] Although this likely occurs in other mountain lion populations, the causes of abandonment are unclear. There are various reasons why females might abandon their cubs. The cubs could be sick, the female may not be able to take care of them, or perhaps the female was initially protecting them from a mature male. Unfortunately, there is a lack of data regarding why and how often cubs get abandoned. Yet this is one of the main causes of death for mountain lions in the Santa Monica Mountains, which likely affects this already-small population.

Mountain lion cubs can also become orphaned if the mother is killed before they have dispersed. If they are too young to fend for themselves, they likely starve to death or are preyed upon by other predators. If the young are more mobile, they may come up against areas where they are more likely to encounter humans as they search for food. This was seen in November 2017, when a mother mountain lion was killed by a vehicle strike in the SAM and two of her cubs were found roaming near human establishments – one in a backyard and the other along a road (Veklerov 2018). Both were too young to survive on their own and were placed in the Oakland Zoo.

[18] Id.

6.6 Poisoning from Rodenticides and Other Environmental Toxicants



The famous mountain lion of Griffith Park, P-22, suffering from notoedric mange, a parasitic skin disease that has been linked with the ingestion of rodenticide poisoning (left) and mountain lion P-34 found dead on a trail due to rodenticide poisoning (right). Photos: NPS

Although mountain lions are not the primary target of environmental toxicants, such as rodenticides and other pesticides and herbicides, secondary poisoning has been documented in many non-target animals, especially predators (e.g., coyotes (Riley et al. 2003), bobcats (Riley et al. 2007; Serieys et al. 2015), San Joaquin kit fox (McMillin et al. 2008), California fishers (Gabriel et al. 2012), raptors (Lima and Salmon 2010), and many more). Data regarding pesticide poisoning in mountain lions are limited; however, there is evidence that these big cats are likely vulnerable to similar negative impacts that other predators experience, including direct death, weakened immune systems, and vulnerability to predators or conspecifics (Riley et al. 2003; Riley et al. 2007; Serieys et al. 2015; Rudd et al. 2019).

While poisoning can sometimes lead to direct death, rodenticide exposure has also been associated with notoedric mange, a parasitic skin disease that has led to high levels of mortalities, population declines, and even local extirpations in Southern California bobcats (Riley et al. 2007; Serieys et al. 2015). Although the link between rodenticide poisoning and mange is not as clear in mountain lions, since 2002 five mountain lions in the CC-S have been found suffering from mange, and researchers suspect that rodenticide poisoning may have played a role (Reyes-Velarde 2019a). In addition, of four dead mountain lions in the Santa Monica Mountains that were found to have rodenticides in their systems, two died from poisoning and two died from intraspecific strife, and it is possible that indirect effects of poisoning may have prevented the mountain lions from escaping conflict or fighting back (Riley et al. 2007). And rodenticide poisoning is suspected to be the cause of death in mountain lion P-47, who was recently found dead in Santa Monica Mountains (Reyes-Velarde 2019b), and CC-N mountain lion 36m, who was found dead in the Santa Cruz Mountains in 2015 (Wilmers 2015).

The Department of Pesticide Regulation (DPR) analyzed data provided by CDFW and found that 92% (59/64) of tested mountain lions from throughout the state had detectable levels of anticoagulant rodenticides, which indicates alarmingly high exposure rates (DPR 2018). This has been found to be true in the CC-S as well, where researchers have found that 94% (17/18) of mountain lions tested had traces of rodenticides in their systems (Reyes-Velarde 2019a).

Rodenticides have been implicated in mountain lion mortalities in the CC-S, and in the SAM anticoagulant rodenticide residues were detected in the livers of 100% of deceased animals tested, with up to five different compounds being detected in some animals (Riley et al. 2007; Riley et al. 2014; W. Vickers, *pers comm*). And a study conducted by CDFW and the Integral Ecology Research Center (IERC) has found that mountain lions are being exposed to dangerously high levels of illegal pesticides, such as carbofuran, being used on illegal marijuana grow sites, which can also bioaccumulate and cause health issues (Rudd et al. 2019). Furthermore, it is possible that herbicide exposure from deer could be detrimental to mountain lions as well. Although poisoning from environmental toxicants may not constitute a large proportion of direct deaths (that we are aware of), it is possible that high exposure levels influence other causes of mortalities. Any additional mortalities in the small, isolated Central Coast and Southern California populations suffering from other anthropogenic pressures could impact the short- and long-term survival of these mountain lions.

6.7 Wildfires



After the Woolsey Fire, the body of mountain lion P-64, known to use culverts to cross the Hwy-101 and SR-118 freeways a total of 41 times, was found dead with severely burned paws. Photos: NPS

Although fire is a natural disturbance in California ecosystems, sprawl development with low/intermediate densities extending into habitats that are prone to fire have led to more frequent wildfires that burn larger areas (Syphard et al. 2007; Syphard et al. 2009). Most wildfires in California are caused by human ignitions, like power lines, arson, improperly disposed cigarette butts, debris burning, fireworks, campfires, or sparks from cars or equipment (Keeley and Fotheringham 2003; Syphard et al. 2007; Syphard et al. 2012; Bistinas et al. 2013; Balch et al. 2017; Radeloff et al. 2018; Syphard et al. 2019). In fact, human-caused fires account for 95-97% of all fires in California's Mediterranean habitats (Syphard et al. 2007, Balch et al. 2017). In addition, climate change is leading to hotter, drier conditions that make fires more likely to burn. At least 29 fires throughout California in the last two years were caused by electric power and distribution lines, and transmission lines are suspected to be the cause of last year's Camp Fire and Woolsey Fire (Atkinson 2018; Chandler 2019).

Increased frequency of wildfires poses a threat to the survival of Central Coast and Southern California mountain lions. Although mountain lions are highly mobile and generally able to move away from wildfires, in severe weather conditions wind-driven fires can spread quickly – they can cover 10,000 hectares in one to two days, as embers are blown ahead of the

fires and towards adjacent fuels (*e.g*., flammable vegetation, structures) (Syphard et al. 2011). If their movement is constrained by roads and development and they are unable to access escape routes, then their chances of surviving wildfires are greatly reduced. Vickers et al. (2015) documented one death of a collared mountain lion in the SAM and one in the EPR due to human-caused wildfires, and the deaths of two collared mountain lions in the CC-S in 2018 have been attributed to the Woolsey Fire.[19] Environmentally stochastic events (*e.g*., wildfires, flooding) could destabilize small mountain lion populations and make them vulnerable to extinction (Benson et al. 2016a; Benson et al. 2019). In addition, increased frequency of fire ignitions can cause shifts in natural fire regimes, which can lead to large-scale landscape changes, such as vegetation-type conversion or habitat fragmentation, which can impact wide-ranging species like the mountain lion (Jennings 2018).

Increasing landscape connectivity (*e.g*., by designing corridors, removing barriers, and preserving habitats that are close to each other) is important for resilience to environmentally stochastic events and climate change adaptation (Heller and Zavaleta 2009). Enhanced connectivity that incorporates corridor redundancy (*i.e*. the availability of alternative pathways for movement) would allow for improved functional connectivity and resilience. Compared to a single pathway, multiple connections between habitat patches increase the probability of movement across landscapes by a wider variety of species, and they provide more habitat for low-mobility species while still allowing for their dispersal (Mcrae et al., 2012; Olson & Burnett, 2008; Pinto & Keitt, 2008). In addition, corridor redundancy provides resilience to uncertainty, impacts of climate change, and extreme events, including wildfires, by providing alternate escape routes or refugia for animals seeking safety (Cushman et al., 2013; Mcrae et al., 2008; Mcrae et al., 2012; Olson & Burnett, 2008; Pinto & Keitt, 2008).

6.8 Climate Change

A strong, international scientific consensus has established that human-caused climate change is causing widespread harms to human society and natural systems, and climate change threats are becoming increasingly dangerous. In a 2018 *Special Report on Global Warming of 1.5°C* from the Intergovernmental Panel on Climate Change (IPCC), the leading international scientific body for the assessment of climate change describes the devastating harms that would occur at 2°C warming, highlighting the necessity of limiting warming to 1.5°C to avoid catastrophic impacts to people and life on Earth (IPCC 2018). In addition to warming, many other aspects of global climate are changing. Thousands of studies conducted by researchers around the world have documented changes in surface, atmospheric, and oceanic temperatures; melting glaciers; diminishing snow cover; shrinking sea ice; rising sea levels; ocean acidification; and increasing atmospheric water vapor (USGCRP, 2017).

Climate change is increasing stress on species and ecosystems, causing changes in distribution, phenology, physiology, vital rates, genetics, ecosystem structure and processes, and increasing species extinction risk (Warren et al., 2011). A 2016 analysis found that climate-related local extinctions are already widespread and have occurred in hundreds of species, including almost half of the 976 species surveyed (Wiens 2016). A separate study estimated that nearly half of terrestrial non-flying threatened mammals and nearly one-quarter of threatened

[19] Id.

birds may have already been negatively impacted by climate change in at least part of their distribution (Pacifici et al. 2017). A 2016 meta-analysis reported that climate change is already impacting 82% of key ecological processes that form the foundation of healthy ecosystems and on which humans depend for basic needs (Scheffers et al. 2016). Genes are changing, species' physiology and physical features such as body size are changing, species are moving to try to keep pace with suitable climate space, species are shifting their timing of breeding and migration, and entire ecosystems are under stress (Cahill et al., 2012; Chen et al., 2011; Maclean & Wilson, 2011; Parmesan, 2006; Parmesan & Yohe, 2003; Root et al., 2003; Warren et al., 2011).

Improving landscape connectivity is a key factor for climate change resilience and adaptation (Heller and Zavaleta 2009). Without functional connectivity that provides multiple pathways for mountain lion movement, isolated Central Coast and Southern California mountain lion populations and the prey they depend on may not be able to shift their ranges as available resources shift. Enhanced connectivity that provides redundant corridors for safe passage between suitable habitats would improve chances of survival and reproduction in the face of climate change by increasing the probability of movement across landscapes by a wider variety of species and providing alternate escape routes or refugia for animals seeking safety (Mcrae et al. 2008; Pinto and Keitt 2008; Mcrae et al. 2012; Cushman et al. 2013; Olson and Burnett 2013).

7 Degree and Immediacy of Threat

As demonstrated in the previous sections, Central Coast and Southern California mountain lions are at risk of extirpation under current conditions. Roads and development have fractured connectivity, which has led to the separation of at least six isolated, genetically distinct populations in the CC-N, CC-C, CC-S, SAM, SGSB, and EPR (Ernest et al. 2014; Riley et al. 2014; Vickers et al. 2015; Benson et al. 2016a; Benson et al. 2019). Due to extreme isolation and high levels of human-caused mortalities, the SAM and CC-S mountain lions have low genetic diversity, low effective population sizes, and high levels of inbreeding (Ernest et al. 2014; Riley et al. 2014; Vickers et al. 2015; Benson et al. 2016a; Benson et al. 2019). Benson et al. (2019) predicted high losses of heterozygosity in the SAM and Santa Monica Mountains populations, which suggests that inbreeding depression is imminent. If inbreeding depression occurs, the SAM and Santa Monica Mountains/CC-S populations will likely go extinct within 50 years, with median times to extinction of 11.7 years and 15.1 years, respectively (Benson et al. 2019). With similarly low genetic diversity and effective population size, the SGSB and CC-N populations likely have a similar fate. And although the CC-C and EPR populations appear to be slightly healthier with more genetic diversity and a higher effective population size, these populations have effective population sizes that are still well below the most recent recommended threshold to prevent inbreeding depression in the short-term (Frankham et al. 2014; Gustafson et al. 2018); continued development in these areas could propel these populations towards extinction more quickly. Clearly, Central Coast and Southern California mountain lion populations are succumbing to anthropogenic pressures, and without immediate action to restore and enhance connectivity between the populations and suitable habitat, they will be lost, potentially within our lifetimes.

Immediate action is critical for the long-term persistence of Central Coast and Southern California mountain lions and the health of Central Coast and Southern California ecosystems. Connectivity between the populations and suitable habitat must be restored and enhanced to facilitate movement and gene flow while reducing human-caused mortalities. Anthropogenic pressures, especially vehicle strikes and depredation kills, should be minimized to help the recovery of these populations. Although translocation of outbred animals has been shown to be effective to increase genetic diversity (Johnson et al. 2010), this would only be a short-term, unsustainable solution given the current level of isolation of these populations (Ernest et al. 2014; Riley et al. 2014; Vickers et al. 2015; Benson et al. 2016a; Benson et al. 2019). Strategically-placed road/barrier crossing infrastructure that allows for dispersal and gene flow and reduces mortalities would be a more comprehensive, long-term solution to save these populations in perpetuity. And the preservation of intact linkages, especially the Tehachapi and Sierra Pelona Mountains, is essential to maintain statewide genetic connectivity. Immediate regulatory action under the CESA is needed to enhance connectivity among Central Coast and Southern California mountain lion populations and suitable habitat to ensure the conservation of these iconic big cats.

8 Inadequacy of Existing Regulatory Mechanisms

8.1 State Regulatory Mechanisms

Proposition 117

The California Wildlife Protection Act of 1990 (Proposition 117) declared that the mountain lion is a "specially protected mammal under the laws of this state." (Cal. Fish & Game Code § 4800(a).) Proposition 117 acknowledged that mountain lion habitat in the Santa Monica Mountains, Santa Ana Mountains, Santa Susana Mountains, and Simi Hills is disappearing rapidly and that "[s]mall and often isolated wildlife populations are forced to depend upon these shrinking habitat areas within the heavily urbanizing areas of this state." (Cal. Fish & Game Code § 2780(d).) Proposition 117 further found that "[c]orridors of natural habitat must be preserved to maintain the genetic integrity of California's wildlife." (*Id*.)

In order to preserve mountain lion populations in California, Proposition 117 mandated that mountain lions are not to be considered a "game mammal," such that hunting is generally prohibited. (Cal. Fish & Game Code § 3950.1(a).) Subject to certain exceptions, Proposition 117 makes it unlawful to take, injure, possess, transport, import, or sell a mountain lion. (Cal. Fish & Game Code § 4800(b).) Nonetheless, a mountain lion may still be removed or killed if it is "perceived to be an imminent threat to public health or safety" or is perceived by CDFW to be "an imminent threat to the survival of any threatened, endangered, candidate, or fully protected sheep species." (Cal. Fish & Game Code § 4801.) Mountain lions that have not been designated an "imminent threat to public health or safety" may still be removed via nonlethal means. (Cal. Fish & Game Code § 4801.5(a).)

A person whose livestock or other property has been damaged or destroyed by a mountain lion may request a permit to "take" the mountain lion. (Cal. Fish & Game Code § 4802.) CDFW is required to immediately take action to confirm that there has been a

depredation. (Cal. Fish & Game Code § 4803.) If CDFW is satisfied that there has been a depredation, CDFW "shall promptly issue a permit to take the depredating mountain lion." (*Id*.) There is no limit to the number of depredation permits a property owner can request from CDFW. In addition, mountain lions that are encountered while pursuing or inflicting injury on livestock or domestic animals may be taken immediately without the need for a permit. (Cal. Fish & Game Code § 4807.)

While Proposition 117 prohibits all hunting of mountain lions as well as the purposeful killing of mountain lions in most circumstances, it does not contain provisions to ensure that connectivity between core habitats for the Southern California or Central Coast mountain lions will be protected. As discussed above in *Section 6.0 Factors Affecting the Ability to Survive and Reproduce*, the primary threat to Southern California and Central Coast mountain lions is not hunting—it is habitat fragmentation and the lack of crossing infrastructure, which has led to major declines in genetic diversity, high levels of inbreeding, and high levels of human-caused mortalities via vehicle strikes, depredation kills, and intraspecific strife due to limited space and the inability for young mountain lions to disperse.

8.1.1 CDFW Departmental Bulletins

CDFW has issued "Departmental Bulletins" relating to mountain lions. The most recent bulletin was issued in December 2017 and applied specifically to the Santa Monica Mountains and SAM mountain lion populations (the "2017 Bulletin") (CDFW 2017).[20] The 2017 Bulletin acknowledged (1) the lack of genetic diversity in the Santa Monica Mountains and SAM mountain lion populations and (2) that human population growth and anthropogenic barriers are restricting connectivity with other mountain lion populations. In order to reduce unnecessary killings of mountain lions in the Santa Monica Mountains and SAM populations, the 2017 Bulletin provides that any person reporting a depredation (a "reporting party") may be issued a first permit to employ non-lethal measures to deter mountain lions from further depredation, and a second permit to "haze" a depredating mountain lion. In the first instance, the reporting party would institute economically feasible measures designed to reduce the potential for attracting mountain lions such as removing the carcasses of depredated animals, installing or repairing and consistently using enclosures to exclude mountain lions, or employing guardian animals in the immediate vicinity of livestock or other domestic animals. The 2017 Bulletin provides that CDFW would not be required to issue a lethal depredation permit until (1) a third depredation event has occurred, and (2) CDFW has confirmed that the reporting party has already implemented all reasonable preventative measures.

In January of 2018, CDFW adopted the 2017 Bulletin's new depredation permit policy. Although this provides some additional protections and will likely reduce lethal take of mountain lions in the Santa Monica Mountains and the SAM, researchers have documented instances wherein domestic animal owners killed mountain lions in these areas without complying with CDFW instructions under the new policy (W. Vickers, *pers comm*). The 2017 Bulletin does not apply to other vulnerable populations, like the SGSB, EPR, CC-N, and CC-C mountain lions. In

[20] California Department of Fish and Wildlife, *Human/Wildlife Interactions in California: Mountain Lion Depredation, Public Safety, and Animal Welfare – Amendment to Department Bulletin 2013-02* (Dec. 15, 2017), available at https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=153021.

addition, the new policy is not designed to ensure protection of habitat or connectivity necessary for the continued survival of the Santa Monica Mountains and SAM mountain lion populations and is insufficient to ameliorate the anthropogenic mortalities related to potential extirpation.

8.1.2 California Environmental Quality Act

The California Environmental Quality Act ("CEQA") is California's landmark environmental law and establishes a state policy to prevent the "elimination of fish or wildlife species due to man's activities, ensure that fish and wildlife populations do not drop below self-perpetuating levels, and preserve for future generations representations of all plant and animal communities...." (Cal. Pub. Res. Code § 21001(c)). Towards this end, state and local agencies are required to analyze and disclose the impacts of any discretionary decision or activity. CEQA contains a substantive mandate that agencies should not approve projects as proposed if there are feasible alternatives or mitigation measures which would substantially lessen the significant environmental effects of such projects. (Cal. Pub. Res. Code § 21002.)

CEQA requires a "mandatory finding of significance" if a project may "substantially reduce the number or restrict the range of an endangered, rare or threatened species." (Cal. Code Regs., tit. 14, § 15065(a)(1).) CDFW has interpreted this provision to apply to species of special concern, which are species that are "experiencing, or formerly experienced, serious (noncyclical) population declines or range retractions (not reversed) that, if continued or resumed, could qualify it for State threatened or endangered status."[21] CDFW further provides that species of special concern "should be considered during the environmental review process." (*Id.*; Cal. Code Regs., tit. 14, § 15380.) Thus, a potentially substantial impact on a species of special concern, threatened species, or endangered species could be construed as "per se" significant under CEQA. (*Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* (2007) 40 Cal.4th 412, 449.) And under CEQA, when an effect is "significant," the lead agency approving the project must make a finding that changes or alterations have been incorporated into the project to avoid or mitigate its significant impacts, or that such changes are within the responsibility of another agency, or that mitigation is infeasible. (Cal. Pub. Res. Code § 21081(a).) These provisions therefore provide some protections to species that are listed as species of special concern, threatened, or endangered.

However, Southern California and Central Coast mountain lions are not listed as a species of special concern or as threatened or endangered, such that a project that has the potential to significantly impact one of these populations would not necessarily qualify as a "significant effect" under a lead agency's interpretation of CEQA. In such case, CEQA's substantive mandate to adopt all feasible alternatives or mitigation measures might not be triggered.

CEQA also requires a "mandatory finding of significance" if a project may "substantially reduce the habitat of a fish or wildlife species; cause a fish or wildlife population to drop below self-sustaining levels; threaten to eliminate a plant or animal community." (Cal. Code Regs., tit. 14, § 15065.) Moreover, CEQA's "Environmental Checklist" in Appendix G of the CEQA

[21] California Department of Fish and Wildlife, *Species of Special Concern* , available at https://www.wildlife.ca.gov/Conservation/SSC.

Guidelines characterizes a project's effects as "significant" if the project would "interfere substantially with the movement of any native [] wildlife species or with established native resident or migratory wildlife corridors...."

While these provisions might theoretically offer some protection for Southern California or Central Coast mountain lions, in practice they have not provided sufficient protection. Under CEQA, lead agencies have discretion to develop their own thresholds of significance. (*East Sacramento Partnerships for a Livable City v. City of Sacramento* (2016) 5 Cal.App.5th 281, 300; Cal. Code Regs., tit. 14, § 15064(d)). This allows local agencies—who are often under pressure from developers to approve projects—to make significance determinations that are inconsistent with independent scientific analysis, including CDFW's analysis. For instance, in December 2017, the City of Temecula approved a 200-acre mixed use project called the Altair Specific Plan that would allow development in the last remaining viable linkage for the SAM mountain lion population between the Santa Ana Mountains and Peninsular Ranges. The City determined that impacts to mountain lions were not significant despite strong disagreement by CDFW, USFWS, and independent mountain lion experts.[22] CDFW warned the City of Temecula that the SAM population has "extremely low genetic diversity which is attributed to low gene flow between the small Santa Ana Mountains population and the larger population in the Peninsular Ranges" and that development is contributing to this genetic decay. (*Id*.) CDFW concluded that "increased human activity associated with the proposed Civic Site at this sensitive location would [] be detrimental to facilitating the movement of mountain lions across Interstate Highway 15 (I-15) to the Peninsular Range." (*Id*.)

Even when a lead agency acknowledges that an effect is "significant," CEQA allows a lead agency to adopt a "statement of overriding considerations" and approve a project if the agency finds that other factors outweigh the environmental costs of the project or that further mitigation is infeasible. (Cal. Code Regs., tit. 14, § 15093(b); Cal. Pub. Res. Code § 21081.) This means that even if a project may have a significant effect on a "wildlife population" like the CC-S, SAM, SGSB, or EPR mountain lions, an agency could interpret CEQA as still allowing approval of the project. CEQA in practice is therefore inadequate to protect the Southern California and Central Coast mountain lions.

Finally, as noted above, the lack of adequate wildlife connectivity and wildlife crossings is the primary factor driving Southern California and Central Coast mountain lions closer to extinction. Yet, agencies have not interpreted CEQA (or the National Environmental Policy Act, discussed further below) as including a clear legal mechanism for mitigation for impacts on wildlife connectivity. For example, in the Final Environmental Impact Report/Final Environmental Impact Statement for the Northwest 138 Corridor Improvement Project (the "Northwest 138 EIR"), Caltrans and the Los Angeles County Metropolitan Transportation Authority wrote: "The proposed project has the potential to directly or indirectly impact wildlife movement throughout the project limits. However, with the inclusion of the proposed avoidance and minimization measures, impact levels area expected to be relatively low. Exact acres of impacts to wildlife corridors are unable to be quantified, and currently there is no real

[22] City of Temecula, *Altair Specific Plan Final Environmental Impact Report* (Oct. 2017), available at https://temeculaca.gov/DocumentCenter/View/4513/Altair-Specific-Plan-Final-Environmental-Impact-Report-FEIR.

mechanism for compensatory mitigation for these types of impacts."[23] The Northwest 138 EIR also contained no analysis of the highway's impacts on mountain lions, given that they are not presently listed as threatened or endangered.

Indeed, CDFW has urged lead agencies to consider wildlife connectivity in CEQA planning documents, without success. For instance, the Los Angeles County General Plan Draft EIR concluded that the buildout of the General Plan "will impact regional wildlife linkages" and have a "significant adverse effect on wildlife movement."[24] The Draft EIR concluded that policies proposed in the General Plan "do not provide for mitigation for loss of wildlife movement opportunities. If development impacts regional wildlife linkages and impedes wildlife movement, connectivity will be lost on a regional scale in these vital landscape corridors and linkages. Thus impacts to wildlife movement remain significant at the General Plan level." (*Id*.) In commenting on the Draft EIR, CDFW specifically objected to this conclusion:

> The Department does not concur with the conclusion in the DPEIR that unavoidable loss of wildlife movement opportunities or nursery sites within or outside of an SEA does not warrant mitigation. Without mitigation, the Project and subsequent projects would result in direct and cumulative loss of biological diversity. Mitigation opportunities for wildlife corridors and nursery sites are best established during large scale planning efforts such as this General Plan. Wildlife corridor areas can be delineated and set aside in the General Plan for current and future conservation efforts. An assessment could be placed on development within the Project area to secure the acquisition of these critical linkages and sites, therefore reducing impacts to wildlife corridors and nursery sites and ensuring biological diversity.[25]

In responding to this comment, Los Angeles County refused to implement CDFW's recommendations, claiming "it cannot be assumed that wildlife corridor areas for future conservation that can be set aside because those properties may not become publicly owned." (*Id*.) Los Angeles County's responses to CDFW's recommendations underscore that lead agencies have not interpreted CEQA to include a clear legal mechanism for mitigation for impacts on wildlife connectivity, even though such connectivity is critical to the survival of Southern California and Central Coast mountain lions.

8.1.3 Significant Natural Areas Program

The Significant Natural Areas Program ("SNAP") requires CDFW to develop and maintain a spatial data system that identifies those areas in the state that are most essential for maintaining habitat connectivity, including wildlife corridors and habitat linkages. (Cal. Fish & Game Code § 1932(b).) SNAP also requires CDFW to consult with other government agencies and stakeholders to identify natural areas deemed to be most significant. (Cal. Fish & Game

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[23] State of California Department of Transportation, *Northwest State Route 138 Corridor Improvement Project Final Environmental Impact Report / Environmental Impact State and Section 4(f) Evaluation* (June 2017), available at https://www.metro.net/projects/nw138/nw138-FEIR-FEIS/.

[24] County of Los Angeles, *Los Angeles County General Plan Update Draft Environmental Impact Report* (June 2014), available at http://planning.lacounty.gov/assets/upl/project/gp_2035_deir.pdf.

[25] County of Los Angeles, *Los Angeles County General Plan Update Final Environmental Impact Report* (March 2015), available at http://planning.lacounty.gov/assets/upl/project/gp_2035_lac-gpu-final-eir-final.pdf.

Code § 1932(f).) SNAP further requires CDFW to seek maintenance and perpetuation of the state's most significant natural areas for present and future generations in the most feasible manner. (Cal. Fish & Game Code § 1932(g).)

However, SNAP does not require or authorize any particular land use action or decision. (Cal. Fish & Game Code § 1932.5.) Likewise, SNAP does not change or prevent the change of use of any area identified pursuant to the program. (Cal. Fish & Game Code § 1933.) It therefore does not *require* any particular natural areas to be conserved. Because of this, it is insufficient to protection wildlife connectivity essential to the survival of Southern California and Central Coast mountain lions.

8.1.4 Natural Community Conservation Planning Act

The Natural Community Conservation Planning Act is a voluntary conservation planning mechanism for proposed development projects within a planning area to avoid or minimize impacts to wildlife. (Cal. Fish & Game Code § 2801(f).) The NCCP Act is designed to promote coordination among agencies and landowners to conserve unfragmented habitat areas and multihabitat management. (Cal. Fish & Game Code § 2801(d).)[26]

There are no Natural Community Conservation Plans ("NCCPs") that cover the Santa Monica Mountains or San Gabriel Mountains. There are a few NCCPs that cover portions of the Santa Ana Mountains and Eastern Peninsular Ranges, some of which also act as "habitat conservation plans" or "HCPs" pursuant to the Federal Endangered Species Act (16 U.S.C. § 1539). These include the County of Orange (Central Coastal) NCCP/HCP, the Orange County Transportation Authority NCCP/HCP, Western Riverside County Multiple Species HCP, San Diego Multiple Habitat Conservation Program, San Diego Multiple Species Conservation Program, and the San Diego North County Multiple Species Conservation Plan. There also is an NCCP that covers the Coachella Valley and portions of the San Bernardino Mountains called the Coachella Valley NCCP/HCP.

Of these NCCPs, only four "cover" portions of the Southern California mountain lion populations: (1) Western Riverside County Multiple Species HCP; (2) San Diego Multiple Habitat Conservation Program; (3) San Diego County Multiple Species Conservation Program; and (4) San Diego North County Multiple Species Conservation Plan.[27] Below is a discussion of each as they relate to mountain lions:

(1) The Western Riverside County Multiple Species HCP acknowledges that the SAM mountain lion population is at high risk of extirpation due to demographical instability unless there is a "movement connection between the Santa Ana Mountains

[26] The NCCP Act also is described on CDFW's website at https://www.wildlife.ca.gov/conservation/planning/NCCP.

[27] California Department of Fish and Wildlife, *Conservation Plans By Species*, available at https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=108719&inline. Both San Diego Gas & Electric and San Diego County Water Authority are permittees of HCPs/NCCPs covering mountain lions, but these only apply to activities undertaken by these entities.

and the Palomar Mountains."[28] However, mountain lions are considered to be "adequately conserved."[29] As such, the Western Riverside County Multiple Species HCP offers little protection for the SAM mountain lion population. While this HCP does identify linkages designed to ensure connectivity for mountain lions, the Western Riverside County Regional Conservation Authority has failed to enforce the HCP to protect such linkages when permittees such as the City of Temecula approve development that would severely constrict or impair such linkages.

(2) The San Diego Multiple Habitat Conservation Program is an NCCP and HCP that purportedly covers mountain lions, but the program readily concedes that mountain lions (as well as deer) "were not a major consideration in linkage design."[30] In addition, the EIR/EIS states that "[d]ue to the limited availability of habitat in the study area, implementation of the MHCP is not expected to substantially increase or decrease the population viability of the mountain lion."[31] The EIR/EIS likewise concludes there are no major populations or critical locations for the mountain lion within the plan area, and concludes it is "adequately conserved" under the plan. (*Id*.)

(3) The San Diego Multiple Species Conservation Program is an NCCP and HCP that covers 900 square miles in the southwestern portion of the San Diego. The Program lists mountain lions as "conserved" and states that mountain lions "will be covered by the MSCP because 81% of the core areas (105,000± acres) that support its habitat will be conserved."[32] While the Program generally notes that linkage areas were designed to accommodate "large animal movement," the Program does not identify any linkages designed for mountain lions or any specific measures designed to protect them. Likewise, while the Program states that "[s]pecific design criteria for linkages and road crossings/undercrossings are included in subarea plans," not all subarea plans are complete.

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[28] Western Riverside County Regional Conservation Authority, *Western Riverside County MSHCP Species Accounts*, available at http://wrcrca.conserveriverside.com/wrcrca/Permit_Docs/MSHCP_Docs/volume2/vol2-secb_Mammals.pdf.

[29] Western Riverside County Regional Conservation Authority, *Western Riverside County Multiple Species Habitat Conservation Plan*, available at http://wrcrca.conserveriverside.com/wrcrca/Permit_Docs/MSHCP_Docs/volume1/Vol1-sec2.pdf.

[30] San Diego Association of Governments, *San Diego Multiple Habitat Conservation Program Biological Monitoring and Management Plan (Volume III)* (Mar. 2003), available at https://www.sandag.org/programs/environment/habitat_preservation/mhcp_vol3.pdf.

[31] San Diego Association of Governments, *Final Environmental Impact Statement/Environmental Impact Report for Threatened and Endangered Species Due to Urban Growth within the Multiple Habitat Conservation Program Planning Area* (Mar. 2003), available at https://www.sandag.org/programs/environment/habitat_preservation/mhcp_eir_vol1.pdf.

[32] County of San Diego, *Final Multiple Species Conservation Program* (Aug. 1998), available at https://www.sandiegocounty.gov/content/dam/sdc/pds/mscp/docs/SCMSCP/FinalMSCPProgramPlan.pdf.

(4) The San Diego North County Multiple Species Conservation Plan is one of the "subarea" plans anticipated by San Diego Multiple Species Conservation Program. However, it has not been completed and is still "in development."[33]

(5) The Orange County Transportation Authority NCCP/HCP ("OCTA Plan") lists the mountain lion as a covered species for purposes of the federal HCP, but not for purposes of the NCCP permit. The OCTA Plan acknowledges that despite protection from hunting, annual survival for radio-collared lions is "surprisingly low" at 55.8 percent and that vehicle collisions and depredation permits are primary sources of mortality. The OCTA Plan states that targeted investment in habitat protection is "especially urgent to maintain viability of the Santa Ana Mountains populations."[34] The OCTA Plan does contain four "Species Goals" for mountain lions, including (1) acquiring 1,013 acres of suitable habitat; (2) fencing realignment near the Highway 241 toll road; (3) funding of the North Coal Canyon Restoration Project; and (4) a "wildlife crossing policy" requiring pre-construction surveys to ensure existing crossings "maintain or improve functionality" if modified by new freeway projects. However, despite allowing the expansion of two highways in lion habitat (Projects G and J), the OCTA Plan does not require the construction of any specific wildlife crossings. The OCTA Plan nonetheless claims that impacts on the mountain lion will be offset through these "Species Goals."

There are no NCCPs that cover the Central Coast. In addition, there are no NCCPs that cover portions of the Santa Cruz Mountains except the Santa Clara Valley Habitat Plan. However, this Plan does not cover mountain lions.

8.2 Federal Regulatory Mechanisms

8.2.1 National Environmental Policy Act

The National Environmental Policy Act ("NEPA") is the nation's charter for protection of the environment. (40 C.F.R. § 1500.1(a).) NEPA is designed to ensure that environmental information is available to the public *before* decisions are made or actions taken and to help public officials make decisions based on an understanding of the environmental consequences. (40 C.F.R. § 1500.1(b)-(c).) Federal agencies must prepare an environmental impact statement ("EIS") if it is known that an action will significantly affect the environment, or an environmental assessment ("EA") if the extent of effects are unknown. (42 U.S.C§ 4332; 40 C.F.R. §§ 1502.3 & 1508.9.) NEPA further requires federal agencies to analyze reasonable alternatives to the proposed project. (40 C.F.R. § 1502.14(a)-(c).) NEPA requires the federal agency to consider the degree of adverse effect on a species or its critical habitat designated pursuant to the Federal Endangered Species Act. (*Conservation Cong. v. United States Forest Serv*. (E.D.Cal. 2017) 235 F.Supp.3d 1189, 1207.)

[33] County of San Diego, *Multiple Species Conservation Program*, available at https://www.sandiegocounty.gov/pds/mscp/.
[34] Orange County Transportation Authority, *Natural Community Conservation Plan/Habitat Conservation Plan* (Nov. 2016), available at https://www.octa.net/pdf/NCCP%20HCP%20FINAL.pdf.

However, agencies have not interpreted NEPA as requiring analysis of impacts to populations that are not currently listed as threatened or endangered, such as the Southern California or Central Coast mountain lions. For instance, Caltrans prepared an Initial Study with Proposed Mitigated Negative Declaration/Environmental Assessment for the State Route 118 Widening Project (the "State Route 118 EA") in October 2017 pursuant to NEPA and CEQA. The State Route 118 EA contains no analysis of whether adding more traffic lanes to State Route 118 will impact mountain lions or degrade wildlife connectivity even though multiple mountain lions have died recently attempting to cross State Route 118.[35]

NEPA also is insufficient to protect Southern California and Central Coast mountain lions because courts have interpreted NEPA as primarily a "procedural" statute. While NEPA does require federal agencies to consider detailed information regarding a project's environmental effects, "NEPA itself does not mandate particular results." (*Winter v. NRDC, Inc.* (2008) 555 U.S. 7, 23.)

8.3 Regional and Local Plans and Policies

8.3.1 Santa Monica Mountains National Recreation Area General Management Plan

The Santa Monica Mountains National Recreation Area General Management Plan ("GMP") was prepared pursuant to NEPA and provides a framework for the management of the Santa Monica Mountains National Recreation Area ("SMMNRA"), which is administered by the National Park Service, California State Parks, and the Santa Monica Mountains Conservancy. The GMP recognizes that the Santa Monica Mountains mountain lion population's ability to survive in the face of large-scale habitat fragmentation and destruction is uncertain.[36] (GMP at 154.) The GMP states that "it is likely that their persistence [] would depend upon their capability of dispersing to and from other habitat areas beyond the Santa Monica Mountains." (GMP at 154; see also GMP at 157.) The GMP identifies the "greatest threat" to natural resource preservation in the SMMNRA as "loss of habitat connectivity from increased development and urban encroachment." (*Id*. at 157.) The GMP concedes that "the situation is especially serious for mountain lions" and lists mountain lions as a "park species of concern." (*Id*. at 157 & 161.) The GMP agrees that improvements to facilitate wildlife movement across freeways or through developments may be necessary, but does not propose or require any specific actions to improve wildlife movement across freeways or through development.

The preferred alternative in the GMP provides for enhancing connectivity of undisturbed habitats in the SMMNRA by creating large expanses of open space. (*Id*. at 292.) In addition, the Las Virgenes Canyon and Liberty Canyon areas are included within the SMMNRA boundary to help provide wildlife connectivity for mountain lions and other large species. (*Id*. at 293.) Even though the GMP recognizes the threats facing the Santa Monica Mountains mountain lion

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[35] National Parks Traveler, *Another Mountain Lion Killed Near Santa Monica Mountains National Recreation Area* (Jan. 27, 2017), available at https://www.nationalparkstraveler.org/2017/01/another-mountain-lion-killed-near-santa-monica-mountains-national-recreation-area.

[36] National Park Service, U.S. Department of Interior, *Santa Monica Mountains National Recreation Area General Management Plan Environmental Impact Statement* (July 2002), available at https://www.nps.gov/samo/learn/management/loader.cfm?csModule=security/getfile&PageID=383979.

population and takes steps to protect this population, the GMP does not apply to lands outside of the SMMNRA and thus is insufficient to address the regional connectivity issues facing the population. Nor does the GMP apply to roads and highways under Caltrans' jurisdiction.

8.3.2 Ventura County Wildlife Connectivity Ordinance

The Ventura County Board of Supervisors adopted an ordinance on March 12, 2019 (the "Connectivity Ordinance") to help facilitate wildlife connectivity and minimize habitat fragmentation for mountain lions, mule deer, California gnatcatchers, bobcats, least bell's vireos, California red-legged frogs, and other species. The Connectivity Ordinance establishes overlay zones called "habitat connectivity and wildlife corridors" ("HCWCs") and "critical wildlife passage areas" ("CWPAs") in which development standards and permitting requirements apply. Development standards include 200-foot setbacks from surface water features such as streams and wetlands, limits on certain wildlife impermeable fencing, encouraging compact siting of development, and prohibiting non-commercial planting of invasive plants. Two of the linkages targeted in the Connectivity Ordinance are the Santa Monica Mountains – Sierra Madre Mountains connection and the Sierra Madre Mountains – Castaic Connection, which connect wildlife habitat in the Santa Monica Mountains, Santa Susana Mountains, Simi Hills, and Los Padres National Forest.

While the Connectivity Ordinance should help allow wildlife to move more easily through private lands between core habitat areas, it would do little to ensure connectivity across major roads and highways because Ventura County does not have jurisdiction over these areas. The ordinance would, however, establish 200-foot setbacks from the exit and entry points of 25 existing road crossings in order to facilitate wildlife movement through the crossings. Caltrans and its road maintenance and improvement activities are not regulated by the Connectivity Ordinance. The Connectivity Ordinance is therefore a step in the right direction but insufficient on its own to address the threats facing the CC-S mountain lion population.

8.3.3 Los Angeles County Significant Ecological Areas Program

Los Angeles County is currently in the process of updating the Significant Ecological Areas ("SEAs") Ordinance. The draft ordinance is intended to protect biodiversity in SEAs from incompatible development and ensure that projects reduce habitat fragmentation and edge effects by providing technical review of impacts and requiring mitigation.[37] Like the Ventura County ordinance, the SEAs designations can lead to compact development and allow wildlife to more easily move across private lands between core habitat areas. However, the SEA ordinance is not specifically designed to protect mountain lions and would not regulate Caltrans and its road maintenance and expansion activities.

[37] Los Angeles County Department of Regional Planning, *Significant Ecological Areas Ordinance Update, Public Hearing Draft* (Feb. 14, 2019), available at http://planning.lacounty.gov/site/sea/wp-content/uploads/2019/02/EX-C-SEA-Ordinance-Public-hearing-Draft-2-14-2019.pdf

8.4 Future Development Will Further Threaten the Survival of Southern California Mountain Lions

Continued development in Southern California is expected to further impair connectivity between core habitat areas, leading to further decreases in genetic diversity for Southern California mountain lions. In the environmental review for Southern California national forest land management plans, the U.S. Forest Service found that impaired connectivity poses a serious threat to Southern California mountain lions: the "greatest concern for the long-term health of mountain lion populations on the national forests of southern California is loss of landscape connectivity between mountain ranges and large blocks of open space on private land."[38] The review warned that private land development in Southern California is "steadily reducing the habitat linkages that wildlife species need to connect large blocks of national forest land with other public and private natural spaces and habitat reserves." The review observed that the "widening of the existing highway system and new highways" are a threat to mountain lions because they create barriers to movement. The review concluded that "[w]ithout the national forests and linkages between the mountain ranges and other large habitat preserves*, there is not much long term potential for mountain lions in southern California.*" The review noted that maintenance and restoration of corridors between large wildlands is essential to conserving mountain lions in Southern California

As anticipated by the U.S. Forest Service's environmental review, private land development is currently being approved on linkage areas without sufficient mitigation for Southern California mountain lions or wildlife connectivity. For instance, the 1,000-acre Northlake Specific Plan ("Northlake") was approved by the Los Angeles County Board of Supervisors on April 2, 2019. The Santa Monica Mountains Conservancy ("SMMC") formally objected to the Board's approval of Northlake, noting that the development would degrade a known wildlife linkage between the Angeles National Forest and Los Padres National Forest.[39] CDFW raised similar concerns about the development because it would impair a linkage that is "highly suitable for regional wildlife movement and connectivity" for mountain lions and other species.[40] The Board of Supervisors approved Northlake notwithstanding the objections and concerns of SMMC and CDFW.

Likewise, the Los Angeles County Board of Supervisors approved the 12,000-acre Centennial Specific Plan ("Centennial") on April 30, 2019, despite SMMC warning the Board that Centennial "would sever the most optimal five-mile-wide habitat linkage across Highway 138 between I-5 and State Route 14."[41]

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[38] Forest Service, U.S. Department of Agriculture, *Final Environmental Impact Statement, Land Management Plans, Angeles National Forest Cleveland National Forest Los Padres National Forest San Bernardino National Forest* (Sept. 2005), available at https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5166889.pdf.
[39] Santa Monica Mountains Conservancy, *Draft Supplemental Environmental Impact Report Comments on Northlake Specific Plan Project,* May 22, 2017.
[40] California Department of Fish and Wildlife, *Draft Supplemental Environmental Impact Report Comments on Northlake Specific Plan*, June 12, 2017.
[41] Santa Monica Mountains Conservancy, *Centennial Project Draft Environmental Impact Report Comments County Project No. 02-232*, July 17, 2017.

In the SAM, key linkage and habitat areas remain unprotected and subject to potential or actual development. The Altair Specific Plan discussed in *Section 8 Inadequacy of Existing Regulatory Mechanisms* exemplifies this trend. Other lands in the Santa Ana-Palomar Mountain linkage have been subject to development proposals such as the Temecula Creek Inn (Vickers 2015). The Orange County Board of Supervisors also approved a 6,000-acre development in the Santa Ana Mountains in the "center of puma habitat" (Vickers 2015).[42]

Development in wildlands and linkages will intensify as Southern California's population increases. The Southern California Association of Governments ("SCAG") Program EIR estimates that between 2016 and 2040 the Southern California region will grow by 3.8 million residents and 1.5 million households.[43] The SCAG Program EIR concludes that transportation projects within the SCAG region such as "mixed flow lane projects" and "grade separation projects" may result in significant impacts on wildlife movement, including direct habitat removal and fragmentation that would disrupt corridor functionality. The SCAG Program EIR also acknowledges that "an increase in wildlife-roadway interactions as a result of the development of new transportation projects may increase wildlife injury and fatalities."

The SCAG Program EIR recognizes that "[b]arriers to wildlife movement exist throughout the SCAG region, including large areas of urban development and multilane freeways that cut off regional movement corridors for large migratory species such as mountain lions (*Puma concolor*)." SCAG Program EIR further notes that "wildlife crossings serve to alleviate these barriers and facilitate wildlife movement through the region" and references the planned Liberty Canyon Crossing. However, the Program EIR does not identify any other planned crossings or identify funding for the Liberty Canyon Crossing.

The SCAG Program EIR also confirms that only portions of the lands in the Santa Monica Mountains, SAM, SGSB, and EPR are designated as "open space and recreation" or "undevelopable and protected." Indeed, much of these lands are designated for single family residential or mixed residential. At this time, there are also "vast areas" in Southern California that are undeveloped but are not designated as open space or are otherwise protected, according to SCAG. In addition, agricultural lands are rapidly being converted to urban development throughout Southern California with an estimated 230,000 acres converted between 1996 and 2004 and up to 700,000 acres may be converted by 2030. In short, SCAG recognizes that wildlife connectivity will become even more impaired in the Southern California region due to anticipated growth, but SCAG does not offer any solutions to address the effects of this impaired connectivity on Southern California mountain lions.

Other studies confirm that much of the remaining mountain lion habitat in Southern California is on unprotected lands and at risk of development. According to Burdett et al. (2010), almost half of suitable mountain lion habitat in Southern California (since 1970) is on private lands, of which 35% will be developed by 2030, and other currently contiguous habitat will

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[42] See also Chris Boucly, "New community coming to South County," *The Orange County Register* (Mar. 24, 2012), available at https://www.ocregister.com/2012/03/24/new-community-coming-to-south-county/

[43] Southern California Association of Governments, *Draft Program Environmental Impact Report* (Dec. 2015), available at http://scagrtpscs.net/Documents/2016/peir/draft/2016dPEIR_Complete.pdf.

become fragmented. Hunter et al. (2003) similarly found that 30% of high suitability mountain lion habitat and 76% of medium suitability mountain lion habitat in Southern California is not protected from development. In addition, Zeller et al. (2017) found that only 35% of resource-use patches and 47% of corridors identified in their study area, which encompassed much of the SAM and EPR, were fully protected. Given the extreme isolation, low genetic diversity, and high adult mortality rates from vehicle strikes and depredation kills, increased efforts to protect the species and their habitat are warranted.

Within Riverside County, which covers a significant portion of the Santa Ana Mountains, population growth is expected to be especially high; the Riverside County General Plan predicts that the County's population and housing stock will increase to 3.6 million people and 1.3 million dwelling units by 2035, which constitutes a 65 percent increase.[44] Within San Bernardino County, which encompasses portions of the San Bernardino and San Gabriel Mountains, more than 630,000 people will be added to the County along with 230,000 homes.[45] As urban development overtakes mountain lion habitat and linkage areas throughout the region, conflict with mountain lions, and consequent killing of lions under depredation permits will likely increase. Similarly, use of anticoagulant rodenticides and other environmental toxicants in these areas will likely increase, leading to increased illness and fatalities to "non-target organisms" such as Southern California mountain lions.

Caltrans and local transportation agencies are expected to continue building and expanding roads and highways in Southern California to accommodate actual and anticipated vehicles and development. Caltrans' 2018 State Transportation Improvement Program ("STIP") lists many large-scale road and highway projects planned for Southern California.[46] These include converting SR-71 to a four- and six-lane freeway as well as adding more lanes to the I-15 Freeway adjacent to the SAM,[47] which already acts as a nearly impenetrable barrier to the SAM and EPR mountain lion populations. As noted in *Section 8 Inadequacy of Existing Regulatory Mechanisms*, Caltrans has certified an EIR/EIS to convert the existing two-lane SR-138 into a four or six-lane highway, which will create major barrier between the Tehachapi Mountains and Angeles National Forest. Caltrans also intends to widen SR-118, which will further impair connectivity between the Santa Monica Mountains and Santa Susana Mountains to the detriment of the Santa Monica Mountains mountain lions. There are numerous other road and highway projects planned for Southern California in the next few years.[48] These projects will be funded in part by SB 1, which will raise approximately $52 billion over 10 years.

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[44] County of Riverside, *Riverside County General Plan Environmental Impact Report No. 521* (March 2014), available at https://planning.rctlma.org/Portals/14/genplan/general_plan_2014/EnvironmentalImpactReport/03-0_ProjectDescription_2014-04-07.pdf.

[45] San Bernardino County, *Countywide Plan Growth Forecast*, available at http://countywideplan.com/wp-content/uploads/2018/08/CWP_OH_GrowthForecast_FINAL_20180809.pdf.

[46] California Department of Transportation, *2018 Report on STIP Balances County and Interregional Shares* (Aug. 1, 2018), available at http://www.catc.ca.gov/programs/stip/2018-stip/2018_ORANGE_BOOK.pdf.

[47] Riverside County Transportation Commission, *I-15 Express Lanes Project Southern Extension*, https://www.rctc.org/i15-express-southern-extension/

[48] Kurt Snibbe, "Here are the major highway improvement projects happening in Southern California through 2023," *Orange County Register* (Jan. 23, 2018), https://www.ocregister.com/2018/01/23/here-are-maps-and-a-list-of-the-major-highway-improvement-projects-in-southern-california/; Jeong Park, "2019 will be a busy year for big road construction projects in Orange County," *Orange County Register* (Dec. 31, 2018),

Along with this expansion in roads and highways will come an increase in automobile use: SCAG predicts that the number of vehicle miles travelled ("VMT") in the region is expected to increase 13.3 percent by 2040 (from 448 million VMT per day to 504 million VMT per day). This significant increase in automobile use will further impair connectivity and lead to more collisions between automobiles and lions.

8.5 Future Development Will Further Threaten the Survival of Central Coast Mountain Lions

Future development and highway expansion in the San Francisco Bay Area and Central Coast is anticipated to further fragment habitat for Central Coast mountain lion populations and will increase threats to their survival.

The Association of Bay Area Governments' Plan Bay Area projects that the population of the San Francisco Bay Area is expected to increase from 7.2 million to 9.3 million by 2040—a 30 percent increase.[49] This includes a 26 percent increase in San Mateo County and a 36 percent increase in Santa Clara County, both of which encompass significant portions of the Santa Cruz Mountains. The Plan Bay Area also envisions a 25 percent increase in housing units in San Mateo County, and a 31 percent increase in Santa Clara County.

The Greenbelt Alliance's "At Risk" Report ("Greenbelt Report") estimates that 22,700 acres in San Mateo County are at medium or high risk for development, significant portions of which are in the Santa Cruz Mountains.[50] The Greenbelt Report shows that only 113,000 acres of the Santa Cruz Mountains are permanently protected and warns that San Mateo County has planned to develop housing in remote areas on the eastern slope of the Santa Cruz Mountains. The Greenbelt Report estimates that Santa Clara County has 54,100 acres at high or medium risk of development, significant portions of which are in the Santa Cruz Mountains and eastern foothills. The Greenbelt Report further shows that while large swaths of the eastern Santa Cruz Mountains are currently at "low risk" for development, only fragmented portions enjoy permanent protection.

Similarly, the EIR for the Plan Bay Area 2040 notes that land use growth footprints overlap with approximately 1,040 acres of "Essential Connectivity Areas" or "ECAs."[51] The EIR claims these growth footprints are in already urbanized corridors that are degraded so that their function as linkages is limited. The EIR acknowledges that development projects may directly encroach on wildlife corridors, but does not provide any plan to address the effects of

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https://www.ocregister.com/2018/12/31/2019-will-be-a-busy-year-for-big-road-construction-projects-in-orange-county/.

[49] Metropolitan Transportation Commission and Association of Bay Area Governments, *Bay Area Plan*: *A Strategy for A Sustainable Region* (July 18, 2013), available at http://files.mtc.ca.gov/pdf/Plan_Bay_Area_FINAL/Plan_Bay_Area.pdf.

[50] Greenbelt Alliance, *At Risk 2017* (May 2017), available at https://www.greenbelt.org/at-risk-2017/.

[51] Metropolitan Transportation Commission and Association of Bay Area Governments, *Draft Environmental Impact Report for Plan Bay Area 2040* (April 2017), available at http://2040.planbayarea.org/cdn/farfuture/JHbwWZgw24OSpVBL0b8cJ5_2KHOdckVexpxYp5McOkI/1499352691/sites/default/files/2017-07/PBA%202040%20DEIR_0_1.pdf.

such encroachment. In addition, Caltrans has a number of highway improvement projects planned in Santa Clara and San Mateo counties.[52]

There also is development pressure on the Pajaro Hills linkage, which is important to the Central Coast North mountain lion population and connects the Santa Cruz Mountains and Gabilan Range.[53] The Land Trust of Santa Cruz County notes that while a few large ranches cover most of the Pajaro Hills, many of the properties are parcelized, creating the potential for development which would fragment the landscape. Only 8 percent of the Pajaro Hills is permanently protected.

Growth is expected to increase in the Monterey Bay Area, leading to further fragmentation of natural habitats by urban or exurban development. The Association of Monterey Bay Area Governments predicts that the population in the Monterey Bay Area will rise from 755,403 in 2015 to 883,300 in 2040.[54] The Land Trust of Santa Cruz County notes that while high rates of conversion of forests, rangeland and farmland has largely been prevented in Santa Cruz County, exurban development, roads and mining are fragmenting wildlife habitat. Vineyard conversion adjacent to Zayante, Beer Creek, and Summit roads is causing habitat fragmentation in one of the largest intact habitat patches connecting Santa Cruz and Santa Clara counties. The Land Trust of Santa Cruz County estimates that only 44 percent of the large patches of intact habitat are protected. The Conservation Lands Network likewise confirms that much of the Santa Cruz Mountains do not currently qualify as protected areas.[55]

In San Luis Obispo County, the population is expected to increase by 41,650 between 2015 and 2045.[56] The sparsely populated North Coast region of San Luis Obispo County is currently characterized by ranchlands, rural development, and open space. However, the San Luis Obispo Council of Governments ("SLOCOG") predicts more population growth in this region as compared to other regions. SLOCOG also predicts significant increases in traffic volumes on Highway 101 throughout San Luis Obispo County. The US 101 Corridor Mobility Master Plan also contains various proposals to expand the Interstate 101 freeway in San Luis Obispo County, including adding more lanes to the freeway.[57] There are also proposals to widen portions of State Route 46, the western portions of which bisect mountain lion habitat. The Caltrans State Route 46 Corridor System Management Plan concedes that widening segments 2 and 3 of State Route 46 "could present additional barriers to animal movements by further

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[52] Caltrans District 4, *Projects By County*, available at http://www.dot.ca.gov/d4/projects_list.htm.
[53] Land Trust of Santa Cruz County, *A Conservation Blueprint* (May 2011), available at https://landtrustsantacruz.org/blueprint/conservation-blueprint_low-res_110522.pdf.
[54] Association of Monterey Bay Area Governments, *2040 Metropolitan Transportation Plan/Sustainable Communities Strategy* (June 2018), available at http://ambag.org/programs/met_transp_plann/documents/Final_2040_MTP_SCS/AMBAG_MTP-SCS_Final_EntireDocument.pdf.
[55] Conservation Lands Network, *1.0 Progress Report* (2014), available at https://www.bayarealands.org/wp-content/uploads/2017/07/CLN-1.0-Progress-Report.pdf.
[56] San Luis Obispo Council of Governments, *2019 Regional Transportation Plan Public Review Draft* (Feb. 2019), available at https://www.dropbox.com/s/6pysudp1g36n4a5/__Public%20Rev%20draft.pdf?dl=0 .
[57] San Luis Obispo County of Governments, *US 101Corridor Mobility Master Plan* (Sept. 2014), available at http://www.dot.ca.gov/hq/tpp/offices/ocp/5_SLOCOG%20101_executive_summary_draft_9%2019%2014.pdf.

dividing large, contiguous wildlife habitat areas."[58] There are numerous other road and highway expansion projects planned for Santa Cruz, Monterey, San Luis Obispo, and Santa Barbara counties.[59] The expansion of existing roads and highways along with increased numbers of automobiles will further impair connectivity in the Central Coast region.

9 CESA Listing for Southern California and Central Coast Mountain Lions Would Supplement Proposition 117's Protections.

9.1 CESA Listing is Consistent with Proposition 117.

CESA protections for Southern California and Central Coast mountain lions are consistent with and supplemental to those established by Proposition 117. Both CESA and Proposition 117 include "take prohibitions"—CESA makes it unlawful for any person or agency to import, export, take, possess, or purchase a listed species. (Cal. Fish & Game Code § 2080.) By the same token, Proposition 117 makes it unlawful to take, injure, possess, transport, import, or sell a mountain lion. (Cal. Fish & Game Code § 4800(b).)

Both CESA and Proposition 117's take prohibitions are subject to certain exceptions. Under CESA, CDFW may authorize that a person, agency, or institution take a listed species "for scientific, educational, or management purposes." (Cal. Fish & Game Code § 2081(a).) CESA defines scientific resources management activities to include "research, census, law enforcement, habitat acquisition, restoration and maintenance, propagation, live trapping, and, transplantation, and, in the extraordinary case where population pressures within a given ecosystem cannot be otherwise relieved, [] regulated taking." (*San Bernardino Valley Audubon Society v. City of Moreno Valley* (1996) 44 Cal.App.4th 593, 604, quoting Cal. Fish & Game Code § 2061.) The regulations implementing CESA also allow for the take of a listed species for management or law enforcement purposes: "Department wildlife management activities. The possession or take of endangered, threatened, or candidate species by employees and agents of the Department for scientific, educational and management purposes, and for law enforcement purposes, is not prohibited." (Cal. Code Regs., tit. 14, § 783.1(c).) As discussed above in *Section 8 Inadequacy of Existing Regulatory Mechanisms*, Proposition 117 also contains exceptions which allow for the take of mountain lions in certain circumstances. These exceptions are sufficiently similar that in most cases take of mountain lions properly authorized by Proposition 117 could be consistent with CESA's exceptions for wildlife management activities or law enforcement purposes. (Cal. Code Regs., tit. 14, § 783.1(c).)

9.2 CESA Listing Would Further the Goals of Proposition 117.

CESA listing would further Proposition 117's goals of protecting and restoring wildlife habitat as human populations increase. (Cal. Fish & Game Code § 2780(a).) CESA listing would also help preserve "corridors of natural habitat [] to maintain the genetic integrity" of mountain lions in the Santa Monica Mountains, Santa Ana Mountains, Santa Susana Mountains, Simi Hills, and Coast Range. (Cal. Fish & Game Code § 2780(a).)

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[58] Caltrans, *State Route 46 Corridor System Management Plan* (June 2009), available at http://www.dot.ca.gov/hq/tpp/corridor-mobility/CSMPs/d5_CSMPs/SR%2046/SR-46%20CSMPo100.pdf.
[59] Caltrans District 5, *Projects By County*, available at http://www.dot.ca.gov/d5/.

Likewise, CESA requires that "reasonable and prudent alternatives" that will not jeopardize the existence of a listed species be developed in coordination with the project proponent and state lead agency consistent with conserving the listed species and maintaining the project purpose to the greatest extent feasible. (Cal. Fish & Game Code § 2053(b).) In the event that such alternatives are infeasible, individual projects may still be approved if appropriate mitigation measures are implemented. (Cal. Fish & Game Code § 2054.) CESA envisions these mandates will be incorporated into the CEQA process. (Cal. Fish & Game Code §§ 2064-2065; Cal. Code Regs., tit. 14, §§ 783.3 & 783.5.)

Consistent with Proposition 117, CESA further provides that it is the policy of the state to conserve and protect listed species and their habitat, including through acquiring lands for habitat. (Cal. Fish & Game Code § 2052.) Towards this end, CESA directs state agencies to utilize their authority to conserve listed species. (Cal. Fish & Game Code § 2055.) If the Southern California and Central Coast mountain lions were listed under CESA, this mandate would apply to, for example, Caltrans, which currently lacks a clear mandate to conserve these lions or habitat connectivity necessary for their continued survival.

CESA authorizes CDFW to develop and implement "nonregulatory recovery plans" for listed species with priority given to species that are or may be "significantly affected by anticipated land use changes, climate change, or changes in aquatic conditions." (Cal. Fish & Game Code §§ 2079.1(a) & (b).) Given the strong evidence that land use changes will significantly affect (and have already significantly affected) Southern California and Central Coast mountain lions, CDFW could develop and implement a recovery plan for these lions pursuant to this provision.

In sum, CESA listing would build upon the protections in Proposition 117 by establishing an affirmative duty to ensure the survival and recovery of the Southern California and Central Coast mountain lions by, *inter alia*, (1) prohibiting the approval of projects that could jeopardize their continued existence or result in destruction of essential habitat (Cal. Fish & Game Code § 2053(a)); (2) requiring state agencies such as Caltrans to utilize their authority to conserve listed species (Cal. Fish & Game Code § 2055); and (3) requiring appropriate mitigation measures be implemented for projects that could destroy mountain lion habitat or impair connectivity (Cal. Fish & Game Code § 2054).

To the extent there is any tension between the provisions in Proposition 117 and CESA, Proposition 117 is to be "liberally construed to further its purposes." (Prop. 117 § 9.) Because Proposition 117 and CESA both have similar purposes, Proposition 117 should be construed to be consistent with CESA.

10 Recommended Management and Recovery Actions

Recommendations for the management and recovery of Southern California and Central Coast mountain lion populations are as follows:

1. Design and build crossing infrastructure in strategic locations to improve wildlife connectivity and permeability at existing roads and highways. Crossing infrastructure should include but is not limited to overcrossings, underpasses, culverts, and exclusionary fencing that guides animals to safer crossing areas. The following crossing locations have been identified by mountain lion experts and should be prioritized for the implementation of crossing infrastructure: 1) I-15 Freeway at Temecula Creek Bridge to enhance the Palomar Linkage and connect the Santa Ana and Eastern Peninsular Mountain Ranges (Gustafson et al. 2017; Zeller et al. 2017; Ernest et al. 2014; Riley et al. 2018); 2) I-15 Freeway at "Site 5" as described in Riley et al. (2018); 3) Hwy-101 at West Liberty Canyon. (Riley et al. 2018.)

2. Improve or add large culverts to existing freeways in areas suitable for mountain lion crossing. (Vickers 2015).

3. Dedicate sufficient Wildlife Conservation Board, Habitat Conservation Fund and other state funding sources towards acquiring key mountain lion habitat and for establishment of highway crossing infrastructure.

4. Ensure that suitable habitat exists (through preservation or restoration/enhancement) on both sides of crossing structures and culverts (South Coast Wildlands 2008). Restrict human activity near crossing structures and relocate foot trails away from these structures (South Coast Wildlands 2008).

5. Fully protect mountain lion habitat, including resource-use patches and corridors (Zeller et al. 2017; Vickers et al. 2015). Prohibit large-scale development in primary travel corridors and habitat linkages, such as in and around the last remaining linkage for statewide genetic connectivity in the Tehachapi and Sierra Pelona Mountains (Gustafson et al. 2018) and in corridor areas between the SAM and EPR (Gustafson et al. 2017).

6. Require analysis of region-wide wildlife connectivity in all new development proposals (Gustafson et al. 2018).

7. Reduce depredation conflicts that precipitate mountain lion deaths (Vickers et al. 2015). Develop and implement outreach and education activities to promote use of predator-proof enclosures for domestic animals. (Vickers et al. 2015.) Expand CDFW's new three-step depredation permit policy in the CC-S and SAM areas to include all mountain lions across the state, or at a minimum, within the SGSB, EPR, CC-N, and CC-C population areas. Enhance the policy with enforceable implementation of non-lethal protective measures and reporting requirements.

8. Prohibit the use of second-generation anticoagulant rodenticides ("SGARs"), such as brodifacoum, bromadiolone, difenacoum, and difethialone in Southern California and Central Coast mountain lions' core habitat areas and linkages. Limit the use of other pesticides and herbicides that may have negative effects on mountain lion populations in Southern California and the Central Coast.

9. Identify “priority areas” for establishing wildlife passage features for the Southern California and Central Coast mountain lions using the best available science, including data collected by various agencies, academic institutions, and organizations, including but not limited to the National Park Service, the Karen C. Drayer Wildlife Health Center at UC Davis, the Road Ecology Center at UC Davis, and the Santa Cruz Puma Project at UC Santa Cruz.

10. Require Caltrans to analyze how projects in the State Highway Operation Protection Program and State Transportation Improvement Program can be designed to facilitate wildlife connectivity through wildlife passage features such as culverts, undercrossings, overcrossings, bridges, directional fencing, scuppers, barrier breaks, roadside animal detection systems, etc. Require Caltrans to collect and analyze roadkill data to identify hotspots where mountain lions are killed. Require Caltrans to implement wildlife passage features to the greatest extent feasible and as expeditiously as possible.

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State of California
Department of Fish and Wildlife

Memorandum

Date: December 10, 2025

To: Melissa Miller-Henson
Executive Director
Fish and Game Commission

From: Charlton H. Bonham
Director

Subject: Status Review Report for the Petitioned Southern California/Central Coast Evolutionarily Significant Unit (ESU) of Mountain Lion (*Puma concolor couguar*)

The California Department of Fish and Wildlife (Department) has prepared the attached status review report for the petitioned Southern California/Central Coast Evolutionarily Significant Unit (ESU) of mountain lion (*Puma concolor couguar*) for the California Fish and Game Commission (Commission) pursuant to the California Endangered Species Act, Fish and Game Code section 2050 et seq. The Commission published the Notice of Candidacy Findings on May 1, 2020, directing the Department to prepare a status review report. On April 14, 2021, the Commission approved a department request for a 6-month extension to further analyze the petition and complete its status review report.

The Department completed the attached status review report as required by Fish and Game Code section 2074.6. The status review report contains the Department's review of the best scientific information available to the Department on the status of the mountain lion in the petitioned area and serves as the basis for the Department's recommendation to the Commission that listing a distinct population segment of the mountain lion as threatened is warranted. The Department finds that although not presently threatened with extinction, a distinct population segment of the mountain lion is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by CESA.

If you have any questions or need additional information, please contact Scott Gardner, Branch Chief, Wildlife Branch at (916) 801-6257 or by email at wildlifemgt@wildlife.ca.gov.

Attachment

ec: *California Department of Fish and Wildlife*

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Natural Resources Agency
Department of Natural Resources Agency
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Report to the California Fish and Game Commission

A Status Review of the Petitioned Southern California/Central Coast Evolutionarily Significant Unit (ESU) of Mountain Lion (*Puma concolor couguar*) in California



Charlton H. Bonham, Director

California Department of Fish and Wildlife

December 2025

Table of Contents

List of Figures iv
List of Tables v
Acknowledgments vi
Executive Summary vii
1. Introduction 1
1.1 CESA Petition History 1
1.2 Status Review Overview 1
1.3 Notifications, Information Reviewed, and Peer Review 2
1.4 Administrative Status 3
1.5 Summary of Petitioned Action 3
2. Biology And Ecology 6
2.1 Species Description and Life History 6
2.2 Range and Distribution 9
2.3 Habitat That May Be Essential to the Continued Existence of the Species 12
2.4 Population Structure 12
3. Status and Trends in California 21
3.1 Historical Distribution and Abundance 21
3.2 Population Size 22
4. Factors Affecting Ability to Survive and Reproduce 24
4.1 Past and Threatened Modification and Destruction of Habitat 24
4.2 Vehicle Strikes, Roads, and Rail Lines 27
4.3 Overexploitation 32
4.4 Depredation and Public Safety Management 32
4.5 Competition 35
4.6 Toxicants 36
4.7 Infectious Diseases 40
4.8 Wildland Fire and Fire Management 42
4.9 Climate Change 46
4.10 Risks to Small, Isolated Populations 49
5. Existing Management 57
5.1 Land Ownership within the Petitioned Southern California/Central Coast ESU 57

5.2 California Wildlife Protection Act 60
5.3 State and Federal Land Use Laws 60
5.4 Local Ordinances 63
5.5 Management on Federal Lands 63
5.6 Management on State Lands 65
5.7 Management in Neighboring States and Nations 67
6. Assessment of Listable Groups 70
6.1 Assessment of Evolutionary Significant Units 70
6.2 Assessment of Distinct Population Segments 72
6.3 Assessment of Significant Portion of Range 78
7. Summary of Listing Factors 79
7.1 Present or Threatened Modification or Destruction of Habitat 79
7.2 Overexploitation 80
7.3 Predation 80
7.4 Competition 80
7.5 Disease 81
7.6 Other Natural Occurrences or Human-related Activities 81
8. Protection Afforded by Listing 83
9. Listing Recommendation 84
10. Management and Recovery Action Recommendations 85
10.1 Connectivity 86
10.2 Research and Monitoring 87
10.3 Regulations and Policy 88
10.4 Partnerships and Coordination 89
10.5 Public Education 89
Literature Cited 90
Appendix A – Acronyms, Abbreviations, and Definitions A1
Appendix B – Solicitation of information and comments received B1
Appendix C – External Peer Review Comments C1

List of Figures

Figure 1. Fine-scale genetically discernible mountain lion groups and major roadways in California.

Figure 2. Mountain lion range and habitat use probability in California.

Figure 3. Agricultural and urban areas and major roadways in California.

Figure 4. Functional connectedness of mountain lion populations, based upon discriminant analysis of principal components and bi-directional migration rate estimates.

Figure 5. Broad-scale genetically discernible groups of mountain lions in California determined from principal component analysis of Single Nucleotide Polymorphisms (SNPs).

Figure 6. The geographic distribution of 10 discernible genetic populations.

Figure 7. Assignment of individual mountain lion samples from Central California to genetic groups identified by Gustafson et al. (2022) using Single Nucleotide Polymorphisms.

Figure 8. Assignment of individual mountain lion samples from Southern California to genetic groups identified by Gustafson et al. (2022) using Single Nucleotide Polymorphisms.

Figure 9. Assignment of individual mountain lion samples from Central California to genetic groups identified by Gustafson et al. (2019) using microsatellite DNA markers.

Figure 10. Assignment of individual mountain lion samples from Southern California to genetic groups identified by Gustafson et al. (2019) using microsatellite DNA markers.

Figure 11. Mountain lion vehicle strike mortality incidents 2000–2023.

Figure 12. Priority movement barriers within the petitioned area

Figure 13. Rendering of Wallis Annenberg Liberty Canyon Wildlife Crossing.

Figure 14. The number of mountain lions reported killed on depredation permits in California 2001–2024.

Figure 15. Anticoagulant rodenticide residues detected in 364 livers of mountain lions 2016–2022.

Figure 16. Number of different anticoagulant rodenticide analytes detected in 364 individual mountain lions.

Figure 17. Wildfire perimeters in California by fire year, 1990–2022.

Figure 18. Burned paw of female mountain lion F121 found deceased after the Bond Fire in Orange County and F121 prior to the fire.

Figure 19. Percent of California land area in each Palmer Drought Index category, Jan 2000–April 2023.

Figure 20. Public and tribal lands within the petitioned Southern California/Central Coast ESU.

Figure 21. US/Mexico border showing locations of GPS-collared mountain lions within 15 miles of the border.

Figure 22. Proposed boundary of Central Coast and Southern California Distinct Population Segment.

List of Tables

Table 1. Table of mean pairwise genetic distance values for the broad-scale *K* = 4 clusters reported by Gustafson et al. (2022).

Table 2. Table of mean pairwise genetic distance values for the fine-scale *K* = 10 genetic clusters reported by Gustafson et al. (2022).

Table 3. Estimates of population sizes in the genetically distinct mountain lion groups.

Table 4. Anticoagulant rodenticide testing results for liver samples from 8 pregnant mountain lions and their fetuses.

Table 5. Baseline and projected changes in temperatures at representative sites in the four large scale mountain lion genetic groups identified by Gustafson et al. (2022).

Table 6. Estimated census and effective population sizes of genetically distinct mountain lion groups.

Table 7. Land ownership within the petitioned Southern California/Central Coast ESU and the percentage of total land and public land in the petitioned ESU.

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Executive Summary

This status review contains the most current information available on the mountain lion (*Puma concolor couguar*) in the central coast and southern parts of California and serves as the basis for the California Department of Fish and Wildlife's (Department) recommendation to the California Fish and Game Commission (Commission) on whether to list the species in those areas as threatened or endangered under the California Endangered Species Act (CESA).

On June 25, 2019, the Commission received a petition from the Center for Biological Diversity and the Mountain Lion Foundation that proposed the listing of the mountain lion as threatened or endangered in a portion of the state identified as the Southern California/Central Coast Evolutionarily Significant Unit (ESU). The petitioners also requested, in the event the Commission determined that the six populations comprising the identified ESU did not collectively comprise a single ESU or otherwise did not warrant listing, that the Commission consider whether any of the six populations, singularly or in combination, comprise an ESU and meet the criteria for listing. On April 16, 2020, the Commission considered the petition, the Department's petition evaluation and recommendation, and comments received. The Commission found that sufficient information existed to indicate the petitioned action may be warranted and accepted the petition for consideration. The Commission's "may be warranted" decision initiated this status review to inform the Commission's decision on whether listing the petitioned ESU or any portion of the Southern California/Central Coast mountain lion population is warranted. The term "petitioned ESU" is used throughout this report. When "petitioned ESU" appears, it is intended to encompass the petitioners' proposal to list the petitioned area as a single ESU.

Species Description, Biology, and Ecology

Mountain lions are large felids that are primarily solitary, territorial, and occur in low density. In California their primary prey are deer, and they have large home ranges often comprised of multiple vegetation types including riparian, chaparral, oak woodlands, coniferous forests, grasslands, and deserts, and occur from near sea level to high elevations. Mountain lions reach sexual maturity at two to four years, and females care for their young for the first one to two years without help from males.

Population Structure

Mountain lion populations in California are genetically structured (differentiated) by natural barriers such as mountain ranges, water bodies, and deserts, as well as urbanization and the proliferation of highways and interstates. In combination these barriers to movement have facilitated the creation of six distinct genetic populations within the petitioned ESU. Roughly, these are:

1) Central Coast North (CC-N), including the Santa Cruz Mountains and San Francisco Bay Area counties to the east;
2) Central Coast Central (CC-C), generally the coastal mountains from southern Monterey Bay to Ventura County;
3) Central Coast South (CC-S), including the Santa Monica Mountains, Santa Susana Mountains, Sierra Pelona Mountains, and Simi Hills;
4) San Gabriel and San Bernardino Mountains (SGSB);
5) Santa Ana Mountains (SA); and

6) Eastern Peninsular Range (EPR), including the mountains of San Diego County, extending east possibly as far as the Colorado River and the Arizona border, and bounded on the south by the border with Mexico.

These genetic populations experience varying levels of isolation and gene flow, and physical signs of inbreeding have been documented in the CC-S, SA, and EPR genetic populations. Available genetic information reveals some level of differentiation between these genetic populations.

Status and Trends

Significant changes in mountain lion distribution have occurred within the petitioned ESU due to habitat loss and fragmentation from land use changes that began in the late 1700s and continue to the present. Agricultural, residential, and industrial development, including the creation of modern transportation and infrastructure networks, has resulted in significant habitat fragmentation and barriers to movement in portions of the petitioned ESU. Mountain lions were historically controlled to protect livestock, and the Department paid a bounty for mountain lions from 1906 to 1963. The size of the California mountain lion population has been estimated periodically. Biologists estimated there were 600 mountain lions in California in the mid-1950s during the bounty period. By 1976, the population was estimated to be 2,400. A 1989 study estimated 4,100–5,700 mountain lions in the state. In 1990, the voters of California enacted Proposition 117, known as the California Wildlife Protection Act of 1990 and codified as Fish and Game Code section 4800, et seq., which prohibited take of mountain lions except in certain limited circumstances. The Department's current and most rigorous statewide population estimate to date is 4,172 (95% CI 3,645–4,750) mountain lions, including dependent young. The current estimate should be considered a refinement of earlier estimates and should not be interpreted to mean the actual population has declined since 1989. There are an estimated 1,449 (95% CI 1,272–1,638) mountain lions within the petitioned area.

Threats

Primary threats to mountain lions in the petitioned ESU include continued habitat loss and isolation of small populations due to expanding human infrastructure. Especially in Southern California, distinct genetic populations inhabit mountain ranges that are surrounded by human development or desert, such that dispersal to and from those ranges is significantly constrained by the presence of freeways and urban areas. From 1974 to 2020, the top sources of mortality throughout the state were removal in response to livestock or property damage and vehicle strikes. These mortality sources exceed "natural" causes of mortality. However, in recent years the number of mountain lions killed for depredating livestock or pets has dropped sharply (as a result of the Department's ongoing efforts to balance Proposition 117's conservation purpose and emphasis on the use of nonlethal methods with the need to provide a reasonable approach to depredation). Rodenticides and infectious disease kill relatively few mountain lions outright but can weaken individuals and make them less resilient to other threats. Recent intense wildfires have killed animals in already small, isolated populations (e.g., the Santa Monica Mountains) and may temporarily reduce habitat suitability. Human infrastructure that challenges or prevents gene flow between the genetic populations is a major concern in much of the petitioned ESU. Malformed sperm and/or kinked tails have been recorded in the SA, EPR, and CC-S genetic populations. Isolation and inbreeding increase the chance of extinction and the SA genetic

population has a 16–21% chance of extirpation over the next 50 years if current low levels of gene flow continue.

Although the cumulative population estimate for the petitioned area is over 1,400 animals, the population is not continuous. Instead, it is broken into six genetic populations with varying levels of connection to adjacent populations. Each of the genetic populations has a low or very low effective population size (Ne; the estimated number of individuals in a population that participate in producing the next generation, which is smaller than the estimated population size), with estimates ranging from 3 to 57. None of the six genetic populations has an estimated effective population size of 100 or more, which would help avoid negative impacts from inbreeding in the long term at the population level. Improved connectivity is needed to increase gene flow, mitigate the negative impacts of isolation, and reduce the risk of localized extirpations from a variety of threats.

Recommendation

Although Petitioners seek to have these mountain lion populations listed as one or more ESUs, the Department concludes they are more appropriately analyzed as a distinct population segment (DPS).[1] The Department finds that neither the petitioned ESU nor genetic populations within the petitioned area, singly or in combination, could appropriately be considered an ESU. The genetic populations are not known to be both substantially isolated from other populations *and* important components of the evolutionary legacy of the mountain lion species.

However, the Department also examined whether the mountain lions comprising the six petitioned genetic populations constitute a DPS, based on a federal policy that is applied in listing evaluations under the federal Endangered Species Act and which has previously been used by the Department in CESA evaluations. A DPS is a population or group of populations that is discrete from other populations of the species and significant in relation to the entire species (in this case the statewide population). The Department finds that the mountain lion population composed of the six petitioned genetic populations is discrete, significant, and imperiled; therefore, the Department recommends the Commission find a DPS of mountain lions in an area largely coinciding with the petitioned area[2] should

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[1] Both DPSs and ESUs are concepts originally developed in the context of the federal Endangered Species Act. The Department and the Commission are not required to apply either the federal ESU policy or the federal DPS policy. CESA permits the Commission to list "species or subspecies" (See Fish & G. Code, §§ 2062, 2067, 2068). To the extent the Commission concludes that an ESU or a DPS of a particular species constitutes a "subspecies" within the meaning of CESA, it may recommend listing of that subspecies as an ESU or DPS (See *Cal. Forestry Assn. v. Cal. Fish and G. Com.* (2007) 156 Cal.App.4th 1535).

[2] For the DPS assessment, the Department made modifications to the petitioned ESU boundary. Areas of the southeastern deserts were excluded because no genetic samples from the area have been evaluated, making it impossible to assign lions in this area to a genetic population. Additionally, areas of intensive agriculture in the northeastern portion of the petitioned ESU were excluded. See sections 6 and 9 of this report for more details.

be listed as threatened. The Department further recommends implementation of the management recommendations and recovery measures described in this status review.

1. Introduction

1.1 CESA Petition History

On June 25, 2019, the California Fish and Game Commission (Commission) received a petition from the Center for Biological Diversity and the Mountain Lion Foundation (hereafter "the petitioners") to list the mountain lion (*Puma concolor couguar*) in a portion of the state identified as the Southern California/Central Coast Evolutionarily Significant Unit (ESU) as threatened or endangered under the California Endangered Species Act (CESA). The petitioners also requested, in the event the Commission determined that the six populations comprising the identified ESU did not collectively comprise a single ESU or otherwise did not warrant listing, that the Commission consider whether any of the six populations, singularly or in combination, comprise an ESU and meet the criteria for listing. Commission staff transmitted the petition to the Department of Fish and Wildlife (Department) pursuant to Fish and Game Code section 2073 on July 5, 2019, and published a formal notice of receipt of the petition on July 26, 2019 (Cal. Reg. Notice Register 2019, No. 30-Z, p. 1086).

On January 31, 2020, the Department provided the Commission with its evaluation of the petition, "Evaluation of a Petition from the Center for Biological Diversity and the Mountain Lion Foundation to List the Southern California/Central Coast Evolutionarily Significant Unit (ESU) of Mountain Lions as Threatened under the California Endangered Species Act," to assist the Commission in making a determination as to whether the petitioned action may be warranted based on the sufficiency of scientific information in the petition (Fish & G. Code, §§ 2073.5 & 2074.2; Cal. Code Regs., tit. 14, § 670.1, subds. (d) & (e)). Focusing on the information available to the Department relating to each of the relevant categories, the Department recommended to the Commission that the petition be accepted. At its public meeting held via teleconference on April 16, 2020, the Commission considered the petition, the Department's petition evaluation and recommendation, and comments received. The Commission found that sufficient information existed to indicate the petitioned action may be warranted and accepted the petition for consideration. Upon publication of the Commission's notice of its findings, the Southern California/Central Coast ESU of mountain lions became a CESA candidate species on May 1, 2020 (Cal. Reg. Notice Register 2020, No. 18-Z, p.692).

The Commission's action designating the mountain lion within the boundary of the petitioned Southern California/Central Coast ESU as a candidate species triggered the Department's process for conducting a status review to inform the Commission's decision as to whether listing the petitioned ESU or any portion of the Southern California/Central Coast mountain lion population as threatened or endangered is warranted. At its scheduled public meeting on April 14, 2021, the Commission granted the Department a six-month extension to complete the status review and facilitate external peer review.

1.2 Status Review Overview

This status review serves as the basis for the Department's recommendation to the Commission on whether the petitioned action to list the mountain lion in the petitioned ESU as threatened or endangered under CESA is warranted. It is based upon the best scientific information available to the Department. It is not intended to be an exhaustive review of all published scientific literature on the mountain lion; rather, it is intended to summarize key points relevant to the status of the species and

address regulatory report requirements. All the required elements in Fish and Game Code sections 2072.3 and 2074.6, as well as in California Code of Regulations Title 14 section 670.1, are included and addressed in this status review.

Specifically, this status review addresses each of the required petition components and the listing factors that the Commission must consider in making its determination. A petition to list a species under CESA must include "information regarding the population trend, range, distribution, abundance, and life history of a species, the factors affecting the ability of the population to survive and reproduce, the degree and immediacy of the threat, the impact of existing management efforts, suggestions for future management, and the availability and sources of information. The petition shall also include information regarding the kind of habitat necessary for species survival, a detailed distribution map, and any other factors that the petitioner deems relevant" (Fish & G. Code, § 2072.3; see also Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)). A status review must include a preliminary identification of the habitat that may be essential to the continued existence of the species and recommend management activities and other recommendations for recovery of the species (Fish & G. Code, § 2074.6). Additionally, a species shall be listed as threatened or endangered "if the Commission determines its continued existence is in serious danger or is threatened by any one or any combination of the following factors: present or threatened modification or destruction of its habitat, overexploitation, predation, competition, disease, or other natural occurrences or human-related activities" (Cal. Code Regs., tit. 14, § 670.1, subd. (i)(1)(A)).

In addition to addressing each of the petition components and listing factors, the Department must make a recommendation to the Commission as to whether the petitioned action to list the mountain lion as threatened or endangered is warranted. An endangered species is defined under CESA as one "which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease" (Fish & G. Code, § 2062). A threatened species under CESA is one that "although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by [CESA]" (Id., § 2067).

Receipt of this report is to be placed on the agenda for the next available meeting of the Commission after delivery. At that time, the report will be made available to the public for a 30-day public comment period prior to the Commission taking any action on the petition.

1.3 Notifications, Information Reviewed, and Peer Review

Following the Commission's action to designate the mountain lion as a candidate species for threatened or endangered status, the Department notified affected and interested parties and solicited data and comments on the petitioned action pursuant to Fish and Game Code section 2074.4 (see also Cal. Code Regs., tit. 14, § 670.1, subd. (f)(2)).

Tribal notifications were distributed by letter and email to tribes identified by the Native American Heritage Commission as having a cultural or traditional affiliation within the geographic area of the mountain lion. The Department received 10 comments in response to the tribal notifications. See Appendix B for additional details.

Public notifications were distributed to affected and interested parties and sent to email distribution lists maintained by the Department and the Commission. A press release was also distributed through the Department's website. The Department received 21 comments in response to public notifications. See Appendix B for additional details.

The draft status review was independently peer reviewed by five experts external to the Department (Fish & G. Code, § 2074.6; Cal. Code Regs., tit. 14, § 670.1, subd. (f)(2)). The Department evaluated the input received and amended the status review as appropriate. See Appendix C for additional details and the Department's written response to peer review.

1.4 Administrative Status

For much of the 20th Century, mountain lions were a bountied predator in California (Young and Goldman 1946; Dellinger and Torres 2020). In 1964, bounties ceased and the mountain lion was classified as a nuisance or vermin species that could be taken without a hunting license and with no limits (Dellinger et al. 2021b). In 1969, mountain lions were classified as a game species that could be hunted by licensed hunters. From 1972–1986, mountain lions were classified as a non-game mammal with a moratorium on hunting. Their status as a game species was reinstated in 1986. However, no mountain lions were harvested between this status change and a ballot initiative (Proposition 117) approved in 1990 which classified mountain lions as a "specially protected mammal species" (Fish & G. Code, § 4800). That classification continues to this day, and state law prohibits the take, possession, transport, import, or sale of a mountain lion or mountain lion products with limited exceptions. Take is defined as hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill (Fish & G. Code, § 86). Take of mountain lions is allowed only under specified conditions, including for the protection of public health and safety, the protection of listed or fully protected bighorn sheep species (*Ovis canadensis* spp.), and in response to livestock or property damage.

1.5 Summary of Petitioned Action

The Petitioners propose listing mountain lion populations south of San Francisco Bay in the coastal, Transverse, and Peninsular Mountain Ranges, the Sonoran Desert, part of the Central Valley, and part of the Mojave Desert as a single Southern California/Central Coast ESU. Alternatively, the Petitioners propose the Commission determine whether one or more of the six genetic populations in the following areas identified by Gustafson et al. (2019) comprise an ESU and meet the criteria for listing as threatened or endangered:

1) Central Coast North (CC-N), which includes the Santa Cruz Mountains and San Francisco Bay Area counties to the east;
2) Central Coast Central (CC-C), generally from southern Monterey Bay to Ventura County in the coastal mountains;
3) Central Coast South (CC-S), which includes the Santa Monica Mountains, Santa Susana Mountains, Sierra Pelona Mountains, and Simi Hills;
4) San Gabriel and San Bernardino Mountains (SGSB);
5) Santa Ana Mountains (SA); and

6) Eastern Peninsular Range (EPR), which includes the mountains of eastern San Diego County, extending east possibly as far as the Colorado River and the border with Arizona, and is bounded on the south by the border with Mexico.

These populations are six of the 10 genetically discernible populations in California as delineated in Gustafson et al. (2019) (Fig. 1).

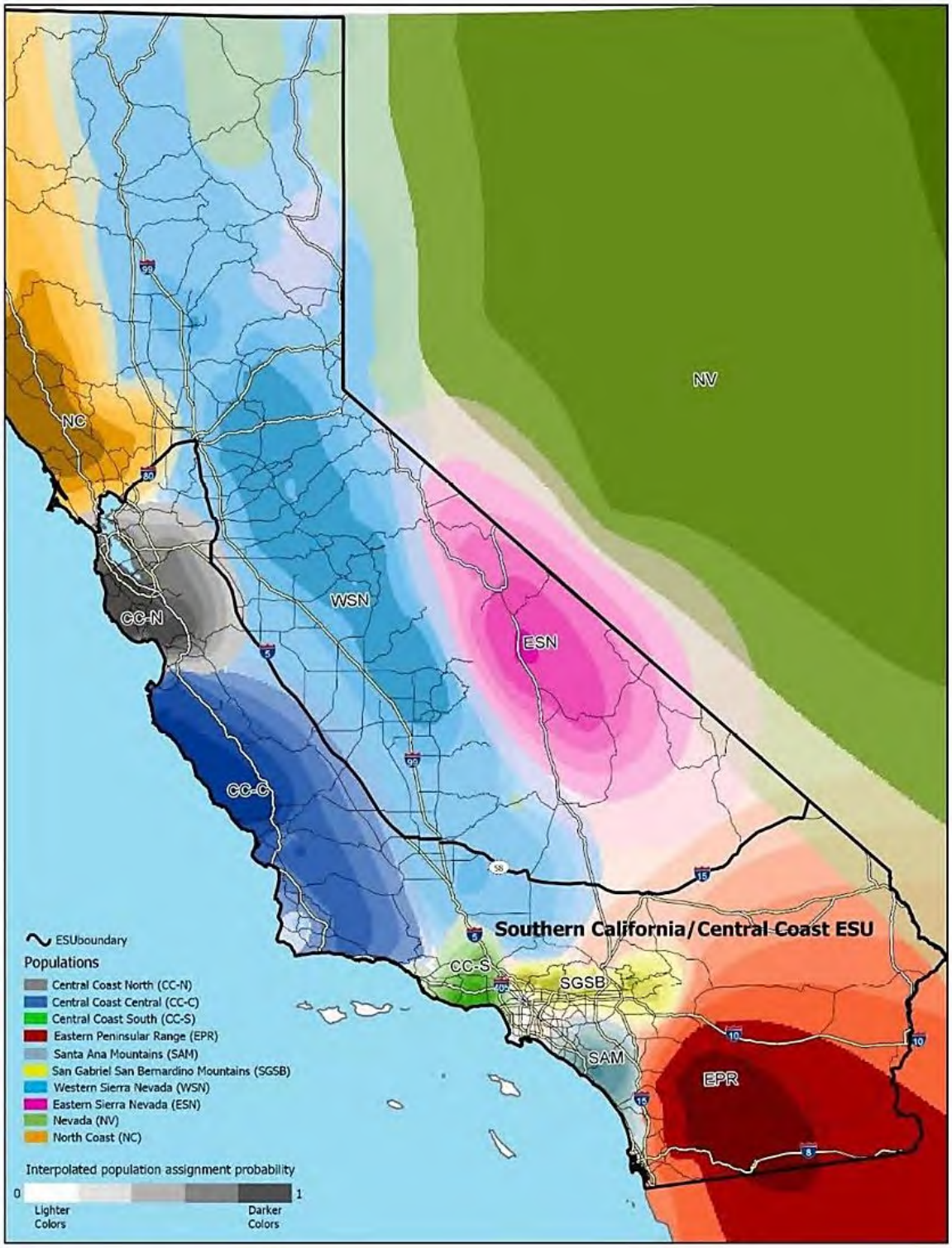


Figure 1. Fine-scale genetically discernible mountain lion populations and major roadways in California based on data collected from 1992 to 2016 (genetic information from Gustafson et al. 2019). Black line outlines the petitioned Southern California/Central Coast ESU boundary. This figure is from the Petition, Figure ES 1.

The Evolutionary Significant Unit concept was developed primarily for use in salmonids by the National Marine Fisheries Service (NMFS) and has been used to list populations of anadromous salmon under the federal Endangered Species Act such as the Columbia River chum salmon ESU (64 Fed. Reg 14508–14517 (March 25, 1999)). The use of ESUs by the Department to evaluate the status of species pursuant to CESA is supported by recent listing determinations by the Commission (e.g., Southern Sierra Nevada Fisher ESU; Coho salmon Central California coast ESU) and by the determination of California's Third District Court of Appeal that the term "species or subspecies" as used in CESA (Fish & G. Code, §§ 2062 and 2067) can include ESUs (*Cal. Forestry Assn. v. Cal. Fish and G. Com.* (2007) 156 Cal.App.4th 1535).

To be considered an ESU under federal policy, a population must meet two criteria: 1) it must be substantially reproductively isolated from other conspecific (i.e., same species) population units; and 2) it must represent an important component of the evolutionary legacy of the species that contributes to the genetic diversity of the species as a whole (Waples 1991). The genetic isolation "does not have to be absolute, but it must be strong enough to permit evolutionarily important differences to accrue in different population units" (Waples 1991). Although neither the Department nor the Commission is bound by the federal ESU policy or the federal DPS policy, the Department has found these approaches useful for assessing the existence of a subspecies under CESA, has used these criteria in its prior evaluations of ESUs for species such as the Pacific fisher and Coho salmon, and uses them in this status review.

For brevity, the term "petitioned ESU" is used throughout this report. When "petitioned ESU" appears, it is intended to encompass the petitioners' proposal to list the petitioned area as a single ESU.

2. Biology And Ecology

2.1 Species Description and Life History

Mountain lions belong to the mammalian order Carnivora and are members of the cat family Felidae, subfamily Feline, and a part of the puma lineage. They have numerous other common names including puma, cougar, panther, painter, and catamount (Young and Goldman 1946; Hunter 2015). Mountain lions were once widespread in the Americas, but Euro-American settlers extirpated them from most of the U.S. and Canada east of the continental divide by the beginning of the 20th century, with only a small population (< 200 individuals) remaining in Florida and a population of unknown size in western and southern Texas. Populations in Mexico and other countries in Central and South America do not appear to have suffered similar extirpations (Hall and Kelson 1959; Pierce and Bleich 2003). However, since the late 20th century, breeding populations of mountain lions have returned to some areas east of the continental divide, including North and South Dakota and Nebraska (Hunter 2015; Cougar Fund 2023).

There are currently two recognized subspecies of mountain lion throughout the Americas (Culver et al. 2000; Kitchener et al. 2017). Mountain lions in North and Central America are classified as *P. c. couguar,* while most mountain lions in South America are classified as *P. c. concolor.* The Department formerly recognized another subspecies, the Yuma puma (*P. c. browni*) (Williams 1986; Kucera 1998; CDFW 2022a). However, research by McIvor et al. (1995) and Culver et al. (2000) detected little morphological or genetic support for retention of the *P. c. browni* subspecies. Consequently, the Department no longer

considers mountain lions from the Colorado River valley and adjacent Sonoran Desert uplands to be a distinct taxonomic unit.

Adult mountain lions are large and slender with muscular limbs and a long, black-tipped tail that is about one third of the animal's total length. Males are typically larger than females. Males generally weigh 55–65 kg (121–143 lbs.) with a length of 2.2–2.3 m (7.2–7.5 ft.) from nose to tail tip, and females generally weigh 35–45 kg (77–99 lbs.) with a length of 2.0–2.1 m (6.6–6.9 ft.) (Currier 1983).

Deer (*Odocoileus* spp.) are the most common prey of mountain lions in the United States, Canada and parts of Mexico, composing about 70% of their diet (Ruth and Murphy 2009). The relationship between mountain lions and deer is so strong that lion distribution throughout the Americas has been described as largely a function of deer distribution (Young and Goldman 1946; Pierce et al. 2000). However, mountain lions are opportunistic predators and are known to eat at least 232 different species of mammals, birds, and reptiles across their extensive geographic range. Larger prey are favored in temperate forest, desert, and grassland biomes, whereas smaller prey are more often consumed in tropical forest biomes (Karandikar et al. 2022). Prey species in North America include, elk (*Cervus canadensis*), feral horses (*Equus ferus caballas*), feral burros (*Equus asinus*), wild pigs (*Sus scrofa*), pronghorn (*Antilocapra americana*), bighorn sheep, coyotes (*Canis latrans*), bobcats (*Lynx rufus*), porcupines (*Erethizon dorsatum*), fishers (*Pekania pennanti*), rodents, wild turkeys (*Meleagris gallopavo*), and livestock (Young and Goldman 1946; Currier 1983; Iriarte et al. 1990; Sweitzer et al. 1997; Wengert et al. 2014; Allen et al. 2015; Vickers and Garcelon 2022).

Mountain lions reach sexual maturity at two to four years, and females care for their young for the first one to two years (Quigley and Hornocker 2009). Mature females typically breed every other year (Robinette et al. 1961). Males will mate with multiple females and do not contribute to rearing young (Logan and Sweanor 2010). Mates locate each other with auditory and olfactory signals including scrapes—shallow troughs with a small mound of debris at the distal end, made using their hind feet. These forms of communication are also vital for maintaining family cohesion and avoiding competition or direct threats from other mountain lions. Identity, social status, and reproductive condition may all be possible functions of scent markers (Logan and Sweanor 2010). Mountain lion scent marks seem to serve as "bulletin boards" which males and females visit to determine the temporal presence, reproductive status, and possibly even the individual identity of other mountain lions (Currier 1983; Logan and Sweanor 2001; Harmsen et al. 2010; Allen et al. 2014).

Gestation lasts 82–96 days (Young and Goldman 1946; Currier 1983; Hunter 2015). Litter size ranges from one to six, though two to four kittens are typical (Pierce and Bleich 2003; Beier et al. 2010; Riley et al. 2014). Reproductive females tend to avoid human disturbances. Wilmers et al. (2013) found that mountain lions exhibiting reproductive behaviors (denning and chemical and vocal communication) avoided human disturbances by distances four times greater than non-reproductive mountain lions. As young reach 12–18 months of age, mothers may come into estrus and become aggressive towards them, encouraging their dispersal (Pierce and Bleich 2003). Adult males are also known to kill kittens, yearlings, subadults, and occasionally other adults (Logan and Sweanor 2010; Riley et al. 2014; Benson et al. 2020). Survivorship of dispersing mountain lions is low relative to adults with established home ranges (Benson et al. 2016; Benson et al. 2020), and dispersing young are more likely than resident mountain lions to be involved in depredation incidents or other conflicts with humans as they try to

find prey without the advantage of an established home range (Torres et al. 1996).

Mountain lions are known to move long distances while dispersing. One subadult male was documenting moving 2,450 km (1,522 mi.) from South Dakota to Connecticut (Hawley et al. 2016). Vickers et al. (2015) documented numerous Southern California study animals dispersing > 80 km (50 mi.), and one young male moved approximately 150 km (93 mi.) from California south into Baja California, Mexico and back. Most long-distance dispersers are thought to be young males in search of available mates (Hawley et al. 2016).

A study of juvenile lion dispersal was conducted by Beier et al. (1995) in the Santa Ana Mountains of Southern California from 1988 to 1992. Juvenile mountain lions dispersed via habitat corridors in a landscape fragmented by urbanization. Each collared male dispersed over several weeks to months, and as many as four temporary home ranges were occupied sequentially. The mean dispersal distance from a sample of eight males was 63 km (39.1 mi.). The one monitored female disperser wandered throughout the northern half of the Santa Ana Mountains, changing directions ≥ 5 times upon encountering the urban-wildland interface and covered ≥ 342 km (212.5 mi.) without establishing a temporary home range. Four months after beginning her dispersal, she returned to the edge of her natal range and bedded near her mother for one day before dying near that location days later of unknown causes. All travel in corridors and habitat peninsulas occurred at night.

Adult mountain lions are primarily solitary, territorial, and occur in low density. They require large areas of habitat with adequate prey abundance (Quigley and Hornocker 2009). Their home ranges are often comprised of multiple vegetation community types including riparian, chaparral, oak woodlands, coniferous forests, grasslands, and deserts (Grinnell 1914; Grinnell et al. 1937; Williams 1986; Dickson et al. 2005; McClanahan et al. 2017; Dellinger et al. 2019) and occur from near sea level to high mountain elevations (Grinnell et al. 1937; Young and Goldman 1946; Hunter 2015).

Average home range size in California varies substantially depending on sex, season, and area of the state. The average male home range size is larger than the average female home range size. Home ranges change size depending on season and tend to be larger in the Sierra Nevada compared to the Coastal Ranges. In the Santa Ana Mountains and the Eastern Peninsular Range, Zeller et al. (2017) found that home range size varied from 41–497 km^2 (16–192 $mi.^2$; mean = 231 km^2; female mean = 188 km^2; male mean = 316 km^2). In the Santa Monica Mountains and surrounding areas, Riley et al. (2021) found the average home range size was 134 km^2 (52 $mi.^2$) for females and 372 km^2 (144 $mi.^2$) for males. In contrast, in the Sierra Nevada Mountains the average home range size for females in summer was 541 km^2 (209 $mi.^2$) and 349 km^2 (135 $mi.^2$) in winter (Grigione et al. 2002). For males it was 723 km^2 (279 $mi.^2$) in summer and 469 km^2 (181 $mi.^2$) in winter. While male home ranges can overlap spatially, male mountain lions are territorial, making temporal overlap between males rare (Logan and Sweanor 2001). However, males attempt to overlap their home ranges with multiple female home ranges to enhance breeding opportunities (Logan and Sweanor 2010). Females are less territorial, with their home ranges often including significant overlap, and the degree of home range overlap is typically greater where prey densities are higher (Stoner et al. 2018). Subadult males are generally met with aggression from resident adult males and can disperse long distances (see above). Only about half of subadult females disperse from their natal area (Logan and Sweanor 2010). Due to these behavioral mechanisms, local abundance of male mountain lions is generally limited by available

habitat (Maletzke et al. 2014), while female abundance is generally limited by prey availability (Stoner et al. 2018). Given the importance of females to population growth, and because one male can breed with multiple females, mountain lion populations can be primarily limited by prey availability (Pierce et al. 2000; Logan and Sweanor 2001; Logan 2019).

Mountain lions have few natural predators in California. Mountain lions are subordinate to black bears (*Ursus americanus*) and gray wolves (*Canis lupus* sp.) across parts of their geographic range including California (Elbroch and Kusler 2018). Black bears occasionally kill mountain lion kittens (Elbroch and Kusler 2018), but mainly affect mountain lions through the plundering of kills and cache sites in California (Elbroch et al. 2015a). Where gray wolves and mountain lions coexist in North America, wolves are known to affect adult and kitten survival, resource selection, prey selection, bedding locations, and local abundance (Bartnick et al. 2013; Elbroch et al. 2015b; Kusler et al. 2017; Elbroch and Kusler 2018; Elbroch et al. 2020). In 2021, a GPS-collared wolf dispersed into the petitioned area before being struck and killed by a vehicle on Interstate 5. In the summer of 2023, the Yowlumni wolf pack was identified in southern Tulare County, with an activity center approximately 80 km (50 mi.) north of the petitioned ESU boundary; however, there are currently no resident wolf packs or individuals known within the petitioned ESU area.

2.2 Range and Distribution

A species' range is the general geographic area within which it normally occurs, while its distribution is the locations it occupies within its range at a given time. For purposes of CESA and this Status Review, the term range refers to the species' California range (*Cal. Forestry Assn. v. Cal. Fish and Game Com.* (2007) 156 Cal. App. 4th 1535, 1551), though emphasis is on the geographic area of the petitioned ESU. The current range of the mountain lion includes much of California. Though verified mountain lion sightings and encounters have occurred in all counties in the last decade, they are most commonly reported from the more mountainous areas of the state (Dellinger et al. 2021b). Mountain lions are most likely to establish home ranges in areas with sufficient forest and/or shrub cover which promotes presence of their primary prey, mule deer (*Odocoileus hemionus*) and provides cover for stalking (Dellinger et al. 2020a). In California, these areas include the coastal mountain ranges from Southern California north to the Oregon border, the Transverse Ranges, the Sierra Nevada, the southern Cascade Range, the Klamath Mountains, and the Modoc Plateau (Fig. 2).

The areas with the least suitable habitat (i.e., lowest densities of mountain lions), include intensively farmed areas of the Central Valley and lowlands of the inland desert regions of the state. However, resident breeding populations have recently been documented near the Sutter Buttes in the Sacramento Valley and in the Mojave Desert (McClanahan et al. 2017; Dellinger et al. 2019). The distribution of mountain lions in California has changed little from what Grinnell et al. (1937) described in the early 1900s, although they are now absent or uncommon in the large, high density urban areas of the San Francisco Bay Area and the Los Angeles–San Diego coastal plain and inland valleys. They are also absent or uncommon in intensively farmed agricultural areas such as the Salinas Valley and the Central Valley, where historical reports noted mountain lions were not uncommon in riparian areas (Fig. 3) (Newberry 1857). Historically, those riparian corridors likely played an important role in connecting mountain lion populations in the Sierra Nevada with populations in coastal mountain ranges.

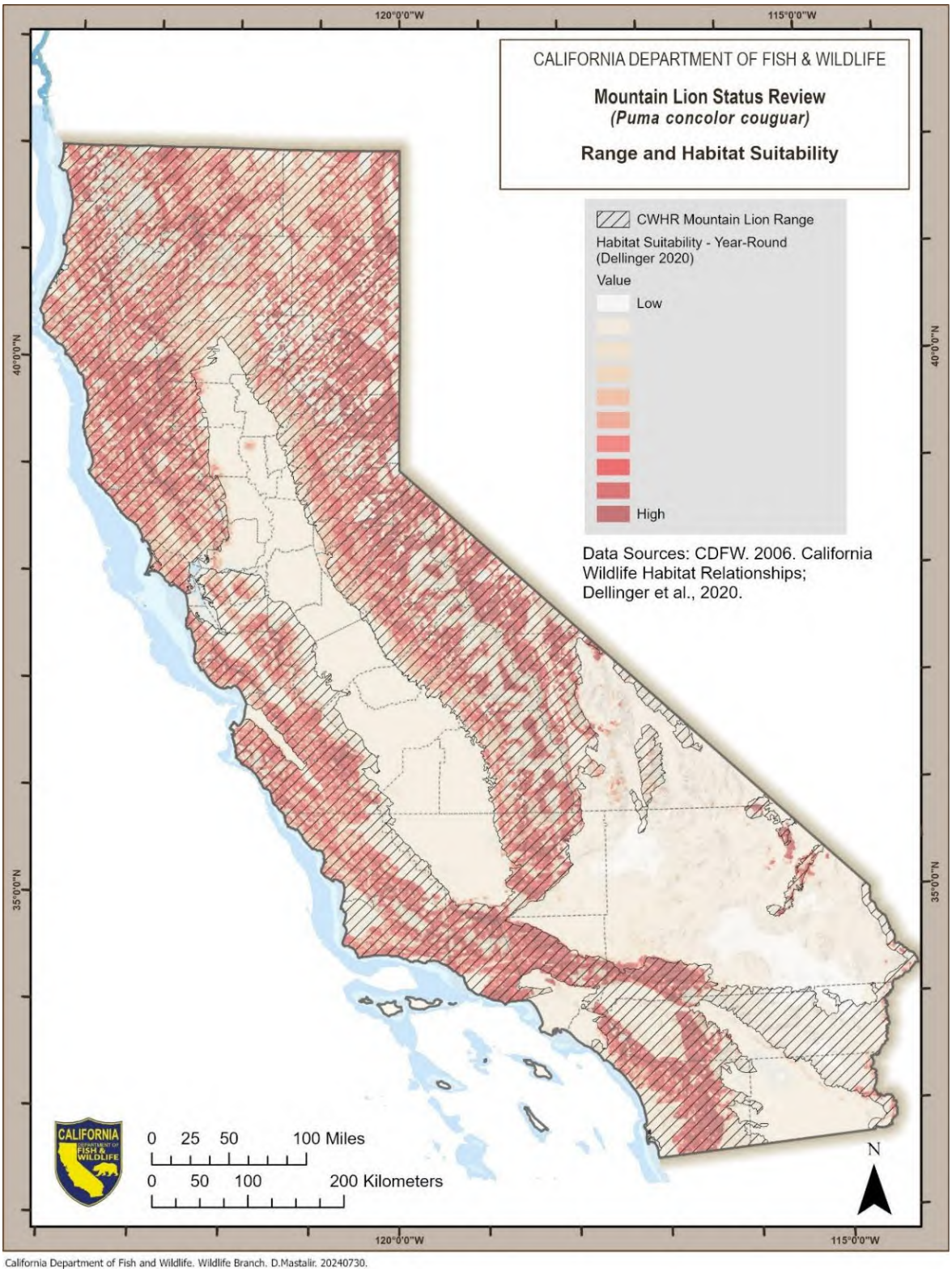
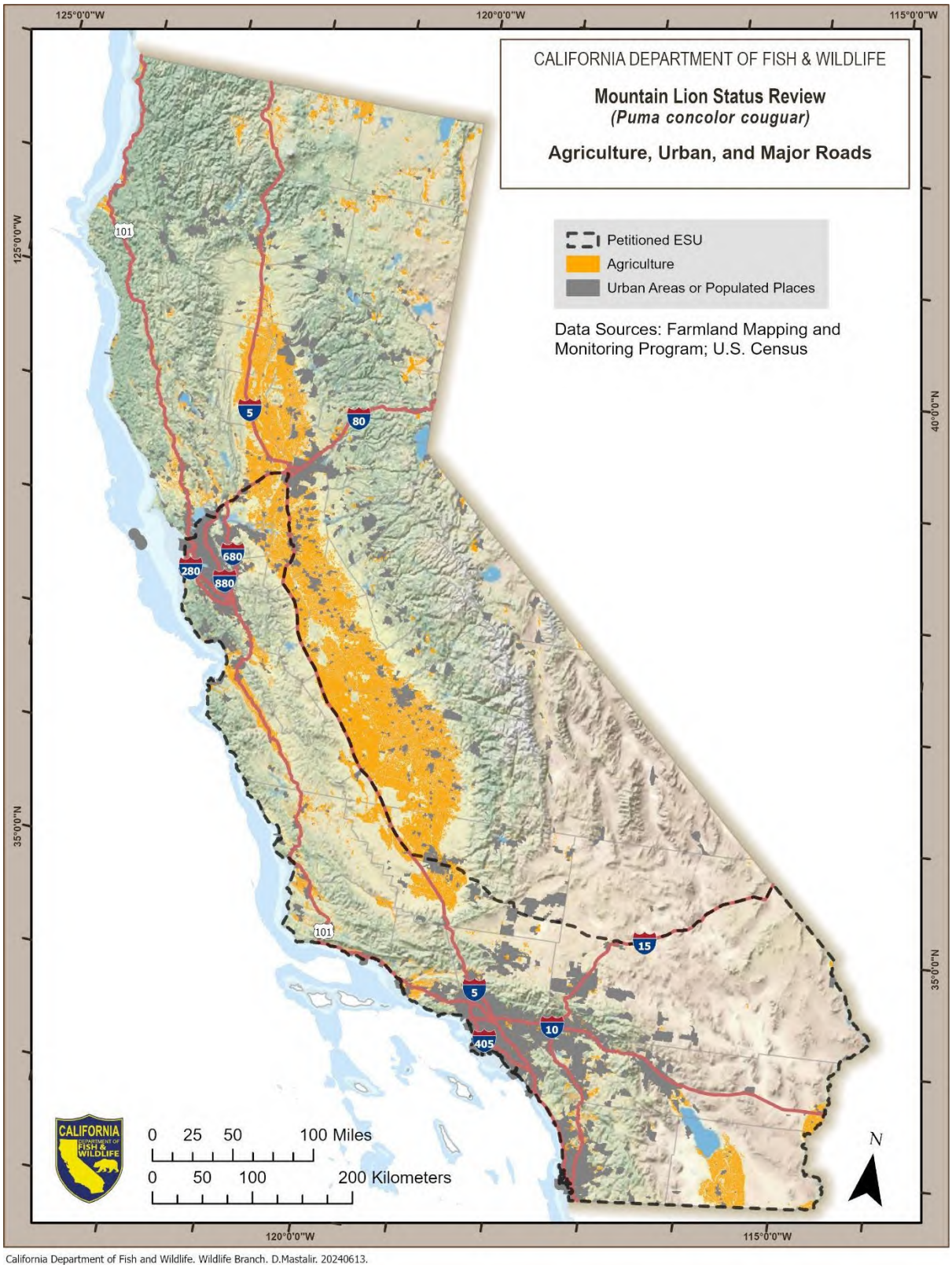


Figure 2. Range and habitat suitability for mountain lions in California. Darker red indicates a higher probability of mountain lion occupancy (Dellinger et al. 2020a). Mountain lions may occasionally occur at low densities outside of this range (most often non-breeding or dispersing individuals).



California Department of Fish and Wildlife. Wildlife Branch. D.Mastalir. 20240613.

Figure 3. Agricultural and populated areas and major roadways in California.

2.3 Habitat That May Be Essential to the Continued Existence of the Species

Dellinger et al. (2021b) described general patterns of habitat use and selection[3] in California:

> "Mountain lions are among the most widely distributed carnivore species (Logan and Sweanor 2001). This wide distribution is a product of their ability to persist in almost any habitat provided adequate prey is available. When establishing a home range, mountain lions select habitat with adequate prey and stalking cover to aid in meeting energetic demands. After establishing a home range, many things, including human activity, can influence habitat use patterns (Wilmers et al. 2013).
>
> In California, mountain lion habitat use patterns were found to be seasonal in the more temperate areas of the state (Dellinger et al. 2018) while, in the more Mediterranean areas, mountain lion habitat use patterns are more stable between seasons (Wilmers et al. 2013)."

Mountain lions in North America have associations with vegetative and topographic cover, steep slopes, and higher elevations, while avoiding areas of open agricultural land, sagebrush (*Artemesia tridentata*) dominated communities, open meadows, and pastures (Fig. 2) (Murphy 1983; Logan and Irwin 1985; Laing 1988; Lindzey et al. 1994; Pierce and Bleich 2003).

Zeller et al. (2017) found that in Southern California, mountain lions preferred to establish home ranges that contained chaparral, scrub, and grasslands, but within those home ranges, primarily spent their time in relatively rugged terrain, riparian areas, and woodland. Dickson and Beier (2002) noted that riparian areas were selected by mountain lions in all seasons in Southern California and suggested the preference is related to the presence of stalking cover and prey. Riley et al. (2021) found that mountain lions in the Santa Monica Mountains and surrounding areas selected "chaparral, riparian woodland, and coastal sage scrub. The two features of the landscape that they consistently avoided were grasslands and altered open areas, which were also the most open portions of the landscape. These results are consistent with previous work showing that mountain lions select areas with dense stalking cover and avoid open areas to facilitate hunting success." However, Burdett et al. (2010) speculated that dense, mature late seral chaparral may be avoided because mule deer prey cannot easily move through such stands and thus may select against them.

2.4 Population Structure

There are currently two recognized subspecies of mountain lion throughout the Americas (Culver et al. 2000; Kitchener et al. 2017). Mountain lions in North and Central America are classified as *P. c. couguar,* while most mountain lions in South America are classified as *P. c. concolor* (the subspecific identity of some mountain lions west of the Andes in South America remains uncertain). This taxonomy is partly based on the finding that the entire North American population is genetically homogenous across several mitochondrial loci (Culver et al. 2000, Caragiulo et al. 2014). Genetic diversity is greater in Central and South American mountain lions, and it is hypothesized that the North American population derived from a relatively recent (i.e., late Pleistocene, circa 10,000 years ago) recolonization by a small

[3] Habitat selection is the choice by an organism of habitats relative to their availability on the landscape.

number of founders whose ancestors originated in eastern South America 200,000–300,000 years ago (Culver et al. 2000, Caragiulo et al. 2014).

Several studies have demonstrated that the complex geography and land use patterns in California have influenced patterns of gene flow and genetic exchange among mountain lions in different areas of the state (Ernest et al. 2003; Ernest et al. 2014; Riley et al. 2014; Gustafson et al. 2019; Gustafson et al. 2022). Two studies are especially relevant to understanding the genetic structure of mountain lions within the petitioned ESU. The first is Gustafson et al. (2019), which the petitioners referenced extensively. Gustafson et al. (2019) collected samples from 992 mountain lions in California and Nevada (obtained from 1992–2016) and examined genetic diversity across 42 microsatellite markers[4]. The authors identified nine geographic clusters of samples containing similar genetic characteristics in California and one cluster in Nevada (Fig. 1). In addition to the six clusters within the petitioned ESU, the other clusters in California include North Coast (NC), Western Sierra Nevada (WSN) and Eastern Sierra Nevada (ESN) (Fig. 1). In this report, the Department follows Gustafson et al. 2019 in referring to these clusters as genetic populations. Though mountain lions associated with these genetic populations show significant genetic differentiation, the populations are not fully isolated from one another (Fig. 4). The bidirectional migration rates calculated by Gustafson et al. (2019) demonstrate important historical connectivity between the Western Sierra Nevada (WSN) genetic population and the Central Coast populations (CC-S, CC-C, CC-N) and populations to the north and east (North Coast (NC) and Eastern Sierra Nevada (ESN)). Additionally, the SGSB genetic population functions to some extent as a linkage between genetic populations to the south (EPR and SA) and the north (WSN and the Central Coast genetic populations), although gene flow through this linkage appears to be very limited.

[4] Microsatellites are short repetitive segments of DNA base pairs (nucleotides) scattered throughout the genome, often in noncoding regions between or within genes.

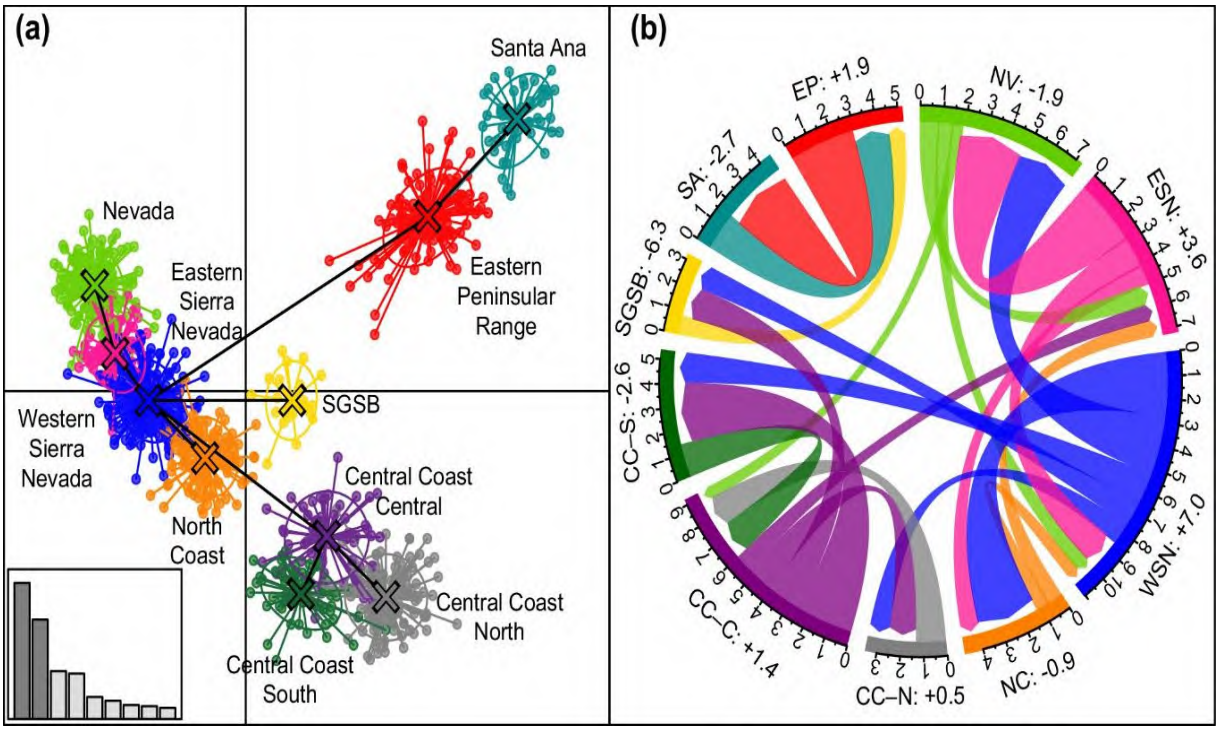


Figure 4. Functional connectedness of mountain lion genetic populations, based on (**a**) discriminant analysis of principal components and (**b**) bi-directional migration rate estimates (multiplied by 100 for visualization). Each dot represents an individual (**a**). Each color (**a, b**) represents a population. Black lines (**a**) indicate the most closely related population based on genetic dissimilarities. The inset barplot (**a**) shows which axes are being displayed (i.e., discriminate functions 1 and 2) and the relative proportion of variation explained by each of the nine discriminant functions. Two-thirds of the individuals in each population are contained within the corresponding ellipsoid. For a biologically meaningful interpretation, only estimates of interpopulation migration rates with 95% confidence intervals that do not cross 0 are presented (**b**). Net genetic source-sink migration rates are presented next to population names with positive values indicating net genetic source and negative values indicating net genetic sink (e.g., WSN exported 9% of migrants and received 2% so its net rate is +7%). Reproduced from Gustafson et al. (2019).

The second study particularly relevant to understanding genetic structure in the petitioned ESU is Gustafson et al. (2022), which analyzed 16,285 genome-wide single-nucleotide polymorphisms[5] (SNPs) from 401 mountain lions sampled broadly across the state from 2011–2017. Using SNPs, Gustafson et al.'s (2022) best supported model identified four broad-scale genetic groups concordant with California's geography: North Coast (NC); Sierra Nevada (SN); Central Coast (CC), which includes Gustafson et al.'s (2019) CC-N, CC-C, and CC-S genetic populations; and Southern Coast (SC), which includes Gustafson et al.'s (2019) SA, SGSB, and EPR genetic populations (Fig. 5).

[5] A SNP is a random substitution of the nucleotides at a single position on a DNA sequence.

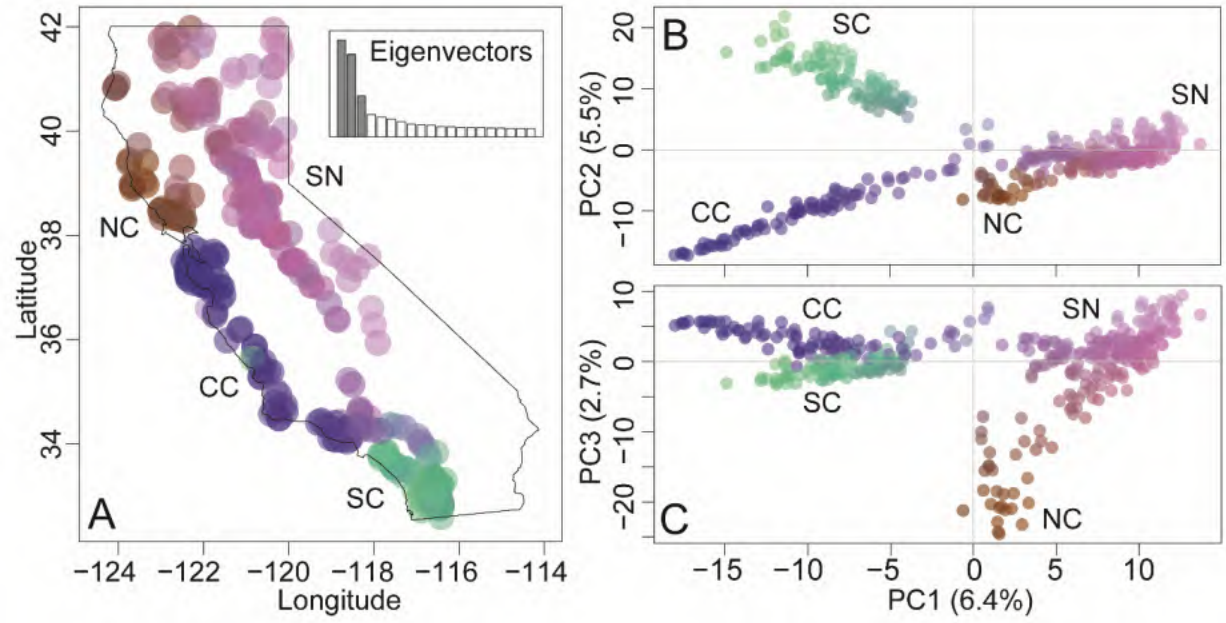


Figure 5. Principal component analysis (PCA) of 401 mountain lions at 16,285 SNPs reveals four broad-scale genetically discernible groups (NC = North Coast, CC = Central Coast, SC = Southern Coast, SN = Sierra Nevada). (A) The color plot of the PCA represents colors corresponding to a combination of the first 3 eigenvectors. The inset plot shows the proportion of the variance explained by shaded PC eigenvectors 1–3 compared to other eigenvectors. The color values are plotted at sample locations to demonstrate geographic structure. Color plots of (B) PC1 and PC2 and (C) PC1 and PC3 resolved the 4 broad-scale genetically discernible groups. Reproduced from Gustafson et al. (2022).

On a finer scale, both cluster analyses and genetic differentiation tests by Gustafson et al. (2022) also supported the presence of nested substructure within the four well-supported, broad-scale groups. The authors found evidence of 10 fine-scale genetically discernible populations roughly corresponding to the genetic populations identified by Gustafson et al. (2019) (Fig. 6). Consistent with the 2019 study, the authors found evidence these fine-scale populations are not fully genetically isolated and have experienced gene flow.

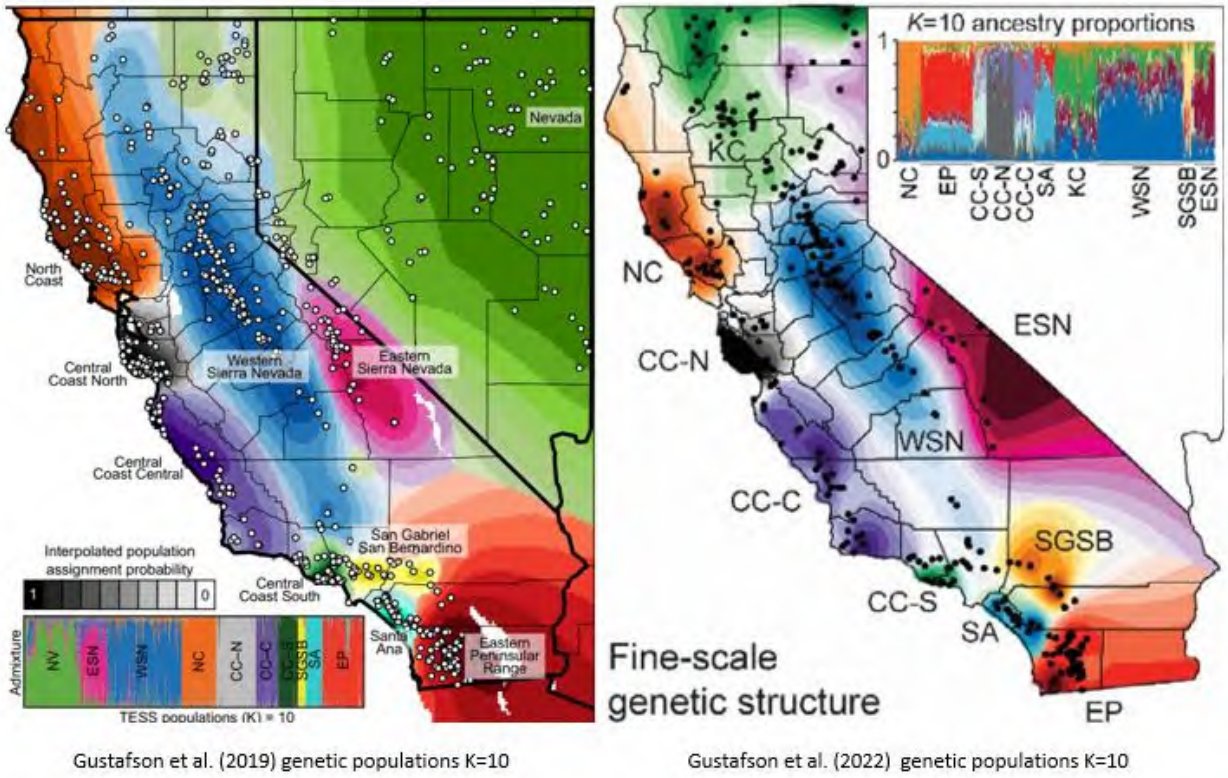


Figure 6. The geographic distribution of 10 discernible genetic populations from Gustafson et al. 2019 (left) and Gustafson et al. 2022 (right). Dots indicate locations of genetic samples. Note that in Gustafson et al. (2019), 9 of the 10 clusters are in California while in Gustafson et al. (2022), all 10 clusters are in California.

Figures 7 through 10 use pie charts to represent the ancestry of the individual lions sampled in Central and Southern California in the Gustafson et al. 2019 and 2022 studies. Each pie chart represents the location where a genetic sample was obtained from an individual mountain lion and the genetic affinities of that individual The different colors show the percentage of the ancestry of sampled lions that was assigned to different genetic populations. A pie chart that is fully or almost fully one color is strong evidence that both parents were from the same genetic population. If the pie chart of a sampled mountain lion is in the same genetic population as its parents (e.g., a fully gray sample in the Santa Cruz Mountains in Fig. 7), it means the sampled lion is unlikely to have moved from the genetic population of its parents. If a mostly solid pie chart is located outside of the population of its parents, that is strong evidence that it is a first-generation migrant that moved to a new population during its lifetime. It is important to recognize that lions that appear to have dispersed from their parent population may or may not have contributed genes to another genetic population depending on whether they produced surviving offspring in the new location or died before they were able to breed. A pie chart with multiple colors suggests gene flow (movement with breeding) occurred in the past. A pie chart that is a 50/50 split is good evidence of a hybrid offspring among parents from two different genetic populations (i.e., likely the offspring of a migrant). As the pie pieces get smaller, hybridization between genetic

populations occurred further and further back among more distant ancestors. Very small pie segments may represent statistical 'noise' in the ancestry calculation.

Gustafson et al.'s 2022 SNP analysis shows evidence of historical genetic exchange among the fine-scale genetic populations, with the WSN genetic population acting as a source of gene flow to the Central Coast genetic populations, to SGSB, and to populations to the north and east. The SGSB genetic population may have historically acted as a linkage between the EPR and SA genetic populations and the WSN and the Central Coast populations (Figs. 7, 8). Many of the samples in the CC-S, SGSB, and the southern part of the WSN genetic population show ancestry from multiple genetic populations, which is to be expected from an area acting as a crossroads. Similarly, the mixed ancestry of individuals in the CC-S and CC-C indicate some level of historical connectivity with one another and with the WSN and SGSB (Fig. 8).

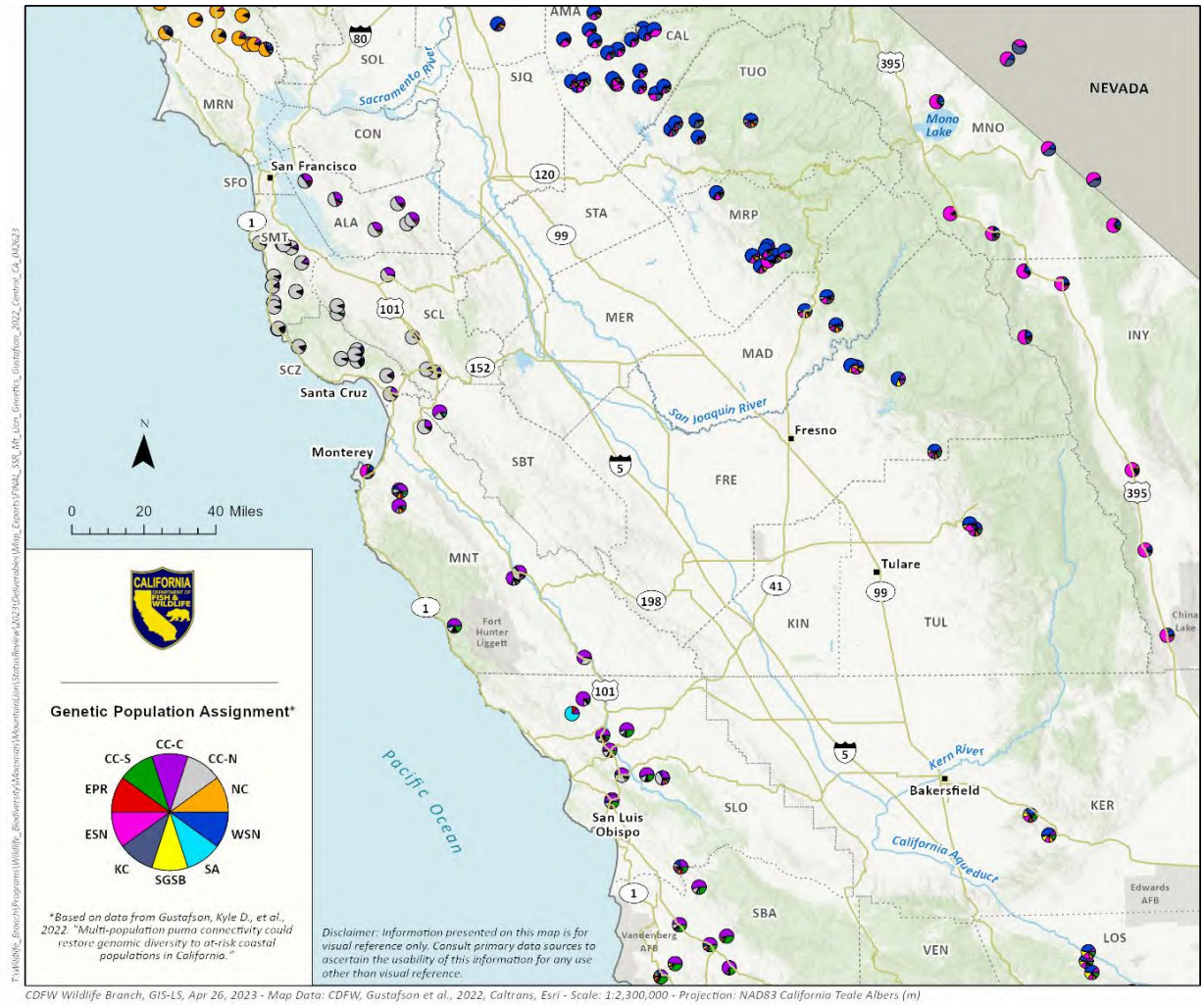


Figure 7. Assignment of individual mountain lion samples from Central California to genetic populations identified by Gustafson et al. (2022) using Single Nucleotide Polymorphisms.

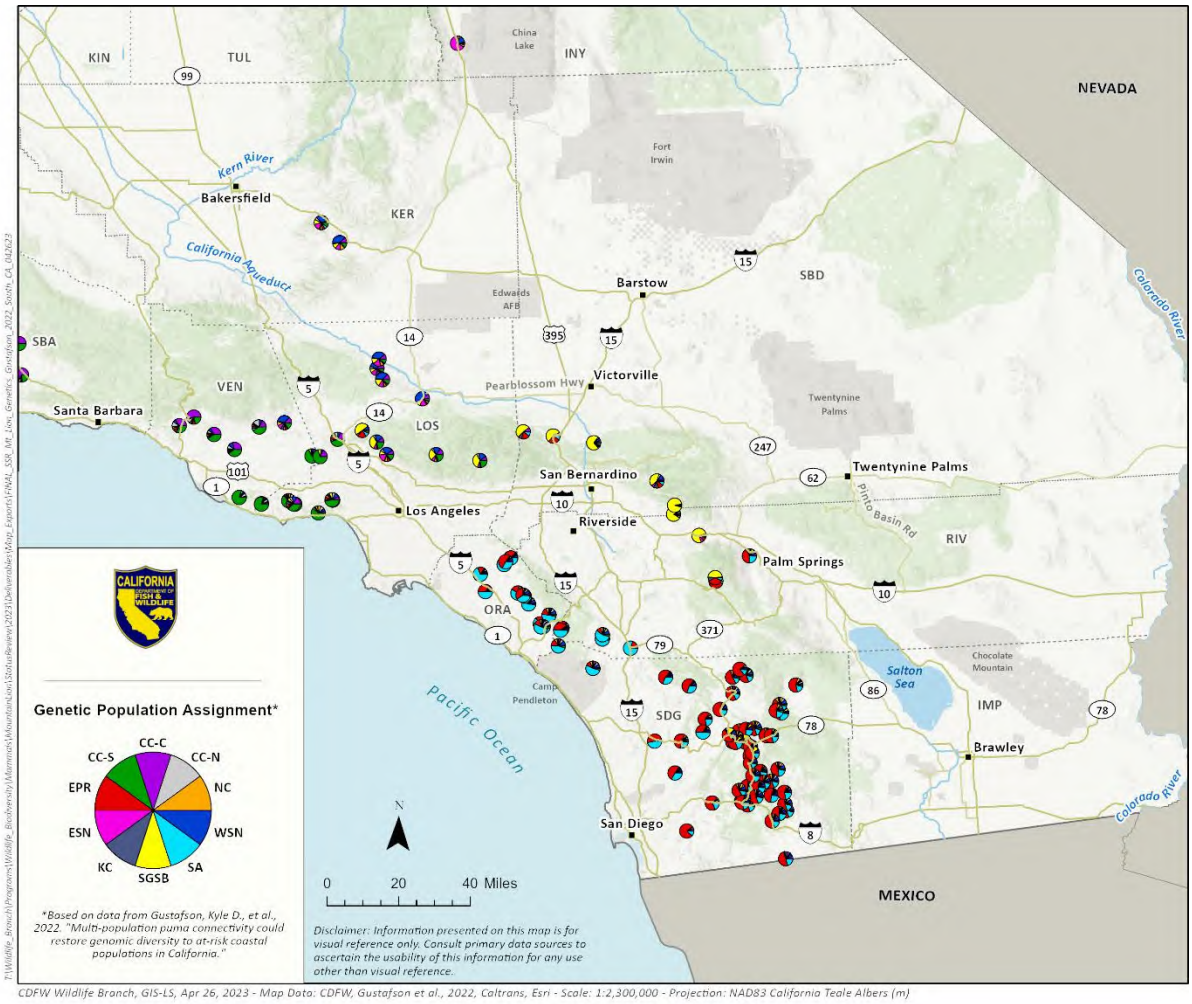


Figure 8. Assignment of individual mountain lion samples from Southern California to genetic populations identified by Gustafson et al. (2022) using Single Nucleotide Polymorphisms.

The microsatellite data from Gustafson et al. 2019 show fewer animals of shared ancestry, and samples are more likely to be assigned to one genetic population (i.e., there are more pies of a solid color in Figs. 9, 10). Microsatellites are fast-evolving genetic markers, and they may represent more contemporary patterns of gene flow relative to the SNP markers. These data suggest relatively little gene flow between populations, potentially due to the expansion of human development and highways making movement more difficult (Gustafson et al. 2019). The population structure revealed by Gustafson et al. (2019; 2022) is consistent with both natural landscape features (e.g., Central Valley, San Francisco Bay, Sierra Nevada Crest) and development (e.g., roads and highways, housing developments) impeding gene flow at various temporal and spatial scales.

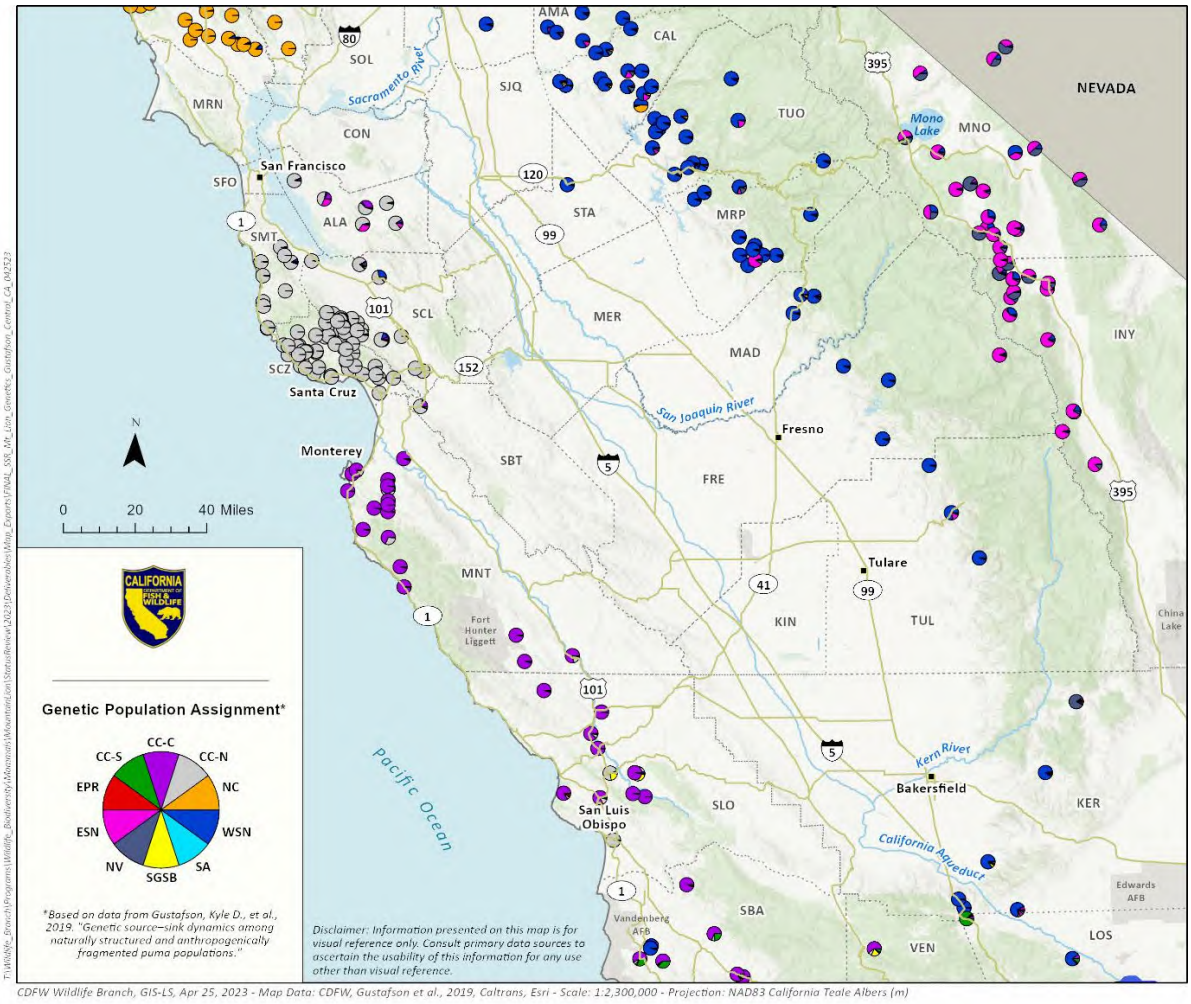


Figure 9. Assignment of individual mountain lion samples from Central California to genetic populations identified by Gustafson et al. (2019) using microsatellite DNA markers.

According to the microsatellite data, the area occupied by the CC-S population, especially north of the Santa Monica Mountains, has been important for sustaining statewide gene flow because of the intersection of mountain lions from the Sierra Nevada and Central Coast broad-scale genetic groups (Fig. 10). The data also reveal some gene flow between CC-C and CC-N, and CC-C and CC-S. The samples show movement between SA and EPR, and EPR and SGSB. However, these three South Coast populations are fairly isolated from other genetic populations in California. Few animals with ancestry from the WSN or the Central Coast group were found south or east of Los Angeles (Fig. 10). The 2022 genetic analysis indicated likely movement of animals from the WSN through the Tehachapi Mountains and into the CC-S and perhaps SGSB populations (Fig. 10). The Tehachapi Mountains seem to provide the only corridor for regular movement between the petitioned areas and more robust mountain lion populations in the Sierra Nevada.

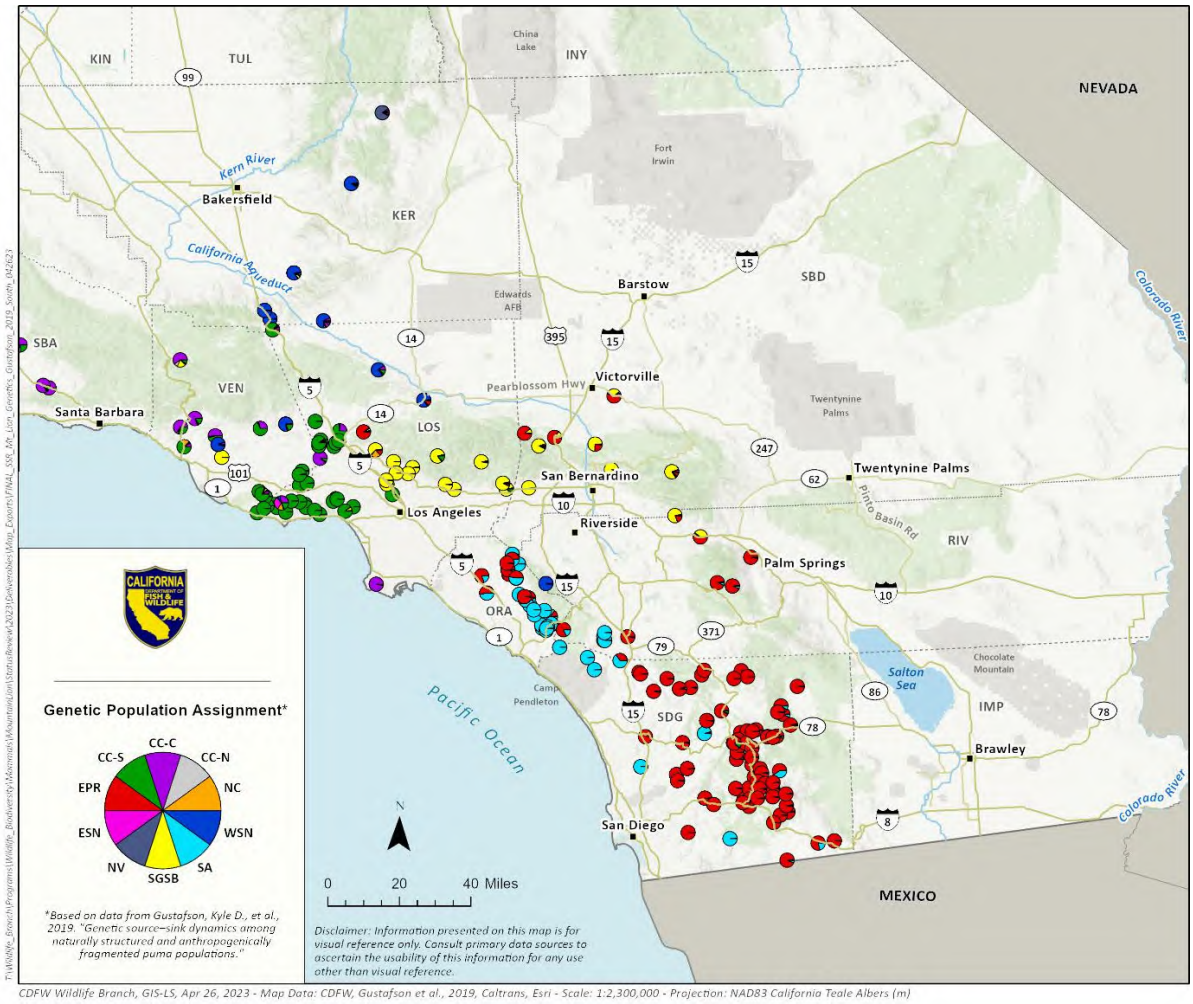


Figure 10. Assignment of individual mountain lion samples from Southern California to genetic populations identified by Gustafson et al. (2019) using microsatellite DNA markers.

Another commonly used measure of genetic differentiation between populations (i.e., genetic population structure) is the fixation index (F_{ST}). F_{ST} was originally developed to estimate differentiation among all subpopulations within a metapopulation (i.e., global F_{ST}; Wright 1931) but is now more commonly used in pairwise fashion to compare two subpopulations (i.e., pairwise F_{ST}). High pairwise F_{ST} values between populations is the result of population isolation reducing the number of migrants and interbreeding. Low F_{ST} values suggest less isolation between populations and more interbreeding. F_{ST} values range from 0 to 1. A value of 0 implies the two populations are completely interbreeding. A value of 1 implies that the two populations do not share any genetic diversity. Values of 0 and 1 are largely theoretical and are not expected to be found in nature. More practically, values of $F_{ST} > 0.15$ are generally considered to represent substantial genetic differentiation between populations, while values < 0.05 are considered minimal differentiation (Frankham et al. 2002).

Gustafson et al. 2022 found that the four broad-scale genetic groups were moderately differentiated, with the South Coast group being the most differentiated from the others and the Sierra Nevada group the least (Table 1). Most of the fine-scale genetic populations within the area of the petitioned ESU had

substantial genetic differentiation from each other (Table 2), indicative of limited gene flow between those populations.

Table 1. Mean pairwise genetic distance values for the broad-scale *K* = 4 genetic clusters. Weir and Cockerham F_{ST} is presented below the diagonal, and Nei's F_{ST} is presented above the diagonal (WC\Nei). Higher values indicate greater genetic differentiation and suggest less connection between populations. All pairwise F_{ST} estimates were significant ($p < 0.001$) based on a bootstrapping analysis. Modified from Table 2 in Gustafson et al. 2022.

K = 4	SN	SC	CC	NC
SN	-	0.133	0.124	0.100
SC	0.129	-	0.173	0.198
CC	0.120	0.173	-	0.156
NC	0.094	0.196	0.156	-

Table 2. Mean pairwise genetic distance values for the fine-scale *K* = 10 genetic clusters. Weir and Cockerham F_{ST} is presented below the diagonal, and Nei's F_{ST} is presented above the diagonal (WC\Nei). Higher values indicate greater genetic differentiation and suggest less connection between populations. All pairwise F_{ST} estimates were significant ($p < 0.001$) based on a bootstrapping analysis. Modified from Table 2 in Gustafson et al. 2022.

K =	CC-N	CC-C	CC-S	SGSB	SA	EPR	WSN	ESN	KC	NC
CC-N	-	0.098	0.148	0.210	0.319	0.231	0.188	0.233	0.183	0.229
CC-C	0.100	-	0.060	0.140	0.254	0.164	0.121	0.168	0.117	0.164
CC-S	0.152	0.059	-	0.163	0.287	0.196	0.147	0.189	0.146	0.202
SGSB	0.221	0.141	0.164	-	0.212	0.130	0.106	0.116	0.109	0.205
SA	0.320	0.251	0.289	0.217	-	0.100	0.222	0.226	0.215	0.301
EPR	0.227	0.163	0.192	0.132	0.095	-	0.163	0.163	0.141	0.214
WSN	0.176	0.116	0.136	0.106	0.203	0.146	-	0.045	0.022	0.26
ESN	0.237	0.168	0.183	0.113	0.221	0.166	0.045	-	0.041	0.183
KC	0.178	0.114	FST0.137	0.105	0.202	0.141	0.022	0.041	-	0.093
NC	0.230	0.164	0.203	0.210	0.300	0.211	0.118	0.183	0.093	-

3. Status and Trends in California

3.1 Historical Distribution and Abundance

Habitat loss and fragmentation resulting from land use changes in the petitioned ESU began in the 1700s and continues to the present. Those changes have significantly affected mountain lion distribution in some areas. Many areas within the petitioned ESU have been modified by urban and agricultural development, primarily in the San Francisco Bay Area, Southern California, and the Central Valley, making them mostly unsuitable for mountain lions (Fig. 3). Near the coast in Southern California, extensive urbanization from Ventura County to the border with Mexico has supplanted large areas of mountain lion habitat in the coastal valleys and plains and has isolated patches of remaining habitat in the Santa Monica, San Gabriel, San Bernardino, and Santa Ana Mountains (Fig. 3; Vickers et al. 2015; Benson et al. 2016; Benson et al. 2019). The Eastern Peninsular Range is also affected by human

development and road networks but to a lesser degree than the aforementioned mountain ranges. Likewise, remaining habitat in the Santa Cruz Mountains and the southern San Francisco Bay Area is increasingly constricted by development and busy highways (Wilmers 2014; Wang et al. 2017). In contrast, the Santa Lucia and other rugged mountains of the central coast have fewer highways and relatively little development and the distribution of lions has likely changed little there from the pre-European era.

3.2 Population Size

Historical estimates of the size of the mountain lion population within the petitioned ESU do not exist. While some historical estimates of the statewide mountain lion population exist, the methods used to derive the estimates, and the statistical rigor of the estimates varied substantially. As such, these estimates are not directly comparable and cannot be used to examine trends in the statewide population over time.

The Department paid a bounty for mountain lions from 1906–1963 (Dellinger and Torres 2020). McLean (1954) presented bounty numbers from 1907-1950 and estimated there were 600 mountain lions in California. Over a decade after the end of the bounty period, Sitton (1977) estimated that there were approximately 2,400 mountain lions in California. A 1989 study estimated 4,100–5,700 mountain lions in the state based on the amount of suitable habitat and adult density estimates from prior studies (Mansfield and Weaver 1989).

The Department recently developed a statistically rigorous estimate of the statewide mountain lion population size using DNA from the scats of 335 individual mountain lions collected in 2017–2022 from 13 study sites distributed widely across the state. The detection histories of individually identifiable mountain lions from these samples were used to estimate the statewide population size using a Bayesian Spatial Capture Recapture (SCR) model. SCR includes a spatial scale parameter (e.g., how the probability of detection of a mountain lion varies over its home range) that is critical for accurately scaling estimated abundances to density and population size (Royle et al. 2013). Using this method, the Department estimates there are approximately 4,172 (95% CI 3,645–4,750) mountain lions in the state. This population estimate includes all age classes of mountain lions, including dependent young. The estimate represents an average annual number of mountain lions over a recent 5-year period (i.e., 2017–2022). An important caveat is that extrapolation from the modeling was limited to only those portions of state that were mapped as mountain lion habitat by Dellinger et al. (2020b). Accordingly, the estimate may be undercounting a small number of mountain lions outside of the mapped range (e.g., Central Valley and some desert areas). These results are preliminary and may change based on peer review when a manuscript is submitted to a scientific journal for publication.

As part of this analysis, the Department used available California GPS telemetry data from 152 mountain lions to inform the spatial scale parameter in the SCR model. The result of this exercise was that spatial inferences from the telemetry were consistent with those from the scat (e.g., <5% difference) which provides validation that the statewide population estimate is accurate.

The Department also generated regional scale current estimates of abundance that roughly correspond to the genetic populations in Gustafson et al. 2019 (Table 3). The boundaries for the regional genetic population estimates come from Figure 1 in Dellinger et al. (2020b). The Department used SCR to create

density estimates that vary over space depending on relative use of specific habitats within an area of interest. However, the covariates the Department used were more effective for extrapolating a statewide population total than drawing accurate inferences about density in specific areas. For this reason, these local estimates may be less accurate than the statewide estimate. The total population estimate within the petitioned ESU is 1,449 mountain lions (95% CI 1,272–1,638). However, each of the genetic populations comprising the petitioned ESU is moderately to considerably isolated from adjacent populations. The petitioned area does not support a single well-connected population and instead effectively consists of several mostly isolated smaller populations. Estimates for the CC-S, SGSB, and SA genetic populations are each lower than 100 individuals. The best currently available data indicate most of the populations within the petitioned ESU have small effective population sizes and low genetic variation (see Section 4.9), which could put them at increased risk of local extirpation (Beier 1993,1995; Dickson et al. 2005; Ernest et al. 2014; Riley et al. 2014; Vickers et al. 2015; Benson et al. 2016; Benson et al. 2019; Gustafson et al. 2019; Gustafson et al. 2022).

Table 3. Estimates of total population sizes and 95% confidence intervals for the genetically distinct mountain lion populations identified in Gustafson et al. 2019. The boundaries used to calculate the population sizes come from Dellinger et al. 2020b. Note: these estimates were derived from modelling at a different geographic scale than the statewide and petitioned area estimates, and consequently, the summed estimates differ from the statewide estimate.

Population	Estimated Population Size (95% CI)
Central Coast North (CC-N)	219 (193–247)
Central Coast Central (CC-C)	480 (422–540)
Central Coast South (CC-S)	64 (56–72)
San Gabriel/San Bernardino (SGSB)	94 (82–107)
Santa Ana Mountains (SA)	67 (59–75)
Eastern Peninsular Range (EPR)	459 (383–546)
North Coast (NC)	821 (707–943)
Modoc Plateau (MP)	377 (307–456)
Western Sierra Nevada (WSN)	1,199 (1,050–1,360)
Eastern Sierra Nevada (ESN)	398 (320–489)

3.2.1 Survival and Sources of Mortality

Benson et al. (2023) analyzed data from 590 radio collared mountain lions in 24 California study areas from 1974 to 2020 (76% of the study animals were collared after the year 2000). They estimated an annual survival rate of 0.67 for males (95% CI 0.63–0.72, n = 297 males and n = 151 deaths) and 0.80 for females (95% CI 0.77–0.83, n = 293 females and n = 112 deaths). Of the 263 known mortalities, 199 were attributable to a specific cause. Management killing had the highest annual mortality rate at 6%. Management killing includes lethal removal of mountain lions following livestock depredations (75% of the mortalities in this category), lethal removal following bighorn sheep depredations (23% of the category), and lethal removal of lions that posed a public safety threat (2%). After management killing,

the greatest sources of mortality were vehicle strikes (4%), non-strife natural mortality including starvation and disease (3%), intraspecific strife (3%), poaching (3%), and other human causes including mortalities directly attributable to rodenticide poisoning and wildfire, which combined resulted in a 1% annual mortality rate (Benson et al. 2023).

The Department's approach to issuing depredation permits has evolved toward increased emphasis on nonlethal methods of take, and the relative importance of this mortality factor may have declined (for more detail see section 4.3.2). Benson et al. (2023) found that as human-caused mortality increased in an area, so did natural mortality, though the trend was not significant. This suggests human caused mortality may have been additive during the study period and did not just affect animals that would have otherwise died of natural causes. They also found that human population density influenced mountain lion mortality rates, with human density being a better predictor of mortality risk than the density of sheep and goat farms on the landscape. Both human-caused and natural mortality were highest in areas of the state with intermediate human density, and lower in both high human density areas and remote, low human density areas (Benson et al. 2023).

4. Factors Affecting Ability to Survive and Reproduce

4.1 Past and Threatened Modification and Destruction of Habitat

4.1.1 Urbanization

Anthropogenic habitat loss and fragmentation have been occurring in California since the arrival of Spanish settlers in the 18th century and increased dramatically with expansion of mining and agriculture in the mid-19th century. Early 20th century naturalists catalogued the flora and fauna throughout the state and noted the loss of formerly abundant prey species of the mountain lion, including elk, mule deer, pronghorn, and beaver (*Castor canadensis*) (Stephens 1906; Grinnell 1914; Merriam 1919; Leopold 1966). Successive waves of agricultural and other development, including railroads, canals, roads, and highways resulted in the conversion of natural vegetation and led to further loss and fragmentation of mountain lion habitat. Development impacts have been extensive in the greater San Francisco Bay area, Sacramento and San Joaquin valleys (water diversions, agricultural development, and urban development), and the Los Angeles Basin and adjacent mountain ranges and valleys south to San Diego (urban, agricultural, and industrial uses).

The California State Wildlife Action Plan summarizes existing stressors on wildlife populations and ecosystems in the state and describes recent and ongoing habitat loss, fragmentation, and degradation in California (CDFW 2015). Significant habitat loss continues in many important California ecosystems. For example, over 195,000 ha (480,000 acres) of California rangeland habitats were converted to other uses between 1984 and 2008 (approximately 3% of available rangelands) - primarily due to residential and commercial development and agricultural intensification. Additionally, habitat degradation—resulting from pollution, invasive species, livestock grazing, intensive recreation, soil erosion, drought, flooding, or wildfire—is a widespread stressor to wildlife populations in California (CDFW 2015).

Habitat fragmentation occurs when portions of habitat are lost or degraded such that natural areas are divided into small and isolated remnants (CDFW 2015). This fragmentation can have numerous negative impacts on wildlife including declining biodiversity and impairment of ecosystem functions, isolation of

species into small subpopulations susceptible to extinction, and inhibition of movement between populations that leads to reduced genetic variation and inbreeding (Ibid.). Species with large home ranges, like mountain lions, require large contiguous areas of habitat or connectivity between multiple diffuse patches of habitat. Habitat loss and fragmentation can eliminate or isolate key habitat elements from home ranges, such as water and prey associated with riparian zones, and can reduce access to breeding and foraging habitat (Ibid.). These effects impact mountain lion populations as well as populations of their prey. When resources are dispersed across a broader area or fragmentation limits access to resources, mountain lions may be required to expend more time and energy to meet their needs, exposing them to more risk.

In Southern California, human populations are especially dense, and land conversion has been extensive. The significant amount of urban, suburban, and rural development in this area—resulting from population pressures of the region's 24 million residents (Wikipedia 2024)—has led to substantial habitat loss and fragmentation (CDFW 2015). Currently, nearly 40% of the land area in southern coastal California is in urban and suburban use (CDFFP 2010). Sprawling development with residential housing located far from existing urban centers has required new or enlarged roads and infrastructure. These development patterns not only reduce the amount of habitat available but also degrade the quality of adjacent habitat making the remaining natural habitats more vulnerable to the incursion of invasive species, air and water pollution, and altered fire regimes (Ibid.). In addition, the developed areas, roads, and utility corridors fragment the landscape leaving few or no movement corridors between natural areas (Ibid.).

Historical habitat loss and fragmentation have caused reductions in the geographic distribution of mountain lions in the petitioned ESU. Moreover, in the absence of adequate habitat conservation efforts, including connectivity measures, such reductions are expected to continue. A study of mountain lion habitat in CC-S and EPR showed that nearly half of mountain lion habitat in the study area is on private land, and the authors estimated approximately one-third of the lands that were available habitat in 1970 would be developed by 2030 (Burdett et al. 2010). Additionally, some habitat that is currently adjacent to development may become fragmented, with potential loss of connectivity and increased risk to mountain lions from vehicle strikes and depredation take (Burdett et al. 2010). For example, Development within key connectivity areas such as the Tehachapi Mountains near Interstate 5, if not carefully planned, could further constrain lion movement within a relatively narrow corridor of highly suitable habitat connecting the western Sierra Nevada with the central coast and Southern California (Penrod and Smith 2022).

Additionally, limited habitat connectivity has resulted in highly restricted gene flow in many areas of central and Southern California. For example, connectivity between the EPR and the SA genetic populations is limited due to the barrier effect of Interstate 15 in the Temecula region. Similar connectivity challenges occur due to Interstate 5 and Highway 58 between the CC and SN genetic groups. Recently published information on reproductive and morphological abnormalities in mountain lions in the Santa Monica Mountains, SA, and EPR indicate that habitat loss and fragmentation, and associated dispersal challenges, have led to inbreeding (Huffmeyer et al. 2022). See section 4.9 for more information on the inadequate habitat connectivity and highly impeded gene flow for these populations.

Residential and industrial development is projected to continue within the petitioned ESU, even in the areas that are already highly urbanized (EPA 2017). Projections of increased housing density through the year 2050 demonstrate that continued development will exacerbate existing barriers to mountain lion movement, effectively rendering existing pathways less permeable, and in some areas may lead to complete isolation of portions of genetic populations (Ibid.). Areas that are projected to become substantially more isolated by the year 2050 due to residential development include the Santa Cruz Mountains of the CC-N, the San Gabriel and San Bernardino Mountains, the Santa Monica and Santa Susana Mountains, and the Sierra Pelona and Tehachapi Mountains near the nexus of the WSN, CC-S, and SGSB genetic populations (Ibid.).

The cumulative effects of approximately 250 years of habitat loss and fragmentation due to development and road construction, loss of riparian habitat, and the associated reduction and shifting of prey species appear to have contributed to the separation of mountain lions into smaller genetic populations in the central and southern regions of California. See section 4.9 for information on the risks to small and isolated populations.

4.1.2 Agriculture and Forestry

The conversion of native habitat to intensively farmed crops and pasture has resulted in large swaths of land that no longer provide foraging and breeding habitat for mountain lions (Fig. 3). This conversion began as early as the 1700s in coastal California and accelerated rapidly in the 19th and 20th centuries as water storage and delivery systems were developed enabling the irrigation of crops. Approximately 43% of California's land area is used for agricultural production (CDFA 2009). In recent years over 9 million acres has been in irrigated agricultural production (DWR 2024). Although the same pattern of conversion of native plant communities to agricultural uses occurred wherever suitable soils and adequate water existed, this change has been most dramatic in the Central Valley, by far the largest contiguous region of intensively farmed land in the state. The Central Valley appears to form a largely semi-impermeable barrier to mountain lion movement between coastal mountain ranges and the Sierra Nevada and Cascade Mountains. Historically, the Central Valley contained extensive riparian forests along the Sacramento and San Joaquin Rivers, their tributaries, and in the Delta which likely provided corridors of suitable cover for mountain lions living in and traveling through the valley. Within the petitioned area, these historical habitats likely facilitated genetic connection between the WSN and NC genetic populations and the Central Coast group. However, it is estimated that 92-97% of such riparian forests have been lost through channelization, altered hydrology, and conversion to agricultural and urban uses, and much of the remaining riparian forest has been modified (CDFW 2014). The loss of Central Valley riparian forests and scrub, in combination with the development of significant highways and other infrastructure, is likely a major driver of contemporary mountain lion population structure.

Commercial timber harvesting in the petitioned area primarily occurs in the redwood-dominated (*Sequoia sempervirens*) forests of the CC-N. Although the impacts are less intense and less permanent than commercial agriculture, commercial timber harvesting can modify mountain lion habitat in that region. A study of nine mountain lion home ranges in the redwood forest of northwest California found mountain lions used forest areas with a greater proportion of fragmentation and edge more frequently than areas of more contiguous forest; however, mountain lions generally avoided areas of active timber harvest operations (Meinke 2004). Mountain lion home ranges included different stages of forest

succession from freshly harvested stands to late seral forests, perhaps indicating commercial timber management, as regulated by the California Department of Forestry and Fire Protection (CAL FIRE), does not fragment mountain lion habitat or isolate populations. Conversely, Smallwood (1994) found mountain lion use of forest stands of the central coast, north coast, and Sierra Nevada sharply declined within six years following clear cut harvest. The timing and extent of mountain lion use of clearcut harvest units likely depends on how rapidly shrub and small tree cover develops in the harvested area, which is influenced by the tree and shrub species composition of the harvested stand, the nature and extent of post-harvest site preparation treatments, and the management of young stands.

4.2 Vehicle Strikes, Roads, and Rail Lines

As mentioned in the section on survival and sources of mortality (3.2.1), vehicle strikes were the second most common cause of known mortalities of mountain lions in California from 1976–2020 (Benson et al. 2023). Figure 11 displays documented mountain lion mortality events caused by vehicle strikes in 2000–2023. The Road Ecology Center at the University of California, Davis (UC Davis) has records of 535 mountain lions killed on state highways in 2015–2022 (Shilling et al. 2023). However, because all vehicle strikes were unlikely to have been reported, the true number is likely higher.

In Southern California, Los Angeles, Orange, and San Diego Counties are major areas of road mortalities (Shilling et al. 2023). From 1981 to 2013, reported vehicle strikes accounted for 50 of 94 (53%) known mountain lion deaths in the Santa Ana Mountains (which includes parts of the greater Los Angeles metropolitan area) and 46 of 154 known deaths (30%) in the Eastern Peninsular Range (which includes the greater San Diego metropolitan area) (Vickers et al. 2015). Vehicle strikes were the main mortality factor for mountain lions in the SA genetic population, and a secondary mortality factor in the EPR genetic populations (Ibid.). The enhancement and/or creation of safe wildlife road crossings may be critical for maintaining lion persistence in these genetic populations.

In the Bay Area (CC-N), vehicle strikes are also a significant source of mortality. California State Routes SR-12, SR-17, SR-1, and especially Interstate-280 have high numbers of mountain lion mortalities (Shilling et al. 2023). Shilling et al. (2023) identify the stretch of I-280 northwest of San Jose as the deadliest highway in California for mountain lions with 20 deaths documented along a 32 km (20 mi.) stretch from 2015 to 2022.

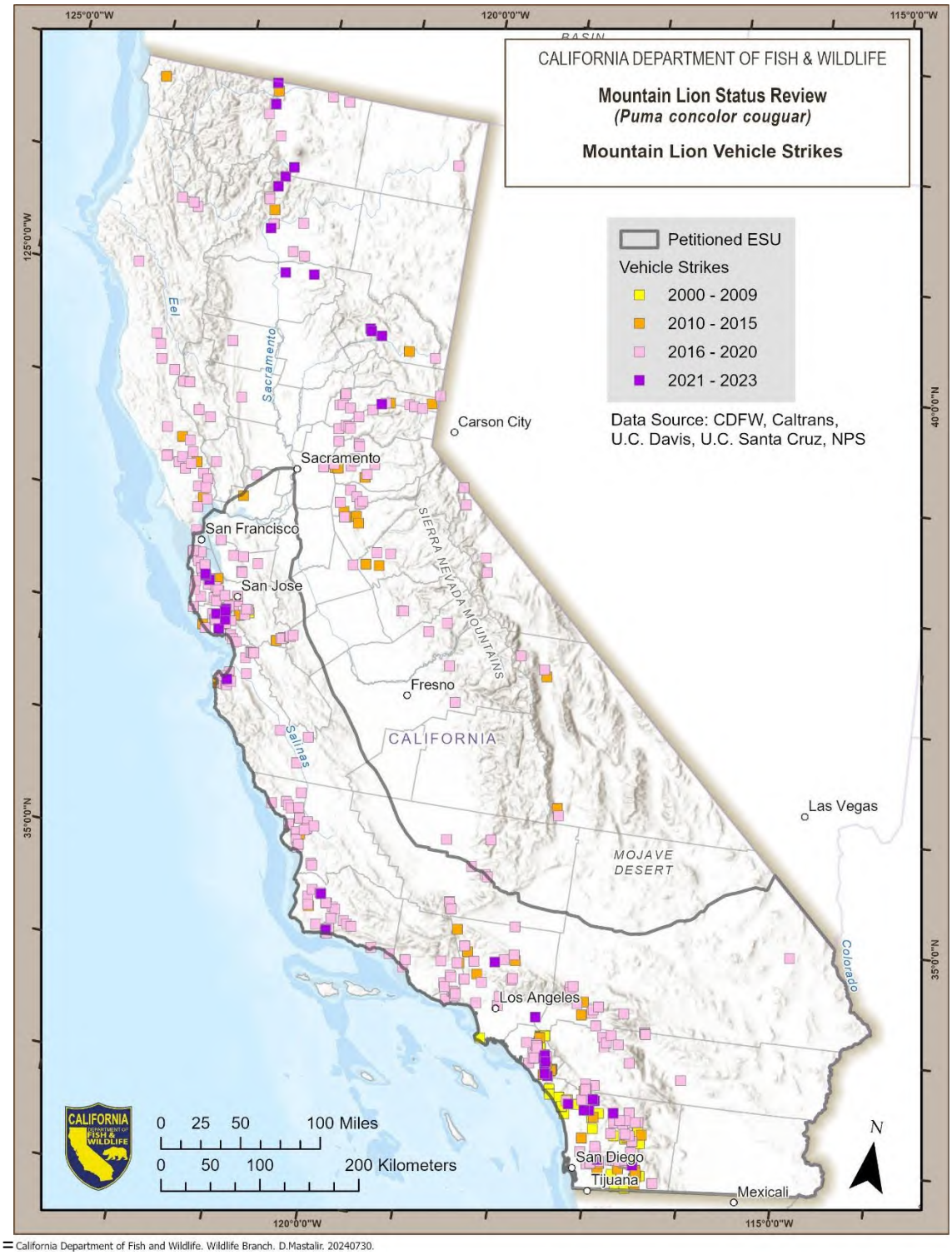


Figure 11. Mountain lion vehicle strike mortality incidents from 2000 to 2023. Roadkill reports are from Department records, Dr. Fraser Shilling and Dr. Winston Vickers at the University of California Davis, Dr. Chris Wilmers at the University of California Santa Cruz, and Dr. Seth Riley at National Park Service.

The threat of vehicle strikes is not limited to roads and highways. Trains also kill wildlife (Gangadharan et al. 2017), and railways often parallel highways and roads (e.g., an existing railway runs roughly parallel to Interstate-15 in the Cajon Pass area between the San Gabriel and San Bernardino Mountains). A high-speed rail line will run along I-15 from Rancho Cucamonga to Las Vegas with multiple crossings for wildlife planned (CDFW 2023). Another planned route for high-speed rail in the petitioned area is from San Jose through Pacheco Pass east to Merced (California High-Speed Rail Authority 2024).

Vehicle strikes may also cause indirect mortality of dependent young mountain lions. When a female with dependent young is struck by a vehicle, the kittens likely starve to death or become easy prey for predators, including other mountain lions. If the kittens are larger and more mobile, they may approach areas where they are more likely to encounter humans as they search for food. This occurred in November 2017, when a mother mountain lion was killed by a vehicle strike in the SA and two of her kittens were found roaming nearby urban areas—one in a backyard and the other along a road (Veklerov 2018). Both kittens, too young to survive on their own, were removed from the wild and placed in the Oakland Zoo.

In addition to direct mortality from vehicle strikes, roads also pose a threat to mountain lions by restricting movements. Radio and satellite-tracking data have revealed that mountain lions will sometimes approach a busy freeway, hesitate to cross, linger in the area, or pace back and forth parallel to the freeway before turning back (Sweanor et al. 2000; Stoner et al. 2008). For example, GPS data from collared mountain lions in the Santa Ana Mountains have revealed that on multiple occasions lions approached one of the three regional freeways that surround the mountains (I-5, I-15, SR-91), only to range back and forth along them before turning back (W. Vickers unpublished data). Only three GPS-collared mountain lions have crossed I-15, the critical barrier between the SA and the EPR genetic populations, during the 19 years that UC Davis researchers have studied mountain lions in the Santa Anas. All three crossed west to east (from SA into the EPR), and all three were dispersal age animals (two males and one female). However, crossing a major barrier like a road does not guarantee the individual will stay or breed in the new area. Of the three who crossed I-15, one was killed on a depredation permit in the EPR within 3 weeks, while the other two returned to the SA after a short period and did not cross the freeway again before their collars dropped off as scheduled (W. Vickers unpublished data). Two uncollared mountain lions have been recorded crossing I-15 on cameras monitoring crossing structures at Temecula Creek and culverts south of that location. Those individuals also crossed I-15 west to east, but no mountain lions have been recorded crossing east to west despite numerous photos of mountain lions being captured along the east side of the freeway (W. Vickers unpublished data). Though one GPS-collared mountain lion has crossed SR-91 from the main body of the Santa Ana Mountains into the Chino Hills and back several times, the Chino Hills are completely surrounded by development and do not provide a pathway to the San Gabriel Mountains to the north.

Planning for safe wildlife crossings in Southern California has been underway for nearly two decades. In 2008, the South Coast Missing Linkages Project identified areas in the coastal areas of Southern California where linkages are needed (South Coast Wildlands 2008). The County of Ventura has incorporated these linkages into its General Plan land use zones to help ensure these important wildlife movement corridors remain passable (Ventura County 2019). In 2020, CDFW assessed priority barriers

to wildlife movement throughout the state, and in 2022, 12 were considered to be top priorities, including several in the petitioned ESU area (Fig. 12, CDFW 2022c).

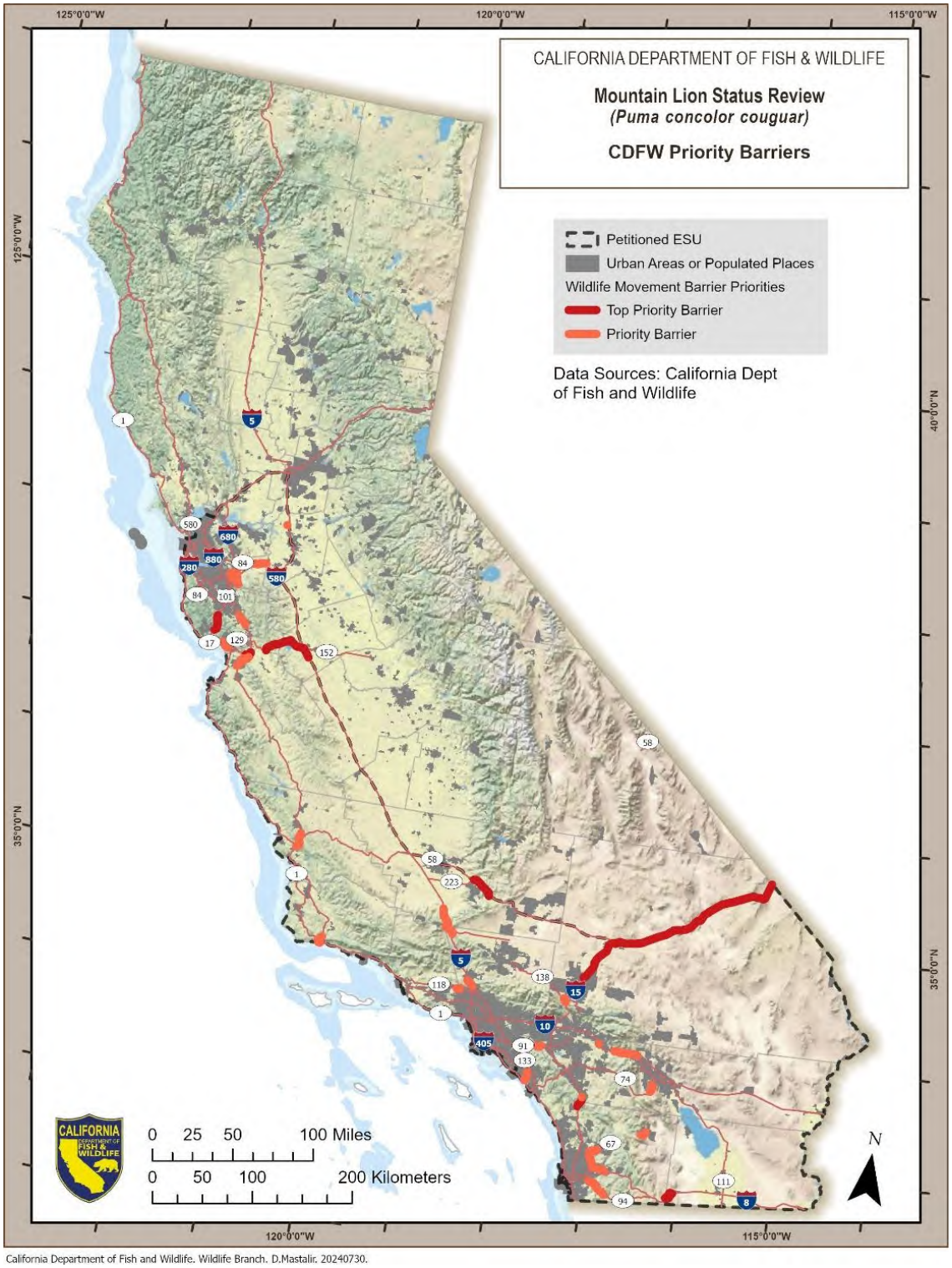


Figure 12. Priority movement barriers within the petitioned area as identified by the Department (CDFW 2022c).

In general, funding to implement wildlife crossing projects, including land acquisition to preserve natural habitat on both sides to make the crossing more suitable for wildlife, has been limited to date. The lack of wildlife crossings with appropriate fencing, and lack of fencing near existing crossing structures, particularly in highly urbanized areas or across major transportation corridors, contributes to continuing vehicle strikes and to the barrier effects on movement and gene flow. However, several crossings have recently been planned and/or approved. Construction of the Wallis Annenberg Wildlife Crossing over Highway 101 in the Liberty Canyon area of CC-S (Fig. 13) began in 2022. The crossing, including the approaches and the crossing over adjacent Agoura Road, is expected to be completed in late 2026. The overpass will help facilitate mountain lion movement between the Santa Monica Mountains and the Simi Hills and could ultimately contribute to genetic exchange throughout the CC-S genetic population, between CC-S and CC-C, and ideally between CC-S and WSN. It may also minimize some local vehicle-related mortality on Highway 101. A wildlife undercrossing with associated fencing and habitat conservation was constructed under Highway 17 in the Santa Cruz Mountains in February of 2023. Another wildlife crossing over Highway 101 in San Benito County is in the planning and fundraising phase. Together, these crossings should help facilitate the movement of mountain lions between the Santa Cruz Mountains in CC-N and the Gabilan Mountains in CC-C. In addition, initial design and environmental studies are being completed for a new crossing structure across I-15 south of Temecula, and improvements to the Temecula Creek passageway are planned. Other connectivity studies are being initiated along I-10 in the Banning Pass area that is critical to mountain lion movement between the EPR and SGSB genetic populations (W. Vickers pers. comm.). Lastly, the Department and the California Department of Transportation (Caltrans) have announced there will be three new wildlife overcrossings along I-15 and the high-speed rail line in San Bernardino County and existing undercrossings and culverts along the corridor will be improved and maintained, all of which should facilitate the movement of mountain lions and other species (CDFW 2023).



Figure 13. Rendering of Wallis Annenberg Liberty Canyon Wildlife Crossing. Source: Santa Monica Mountains Conservancy.

4.3 Overexploitation

4.3.1 Historical Bounties and Hunting

The management of mountain lions in California has varied widely in the last century. From the early 20th century until 1964, mountain lions were a bountied predator in California (Young and Goldman 1946; Dellinger and Torres 2020). During the bounty period, approximately 12,580 mountain lions were killed across California (Dellinger et al. 2021b). Nearly one-third of the bounties paid in the first few decades were in Humboldt, Trinity, Mendocino, and Lake Counties (Dellinger and Torres 2020). Additionally, the Department employed 1–5 hunters whose only job was to remove mountain lions throughout the state (McLean 1954; Dellinger and Torres 2020). One of those hunters, Jay Bruce, killed 669 mountain lions during his long career (Bruce 1953).

When bounties ended in 1964, mountain lions were classified as a nuisance or vermin species—while there was no longer paid incentive for removal, they could be killed year-round without a hunting license and with no limits (Dellinger et al. 2021b). From 1969–1972, mountain lions were considered a game species and could be hunted with a proper hunting license. Two hunting seasons took place (1970–1971) during which 118 animals were harvested from 4,953 permits issued (Dellinger et al. 2021b). Following the second hunting season, a legislative moratorium ceased further mountain lion hunting (Fitzhugh and Gorenzel 1986). From 1972–1986 mountain lions were classified as a non-game mammal and the hunting moratorium remained in place. Their status as a game species was reinstated from 1986, and the Department began to establish hunting zones and harvest quotas and issue tags. However, no mountain lions were harvested due to this change before a 1990 ballot initiative (Proposition 117) approved by California voters classified mountain lions as a "specially protected mammal species" with significant new protections for the species starting in 1991 (Fish & G. Code, § 4800). That classification continues today (see section 1.4). As a specially protected species, the only allowable take of mountain lions occurs via depredation permits when mountain lions have killed or are encountered attacking or threatening livestock, to protect public safety, and the targeted removal of individuals negatively impacting federally listed bighorn sheep populations (Fish & G. Code, §§ 4801–4809).

4.3.2 Poaching

Poaching and other unpermitted take is rarely reported but has been observed in the CC-S, SA, and EPR (Beier and Barrett 1993; Riley et al. 2014; Vickers et al. 2015) as well as in the CC-N (Yap et al. 2019). Benson et al. (2023) reported 26 out of 199 mortalities from known causes in the years 1974–2020 were due to poaching, translating to a 2%–3% annual rate of mortality. This annual mortality rate is lower than the rate for depredation take (6%), vehicle collisions (4%), natural mortality (3%), and being killed by another mountain lion (3%). However, the fact that mortalities from poaching are unreported and difficult to detect means the actual poaching-related mortality rate may be higher than reported in the literature.

4.4 Depredation and Public Safety Management

The interactions between humans and mountain lions in California have profound impacts on the conservation and management of the species. Human-wildlife conflict occurs "when humans and wild animals interact in an unwanted or unsafe way" (CDFW 2024a). As the State's Trustee Agency for fish

and wildlife resources (Fish & G. Code, § 1802), the Department's responsibilities include serving as the primary state agency charged with helping to resolve human-wildlife conflict and public safety wildlife incidents.

4.4.1 Depredation Permits

When mountain lions have attacked or killed domestic animals, depredation permits issued by the Department allow them to be taken, nonlethally and, in some very limited circumstances, lethally (Fish & G. Code, § 4801.5 and 4802, et seq.). Nonlethal methods of take include, but are not limited to, practices such as hazing with hounds and use of less-than-lethal projectiles. Mountain lions encountered in the act of pursuing, inflicting injury to, or killing livestock or domestic animals may be taken—nonlethally or lethally—by landowners and their agents without prior authorization (Id., § 4807). Additionally, the Department or local public safety agencies may take mountain lions perceived to be an imminent threat to public health and safety (Id., §§ 4801, 4801.5).

In 2013, the Department implemented a situation-specific approach to responding to human-mountain lion conflict, which addressed mountain lions in areas of human habitation, mountain lions depredating pets/livestock, and mountain lion public safety situations (CDFW 2013). The most noteworthy change in management action reflected in this approach was specifying that no more than one mountain lion could be taken under a single depredation permit. In 2017, the Department amended its approach, consistent with Fish and Game Code section 4801.5, to prioritize non-lethal measures for dealing with mountain lion depredation in the Santa Monica and Santa Ana Mountains where research indicated that local mountain lion populations constrained by anthropogenic barriers lacked genetic variation (CDFW 2017). Following the Commission's decision to make mountain lion a candidate species in 2020, the Department expanded the area where non-lethal measures would be prioritized to the entire petitioned ESU (CDFW 2020a), and later to the entire state (CDFW 2020b), consistent with Fish and Game Code section 4801.5.

From January 2010 through 2020, the Department recorded 3,637 reported mountain lion incidents statewide. These included depredations, public safety concerns, as well as sightings and nuisance reports[6]. There were 2,202 depredation incidents, wherein mountain lions were reported to have attacked pets and/or livestock.

Across California from 1972 to 2019, the number of reported depredation events trended upward for large hoofstock (cows and horses), small hoofstock (mostly sheep and goats), and pets (Dellinger et al. 2021a). Sheep and goats accounted for 59.4% of confirmed depredations, while large hoofstock accounted for 13.1%, and pets accounted for 10.4%.

From 1972 to 2020, at least 3,694 mountain lions were removed in depredation incidents (Dellinger et al. 2021b), and such removal was the leading cause of attributable mortality of collared mountain lions

[6] When reporting a nuisance animal, the reporting party can select "There is⁄are wild animals on or around my property that I would consider pests and I would like more information" or "There is⁄are wild animals on or around my property that is⁄are disturbing my garbage, causing noise or creating some other type of disturbance."

in 1974–2000 (Benson et al. 2023). Between 2001 and 2020, an average of approximately 92 mountain lions were lethally removed pursuant to depredation permits per year statewide (Dellinger et al. 2021b). With recent efforts to prioritize non-lethal measures in response to livestock damage, the number of mountain lions lethally removed pursuant to depredation permits statewide dropped to 3 in 2021, 10 in 2022, and 15 in 2023 (Fig. 14, CDFW 2022b; 2024b; 2025).

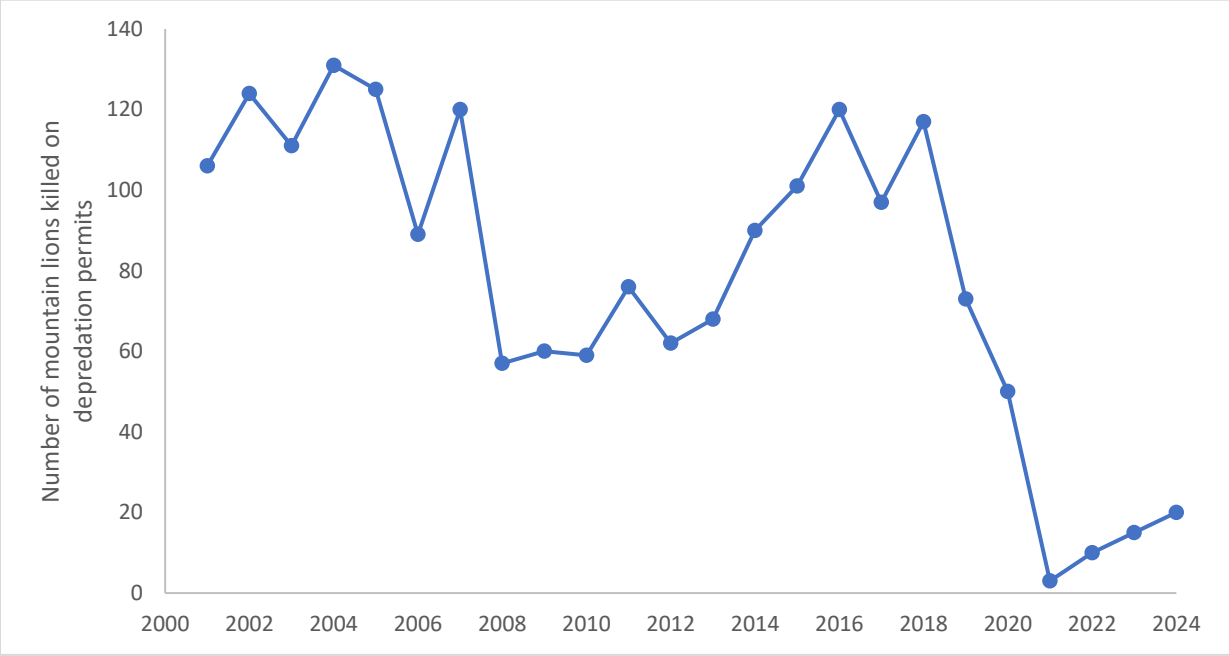


Figure 14. The number of mountain lions reported killed pursuant to depredation permits in California in 2001–2024. Data from (Dellinger et al. 2021b; CDFW 2022b, 2024b, 2025). The Department's approach to mountain lion depredation and public safety response was modified in 2013, amended in 2017, and amended again in 2020.

Interestingly, researchers have noted that at the county level, mountain lion depredation rates increased by 9% for every lion removed through a depredation permit the prior year (Dellinger et al. 2021a). This general pattern of increased depredations in an area the year after mountain lion removal was also seen in Washington State, though removals were done via sport hunting and therefore less targeted to individual mountain lions that may have been involved in depredations (Peebles et al. 2013). Dellinger et al. (2021a) suggested this pattern could be a result of subadults moving to territories vacated when resident adults were removed. Research shows subadults can be more likely to use areas closer to people (Kertson et al. 2013), but evidence that subadults mountain lions have less well-developed hunting skills and are more likely to target easily killed domestic animals is not conclusive (Linnell et al. 1999; Peebles et al. 2013).

Mountain lion removal through depredation permits diminishes the total abundance of mountain lions in an area, and the lions removed are predominantly males (Sweanor et al. 2000). For example, from 1981 to 2013 in the Santa Ana Mountains and the Eastern Peninsular Range, 3.4 times as many males were taken for depredation than females (Vickers et al. 2015). Because males are more likely to disperse

than females, depredation removal may thus further inhibit adequate gene flow between mountain lion populations in Southern California by removing the animals most likely to move between genetic populations (Vickers et al. 2017).

To further reduce the number of mountain lions killed for depredation, best practices to minimize livestock predation should be consistently employed. Unfortunately, mountain lions may not adequately interpret human cues and risk levels to substantially modify their behavior and thus reduce the number of conflicts with humans. In the Santa Cruz Mountains, during the day, mountain lions avoided areas of housing where they were most likely to come into conflict with humans (Nisi et al. 2022). However, at night mountain lions were more likely to use areas of intermediate housing density than during the day. Areas of intermediate housing density are where they were also most likely to be killed in response to depredation events. This suggests that improving livestock husbandry to minimize the risk of depredation is vital to further reduce the lethal take of mountain lions.

4.4.2 Bighorn Sheep Management

Mountain lions are occasionally removed when predating upon state and federally endangered Sierra Nevada bighorn sheep (*O. canadensis sierrae*) or state and federally threatened Peninsular bighorn sheep (*O. canadensis nelsoni*). The Department is authorized to take such actions by Fish and Game Code section 4801, and such actions are identified in each species' federal recovery plan (USFWS 2000, 2007). Between 1999 and 2019, 26 mountain lions were lethally removed in the Eastern Sierra Nevada Mountains as part of bighorn sheep recovery (CDFW 2021). These lethal removals occurred outside the petitioned ESU boundary and where mountain lion populations are relatively large and well connected.

4.4.3 Public Safety

The Department prioritizes public safety and lethally removes or attempts to remove mountain lions that represent an immediate threat to human safety. Specifically, a threat to public safety is when a mountain lion "exhibits one or more aggressive behaviors directed toward a person that is not reasonably believed to be due to the presence of responders." (Fish & G. Code, § 4801.5, subd. (b).) From 1986 to April 2024 there were 25 reported mountain lion attacks on humans in California, 4 of them fatal (CDFW 2024c). The Department has records of 10 mountain lions being euthanized following attacks on humans in California between 2000 and 2024 (reliable records prior to 2000 are unavailable).

Collectively, all forms of permitted take are unlikely to negatively influence mountain lion populations and trends at the statewide level or within the relatively large and well-connected NC and SN genetic populations. However, the additive mortality resulting from lethal removals associated with depredations and human conflicts in areas where mountain lion groups are already small and isolated such as California's central and south coasts may result in local population declines (Benson et al. 2023). Importantly, Benson et al. (2023) noted the risk of mortality from management killing declined dramatically from 2001 to 2020, and raised the possibility that the decline may be related to the 2017 changes in CDFW's management policies. The number of management killings decreased sharply after 2020 (Fig. 14), and therefore its relative importance as a source of mortality has decreased.

4.5 Competition

Mountain lions compete with other large carnivores in most areas of their range. Mountain lions and

black bears regularly overlap in space in almost all mountain lion-occupied areas in California except for the Santa Cruz Mountains and the Santa Monica Mountains. In a study in the Mendocino National Forest in Northern California, black bears displaced mountain lions from about 50% their kills (Elbroch et al. 2015a), depriving them of calories, and potentially forcing them to expend additional energy hunting to procure more prey (Allen et al. 2021). Instead of avoiding areas with bears, mountain lions increased their predation rates to compensate for the kills stolen by bears (Elbroch et al. 2015a). It is unknown whether displacement by black bears occurs frequently enough to affect mountain lion survival and reproductive rates (Elbroch and Kusler 2018).

In western North America, gray wolves can affect adult and kitten survival by directly killing individual mountain lions, and can affect habitat and prey selection, bedding locations, and population size (Bartnick et al. 2013; Elbroch et al. 2015b; Kusler et al. 2017; Elbroch and Kusler 2018; Elbroch et al. 2020). Mountain lions can also kill individual wolves. In Washington State, at least four collared wolves were killed by mountain lions from 2013–2022 (WDFW 2022). However, given the small size and limited distribution of California's current gray wolf population, competition between wolves and mountain lions has not been a significant threat to the persistence of mountain lions in the petitioned ESU. Wolves are currently absent from the petitioned ESU and therefore wolf competition is not considered a current threat; however, wolves are rapidly expanding their range in the state with one pack known to occupy a portion of the southern Sierra Nevada. If wolf distribution continues to expand, competition between wolves and mountain lions in the petitioned area may become a threat in the future. Finally, smaller predators and scavengers such as coyotes are known to opportunistically feed from mountain lions kills (Brunet et al. 2022), although the degree this loss of food resources impacts lions is difficult to quantify.

Intraspecific conflict and aggression (i.e. aggressive interactions between two or more mountain lions) appears to be a significant mortality factor in areas where mountain lions occupy small patches of suitable habitat surrounded by urban and agricultural development and other dispersal barriers (Riley et al. 2014; Vickers et al. 2015; Benson et al. 2020). Intraspecific aggression was identified as the leading cause of mortality for the nearly isolated mountain lions in the Santa Monica Mountains (a portion of the CC-S; Riley et al. 2014), although more recently, vehicles and toxicants have caused similar levels of mortality (Benson et al. 2020). From 2002 to 2018, about 41% of deaths of telemetered mountain lions tracked in the Santa Monica Mountains were determined to have resulted from intraspecific aggression. There were multiple documented cases of adult males killing their siblings, offspring sired by other males (i.e., infanticide), and previous mates (Riley et al. 2014; Benson et al. 2020). Additionally, in the SA, intraspecific predation was documented on two occasions in recent years (W. Vickers, unpublished data). Therefore, this form of competition should be considered a potential threat to mountain lion populations in small, isolated genetic populations such as the CC-S, SA, and the SGSB. While the effect of inter- and intraspecific competitions on mountain lions within the entire petitioned ESU is unknown, in the smaller genetic populations it likely exacerbates the threats associated with small, isolated populations.

4.6 Toxicants

Mountain lions throughout California are exposed to toxic chemicals in their environment. Depending on the extent of exposure, toxicants may cause clinical signs of disease or debilitation, or may lead to

toxicosis and death or debilitation. Some ingested toxicants can be transferred in utero to fetuses, and debilitated lions may be more susceptible to other forms of mortality such as starvation and traumatic injuries.

Anticoagulant rodenticide (AR) baits are commonly used to control rodent pests in urban, suburban, and agricultural areas (Litovitz et al. 1998; Maroni et al. 2000). As summarized in Serieys et al. (2015), ARs interrupt the production of vitamin K-dependent blood clotting proteins, leading to the depletion of these proteins over a period of days and inducing mortality by internal hemorrhage. Comprised of two classes of compounds, ARs are the primary chemical method used worldwide for the control of rats and mice. First-generation ARs, including warfarin, diphacinone, and chlorophacinone, are more readily metabolized, have a shorter half-life in liver tissue (two weeks to several months), and must be consumed in multiple feedings to reach a lethal dose. Second-generation ARs include brodifacoum, bromadiolone, difenacoum, and difethialone, and were developed to target rodents with genetic resistance to warfarin. Due to increased toxicity and persistence in animal tissues, with half-lives ranging from 6–12 months, second-generation ARs may persist in liver tissue for more than a year in some species. Both classes of compounds have a delayed onset of action, and death from AR consumption can occur up to 10 days after ingestion. Individual rodents may continue to accumulate the compounds over a period of days, increasing their likelihood of capture by predators as they become weakened by the toxicant. For these reasons, ARs have the potential of creating primary and secondary poisoning risks to non-target wildlife. Predatory animals are at significant risk of secondary poisoning if they consume prey that had previously ingested ARs. AR exposure in wildlife has been positively associated with proximity to urban areas, raising concerns about long-term conservation impacts of AR exposure on non-target wildlife populations on the fringe of urban areas (Hosea 2000; Riley et al. 2007; McMillin et al. 2008; Gabriel et al. 2012; Serieys et al. 2015; Serieys et al. 2018).

Mountain lions can be exposed to ARs in many settings including near human settlements where legal ARs are used to control vertebrate pests (Moss et al. 2016; Smith et al. 2016). However, even in remote locations on public lands, mountain lions can come into contact with prohibited rodenticides as they are often used to protect illicit cannabis plantations (Gabriel et al. 2012). The Department's Wildlife Health Lab detected AR exposure in 94.2% (343/364) of tested mountain lion livers submitted between 2016 and 2022 (Fig.15; Rudd et al. 2020b; Rudd and Rogers 2021; Rudd et al. 2021; Rudd et al. 2022; CDFW unpublished data). Second-generation ARs were more commonly detected than first-generation ARs, despite a 2014 California regulatory change restricting second-generation AR use to certified pesticide applicators (Rudd et al. 2018; Rudd and Rogers 2021). Eighty-five percent of the mountain lion livers (306/364) tested had two or more different ARs present at the time of death, with 52.2% (190/364) of individuals testing positive for three or four different ARs, which indicates multiple exposure events are common (Fig. 16; Rudd et al. 2020b; Rudd and Rogers 2021; Rudd et al. 2021; Rudd et al. 2022; CDFW unpublished data). The 94.2% (343/364) total exposure prevalence recorded between 2016 and 2022 is higher ($X^2 = 14.8$, $p < 0.001$) than the 82.4% (103/125) exposure prevalence found in mountain lion livers analyzed from across the state between 2003 and 2015 (Poppenga et al. unpublished data). In samples from 2003–2015, 67.2% (84/125) of livers indicated exposure to multiple AR compounds, which was lower than the exposure prevalence rate in livers tested between 2016 and 2022 ($X^2 = 15.4$, $p < 0.001$).

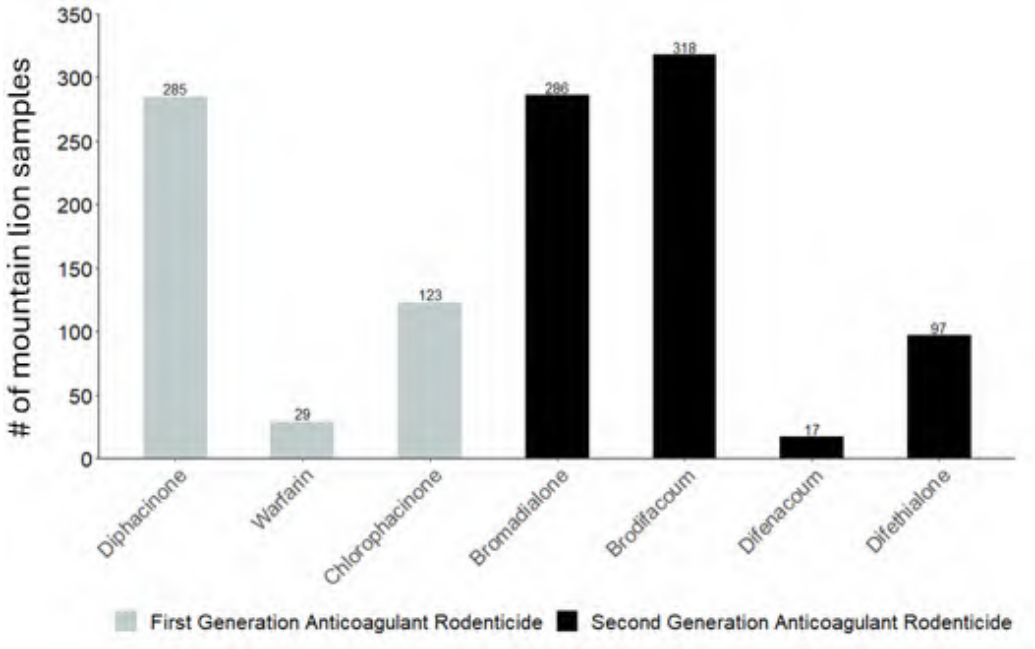


Figure 15. Anticoagulant rodenticide residues detected in 364 livers of mountain lions submitted to the Wildlife Health Laboratory for postmortem examination 2016–2022 (Rudd et al. 2020b; Rudd and Rogers 2021; Rudd et al. 2021; Rudd et al. 2022, CDFW unpublished data). Numbers on top of the bars are the number of livers that the specific residue was found in.

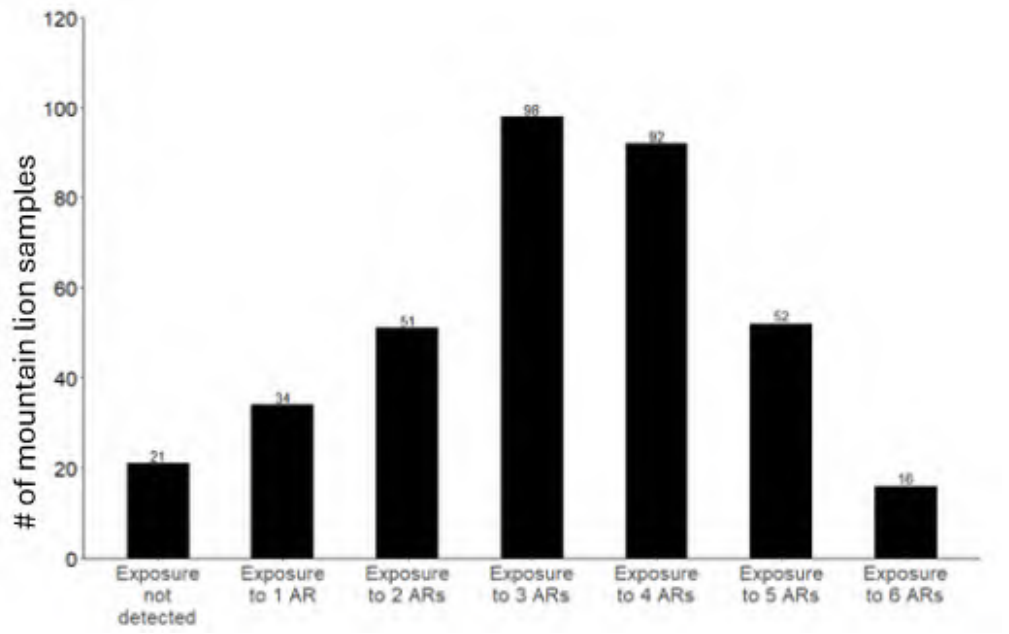


Figure 16. Number of different anticoagulant rodenticide analytes detected in 364 individual mountain lion livers analyzed from 2016–2022 (Rudd et al. 2020b; Rudd and Rogers 2021; Rudd et al. 2021; Rudd et al. 2022; CDFW unpublished data).

Fetal AR exposure occurs in mountain lions, as exposure was detected in four of eight (50%) instances where both pregnant female mountain lions and fetal or placental tissues were tested (Table 4; CDFW unpublished data; National Park Service (NPS) unpublished data). Many toxic substances, including ARs, can adversely affect fetal development and survival at doses that may not produce toxic effects in the mother (Gupta 2012). Fetuses are also typically more susceptible to AR toxicity because the placenta is the only source of vitamin K for the fetus (Gupta 2012). AR-related coagulopathy and toxicity was not observed in any of the examined fetuses with AR exposure (Rudd et al. 2020, CDFW and NPS unpublished data).

Table 4. Anticoagulant rodenticide test results for liver samples from 8 pregnant mountain lions and their fetuses, pooled fetal tissue, or placenta (CDFW and NPS unpublished data). BRD: brodifacoum, BRM: bromadiolone, CHL: chlorophacinone, DIF: difethialone, DIPH: diphacinone. An asterisk (*) indicates that the samples were pooled together for qualitative and quantitative analyses (i.e., samples too small to be evaluated individually).

ID	Cause of Mortality	County	ARs detected in pregnant adult (ppb)	# of fetuses	ARs detected in fetal tissue (ppb)
Z16-1126	Depredation	Tuolumne	BRD (230), BRM (trace)	4*	Not detected
Z17-0199	Hit by car	Santa Barbara	BRD (71), BRM (130), CHL (trace), DIF (trace), DIPH (830)	2	**1.** BRD (trace), DIPH (150) **2.** BRD (trace), DIPH (160)
Z17-0281	Depredation	Trinity	BRD, BRM, DIF, DIPH (all trace)	4*	Not detected
Z17-0328	Depredation	Yuba	BRD (trace), BRM (120), DIPH (trace)	3*	Not detected
Z19-0793	Depredation	Amador	BRD, BRM, DIPH (all trace)	3*	Not detected
P054	Hit by car	Los Angeles	BRD (83), BRM (930), CHL (trace), DIF (190), DIPH (230)	4	**1.** BRD (trace), BRM (trace), CHL (trace), DIPH (120) **2.** BRD (trace), BRM (trace), CHL (trace), DIPH (140) **3.** BRD (trace), BRM (trace), CHL (trace), DIPH (130) **4.** BRM (trace), CHL (trace), DIPH (120)
Z23-0437	Depredation	El Dorado	BRD, BRM, CHL, DIPH (all trace)	4*	DIPH (trace)
Z23-1178	Depredation	Yuba	BRD (trace), BRM (400), CHL (trace), DIPH (400)	3	**1.** DIPH (100) **2.** DIPH (86) **3.** DIPH (68)

In the Santa Monica Mountains National Recreation Area (CC-S), the deaths of seven mountain lions since 2004 have been associated with AR exposure and toxicosis (Riley et al. 2007; NPS 2021). Between 2002 and 2019, out of 26 known deaths of adults and subadults in that population, 5 were from AR toxicosis (Benson et al. 2020). Two mountain lions that died from AR toxicosis in 2004 in CC-S also had infestations of notoedric mange (Riley et al. 2007; Uzal et al. 2007). Notoedric mange, typically caused in felids by the parasitic mite *Notoedres cati,* may cause fatal disease in bobcats and mountain lions (Foley et al. 2016). Exposure to higher doses of ARs or to more than one AR was associated with greater likelihood of dying due to severe mange (Serieys et al. 2015).

In addition to ARs, risk of pesticide exposure may also come from neurotoxic rodenticides, such as bromethalin, which have become more widely used as restrictions on ARs have increased (McMillin et al. 2016). Bromethalin is a single-feed neurotoxic rodenticide which once ingested is absorbed and processed in the liver to form its highly toxic metabolite, desmethylbromethalin (DMB). Both bromethalin and DMB accumulate in fat and brain tissues. Lethal intoxication leads to a death via respiratory failure, while sublethal intoxication can cause neurological dysfunctions that may resolve, or result in death (McMillin et al. 2016).

Bromethalin was thought to have low risk of secondary exposure, yet in recent years has been documented in nontarget wildlife in California (McMillin et al. 2016; Rudd et al. 2021; Rudd et al. 2022). Because exposure was documented in probable mountain lion prey species, CDFW and the California Animal Health and Food Safety Laboratory tested fat or brain tissue from 49 mountain lions for the metabolite DMB over two years. In 2021 and 2022, four of 32 (12.5%) and six of 17 (35.3%) mountain lions tested positive for DMB exposure, respectively (Rudd et al. 2021, 2022). Continued surveillance for bromethalin exposure is warranted and more research is needed on exposure pathways and the sublethal effects on mountain lions due to bromethalin products entering the food web.

The Petition cited Rudd et al. (2019) to state that mountain lions in California are exposed to dangerously high levels of illegal pesticides, such as carbofuran. However, this citation is incorrect; the Department has not documented any cases of carbofuran toxicity in mountain lions to date. Further research is needed to investigate the lethal and sub-lethal effects of anticoagulants and other toxicants on wildlife in terrestrial environments (Riley et al. 2007; Gabriel et al. 2015; Rudd et al. 2018).

4.7 Infectious Diseases

Mountain lions are afflicted by various viral, bacterial, and parasitic pathogens. It is not known if these pathogens and their respective diseases alone could imperil the species in California. However, small, isolated mountain lion populations are at greater risk of experiencing population-level impacts from disease, which could reduce their ability to persist into the future, especially when combined with other threats (Foley et al. 2013). Recent detections of emerging diseases in California mountain lions coupled with potential future changes in the distribution of pathogens and disease vectors due to habitat modification and climate change supports the value of continued mountain lion mortality monitoring and disease surveillance (White et al. 2018; Thurman et al. 2024). The following are pathogens documented to have caused the death of at least one mountain lion in California since 2019.

Highly Pathogenic Avian Influenza (HPAI). Since October 2021, outbreaks of H5N1 HPAI belonging to Eurasian lineage, clade 2.3.4.4 have been detected in wild birds and domestic poultry throughout Europe and North America. The majority of H5 HPAI virus detections in both wild and domestic birds have overlapped with annual fall migration and large aggregations of overwintering waterbirds (Verhagen et al. 2021). In California, six GPS-collared mountain lions were documented to have died from the virus: two from Mono County in December 2022 and January 2023, one from Butte County in January 2023, and three from Modoc County in March 2023 (Rudd et al. 2024). Occasionally, wild birds, including waterfowl, can make up a component of the natural diet for mountain lions, and at least three of the mountain lions that died had a history of hunting wild Canada geese (J. Rudd, CDFW, pers. comm.). While infection with H5N1 HPAI is considered uncommon in mammals, there is evidence suggesting that certain mutations in the H5N1 virus may lead to mammal-to-mammal transmission (Plaza et al. 2024). While H5N1 infection has not been detected to date in coastal populations of mountain lions, the potential for it to occur in and to impact the smaller genetic populations within the petitioned area is of concern. Given the six documented H5N1 HPAI-related mortalities in California mountain lions over a four-month period, infections in mammals in general, multiple possible transmission routes, and the potential for zoonotic transmission, H5N1 or other HPAI viruses should be closely monitored in mountain lions.

Feline leukemia virus (FeLV). FeLV is a common immunosuppressive viral pathogen in domestic cats known to cause morbidity and mortality. While infection is seemingly rare in non-domestic felids, FeLV is considered a disease of potential epidemic concern for small populations. Researchers have found antibody test-based infection prevalence in mountain lions to be low, ranging from 0–5.4% (Paul-Murphy et al. 1994; Foley et al. 2013). More recently, the Department, in collaboration with Colorado State University, documented a FeLV infection prevalence of 2.4% in lymph nodes collected from 130 necropsied CA mountain lions tested using Polymerase Chain Reaction from 2016–2018 (J. Rudd, CDFW, pers. comm.). To date, the Department has documented two mountain lion mortalities due to suspected FeLV-related infections (e.g., opportunistic bacterial and fungal infections and anemia)—one in 1993 (Jessup et al. 1993), and another in 2020 (J. Rudd and Q. Martins, unpublished data).

Feline Panleukopenia Virus (FPV). FPV belongs to a family of parvoviruses that are closely related to canine parvovirus and mink enteritis virus (Truyen and Parrish 2013). FPV primarily infects felids and has a high mortality rate, although individuals that do survive infection generally have life-long immunity (Sykes 2014). Antibodies to FPV were detected in 36% of wild mountain lions from California sampled from 1991–2008 (Foley et al. 2013). Infection with FPV resulted in the illness and death of two six-week-old mountain lion siblings from Ventura County in 2021 and was the cause of illness in an emaciated 11-month-old mountain lion with impaired balance and coordination from Nevada County that was euthanized in July 2022 (J. Rudd, CDFW, pers. comm.). Pathological findings for all three mountain lions demonstrated viral-associated encephalitis.

Mange. Notoedric and sarcoptic mange are skin diseases caused by highly contagious parasitic mites. Severe and sometimes fatal mange epidemics from these mites have been described worldwide, and wild felids in California have been infested with the mite *Notoedres cati* (Riley et al. 2007; Serieys et al. 2013; Foley et al. 2016). In wildlife, mange causes considerable suffering, predisposing the individual to secondary bacterial infections through open wounds, changes in behavior, emaciation, and death

(Maehr et al. 1995; Bornstein et al. 2001; Serieys et al. 2013; Niedringhaus et al. 2019). Mange poses a considerable threat to wildlife species that are more social or have high spatial overlap, which can promote transmission (Rudd et al. 2020a). In the Santa Monica Mountains, there have been six known cases of notoedric mange in mountain lions, including one adult female who died of the disease in March of 2022 (S. Riley pers comm. March 2024). Given mountain lions' largely solitary nature, and that *Notoedres* mites are not thought to survive off of the host animal (Paterson 2008), the potential for disease spread population-wide is presumably low. However, notoedric mange had a negative impact on the bobcat population in CC-S in 2002-2004 (Riley et al. 2007), and in 2019-2021 there has been regular bobcat mortality from mange in the same area (S. Riley pers. comm March 2024).

4.8 Wildland Fire and Fire Management

Fire is a natural disturbance in many California ecosystems. However, intense, high-severity burns can significantly modify ecosystems by changing plant and animal community compositions temporarily or long term (Williams et al. 2023). Wildfires in California can cause direct mortality to mountain lions and can result in temporary adverse modification of their habitats. However, after wildfires, deer populations typically respond favorably to the resulting plant regrowth (Lewis et al. 2022).

In California's wildland-urban interface and in many habitats prone to fire, changes in temperature, humidity, and wind patterns attributable to climate change, in combination with other human activities, have led to more frequent wildfires that burn larger areas (Syphard et al. 2007; Syphard et al. 2009; Keeley and Syphard 2017,2021). In California's central coast and south coast regions, Keeley and Syphard (2017) found the area burned per decade increased dramatically from the 1930s to the 2010s. Keeley and Syphard's more recent work (2021) examined wildfire records over a longer period (1860s–2020) and revealed more complex patterns in the central and south coast regions. They found fire frequency peaked during two periods: the 1920s and the 2000s and has been declining since the 2000s. The average fire size in the central coast region was similarly found to have significantly increased from the 1950s through 2020, but no significant trend in average fire size was found in the south coast region.

Keeley and Syphard (2021) distinguished fuel-dominated and wind-dominated fires and considered the latter type more dominant in the grasslands, shrublands, and woodlands of California's central and southern coast. They pointed out that wind-dominated fires rely on both an extreme wind event and an (usually human-caused) ignition source. The authors considered the major driver of wind-dominated fire impacts to be more frequent ignitions associated with human population growth and the expansion of residential developments into the wildland-urban interface (Keeley and Syphard 2021). Climate models predict increasing temperatures and decreasing humidity in the future, and strong, dry easterly winds (i.e., Santa Ana winds) may become more frequent and extend into the late fall and early winter when fuel loads are highest and fuel moistures lowest—suggesting extreme fire events will become more frequent in the future (Miller and Schlegel 2006; Jennings et al. 2016).

Since 2000, a substantial proportion of the mountains in southwestern California where undeveloped mountain lion habitat remains have burned in wildfires (Fig. 17). Fire-return intervals (the average number of years between successive fires in the same location) in Southern California shrublands historically ranged from 30–100 years but return intervals are now 33% shorter (Jennings et al. 2016). This shortened interval between fires can interrupt plant community successional cycles, reduce plant diversity, favor the establishment of non-native species, and shift shrublands to grass-dominated

landscapes (Keeley 2005; Jennings et al. 2016). Jennings et al. (2016) warn that if trends continue, vegetative communities preferred by mountain lions such as riparian areas, oak woodland and conifer forests could be converted by repeated, short interval fires into homogenous non-native annual grasslands, which are typically avoided by mountain lions. Should this occur in key locations, migration between genetic populations could be further limited.

The central coast of California has similarly experienced a succession of large, severe wildfires in the last two decades. Major fires in the year 2020 alone included the 160,508 ha (396,624 acres) SCU Complex Fire in the interior of CC-N, the 35,009 ha (86,509 acres) CZU Lightning Complex Fire in the Santa Cruz Mountains (also in CC-N), the 50,555 ha (124,924 acres) Dolan Fire in Big Sur, and the 19,461 ha (48,088 acres) River Fire on the eastern slopes of the Santa Lucia Mountains in Monterey County (CAL FIRE 2020). In the central coast region, the annual distribution of fire sizes has trended toward larger fires in the last 75 years, although trends in the frequency of large fires (≥ 10,000 ha) in over the same period are less apparent (Keeley and Syphard 2021). Trends in annual area burned in the central coast region differ by responsibility area, with U.S. Forest Service (USFS)-managed areas located primarily in the interior coastal mountains experiencing an approximately ten-fold increase between 1940 and 2000, from 5,000 ha/million ha in the 1940s to nearly 50,000 ha/million ha in the 2000s (50 mi.^{2}/10,000 mi.^{2} to 500 mi.^{2}/10,000 mi.^{2}). By contrast, within the California Department of Forestry and Fire Protection (CAL FIRE) responsibility area (largely private lands and state lands located on the coastal plains, valleys, and lower slopes of interior mountains), the annual area burned decreased from approximately 15,000 ha/million ha in 1920 to less than 2,000 ha/million ha in 2010 (150 mi.^{2}/10,000 mi.^{2} to 20 mi.^{2}/10,000 mi.^{2}) (Keeley and Syphard 2017). Making predictions about future trends in this region is complicated by the interplay between precipitation levels and fuel accumulation. Within the central coast zone, projections indicate precipitation levels may increase in the north in coming decades potentially resulting in moister conditions and therefore lessened fire frequency, but higher severity fires when they do occur due to higher fuel loads; while in the south, precipitation is projected to decrease, potentially limiting fuel accumulation thereby limiting fire severity, although fires may become more frequent due to prolonged dry periods (Langridge 2018).

In the redwood forests of the Santa Cruz Mountains, mountain lions likely continue to use burned areas following most wildfires as redwoods are adapted to wildfire with trees frequently surviving low and moderate intensity wildfires and decay-resistant dead trees remaining standing for decades. In 2020, an unusually severe fire burned old growth redwoods in Big Basin Redwoods State Park north of Santa Cruz. Six months later, many trees were able to resprout, suggesting redwoods could have some resiliency to changing fire regimes (Peltier et al. 2023). Additionally, redwood sprouts and seedlings can be prolific following fires, numbering in the tens of thousands per hectare, and canopies can develop rapidly (Lazzeri-Aerts and Russell 2014). Consequently, dense cover favored by mountain lions for hunting and travel can develop within a few years following severe wildfire in these forests.

While mountain lions are likely able to escape most wildfires, quickly moving wind-driven wildfires described by Keeley and Syphard (2021) are capable of overtaking fleeing mountain lions or trapping lions between multiple fire fronts (Fig. 18). Vickers et al. (2015) documented the death of a collared mountain lion in the SA and one in the EPR due to burns from human-caused wildfires and, following the 2018 Woolsey Fire in the Santa Monica Mountains and Simi Hills, one collared lion was found in poor

condition with burned feet and eventually died. Another collared lion disappeared and was presumed to have died in the same fire (Blakey et al. 2022). A young lion found with burned paw pads following the 2018 Tomas Fire in the CC-C was treated and placed into captivity. An adult lion found unable to walk due to burned paw pads during the 2020 Bobcat Fire in the San Gabriel Mountains was cared for and released. In Northern California, a three-month-old male kitten suffering burn injuries to the feet and face from the 2020 Zogg Fire in Shasta County was treated and placed into captivity. The same year, the August Complex Fire in Colusa, Glenn, Mendocino, Tehama, Trinity, and Humboldt Counties was likely responsible for the death of one adult female lion and the orphaning of her two kittens which were rescued and placed in captivity (D. Clifford, CDFW, pers. comm.).

Additionally, wildfires can temporarily displace mountain lions, increasing the distances they move and amount of area they use (Blakey et al. 2022). In developed areas, this increased movement may lead them to cross over roads more often, exposing them to vehicle strikes, and potentially bringing them in contact with other mountain lions, increasing the chance of intraspecific aggression (Jennings et al. 2016; Blakey et al. 2022).

Post-fire habitat use by mountain lions may vary over time, with lions initially avoiding heavily burned areas but then utilizing them more as vegetation regenerates (McLean 1954). A study in the Santa Monica Mountains and Simi Hills after the 2018 Woolsey fire showed that, in general, mountain lions avoided burned areas up to 15 months post fire (Blakey et al. 2022). However, assessing use up to 9 years post-fire, Jennings et al. (2016) found mountain lions used regenerating shrub-dominated habitats in the Santa Ana Mountains and the Eastern Peninsular Range to a greater extent than would be expected based on availability (Jennings et al. 2016). The same study assessed suspected cache and kill sites from 44 collared mountain lions and found there were more such sites than expected in recently burned areas (≤ 6 years old), likely reflecting intensive use of recent burned areas by mule deer taking advantage of nutritious young foliage.

Several strategies are employed in different California wildland habits to help minimize the potential for catastrophic wildfires, including prescribed burns and mechanical fuel reduction. Like wildfires themselves, these actions have the potential to benefit or harm mountain lions and their prey. Prescribed fires and mechanical fuel removal can result in the short-term loss of vegetation and cover favored by mountain lions, while over slightly longer terms encouraging vigorous regrowth of palatable foliage favored by key mountain lion prey species.

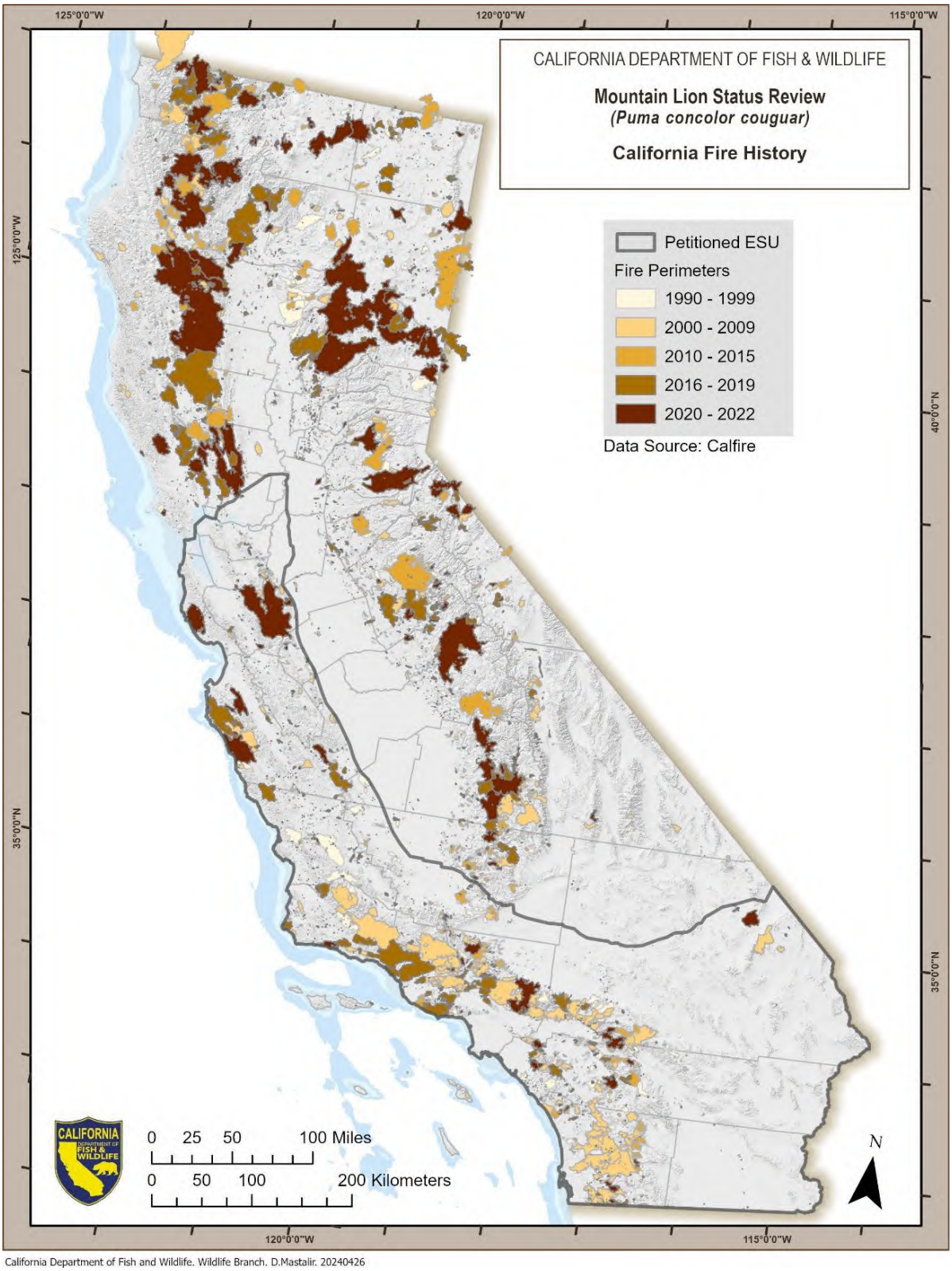


Figure 17. Wildfire perimeters in California by fire year, 1990–2022.



Figure 18. Left: Burned paw of female mountain lion F121 (L) with phalanges showing, found deceased following the Bond Fire in Orange County, California. (Photo Credit: Nick Molsberry, CDFW). Right: F121 prior to the fire (Photo Credit: UC Davis Wildlife Health Center).

4.9 Climate Change

Human-mediated climate change (Bedsworth et al. 2018) threatens biodiversity through both direct effects and interrelated indirect threats (Garcia et al. 2014; González-Orozco et al. 2016). A species' vulnerability to the direct effects of climate change is a function of its level of exposure and its sensitivity to such effects mediated by its ability to adapt physiologically or behaviorally (Dawson et al. 2011). Indirect effects of climate change are those ecosystem changes that affect organisms—including increased frequency and severity of drought, wildfires, flooding, and landslides—which in turn can lead to shifts in vegetation patterns, changes in habitat quality, and modified predator-prey relationships (Williams et al. 2008; Keeley and Syphard 2016).

There has been a consistent trend in recent decades of warming temperatures in California. Average state temperatures have increased by about 1.67°C (3°F) since the beginning of the 20th century (Frankson et al. 2022). The warmest three years on record since 1895 have all occurred in the last decade (OEHHA 2024a), and 2021 was the warmest summer on record in the state (Frankson et al. 2022). Climate model projections for annual temperature in California in the 21st century range from 1.5–4.8°C (2.7–8.8°F) greater than the 1960–2005 mean (Bedsworth et al. 2018).

Temperature increases have not been consistent across California. Rapacciuolo et al. (2014) found that while temperatures generally warmed in California between the historical period (1900–1939) and modern period (1970–2009), increases in mean annual temperature were greatest in Southern California, an area roughly corresponding to the extent of the South Coast large-scale genetic population

in Gustafson et al. (2022). During that period the mean annual maximum temperature increased in Southern California but decreased in much of central and Northern California (Rapacciuolo et al. 2014). Projections of future temperature conditions at specific locations in California are available from the State of California's Cal-Adapt program (https://cal-adapt.org/). Table 5 presents results for a representative location in each of the four broad mountain lion genetic groups areas described in Gustafson et al. (2022) from Cal-Adapt's Local Climate Change Snapshot (https://cal-adapt.org/tools/local-climate-change-snapshot/). Three measures of change in environmental temperature are presented: Annual Average Maximum Air Temperature (AAT_{MAX}), Annual Average Minimum Temperature (AAT_{MIN}), and Number of Extreme Heat Days per Year (EHD)[7]. For each measure, a baseline value modeled from measurements recorded from 1961–1990 is presented, along with modeled future values for the end of the 21st century (2070–2099). Averaged modeled values for the High Emissions scenario (known as Representative Concentration Pathway 8.5)—which most closely tracks current emissions trends—are presented, along with the range of averages from all the model runs. The sites chosen as representative of the broad-scale genetic groups are Willits, CA (NC), Placerville, CA (SN), Atascadero, CA (CC), and Fallbrook, CA (SC). Models for all temperature metrics of the four representative sites suggest substantial warming will occur at the sites during the 21st century.

Table 5. Baseline and projected changes in Annual Average Maximum Temperature (AAT_{MAX}), Annual Average Minimum Temperature (AAT_{MIN}), and Number of Extreme Heat Days (EHD) per year for four representative sites in the North Coast (NC), Sierra Nevada (SN), Central Coast (CC), and Southern Coast (SC) areas identified by Gustafson et al. (2022). Model data are derived from Cal-Adapt's Local Climate Change Snapshot tool, accessed November 2021. The CC group incorporates CC-N, CC-C, and CC-S, and the SC group is made up of SA, EPR, and SGSB. (For more detail, see Figs. 5 and 6).

Metric	Model/Projection Years	NC	SN	CC	SC
AAT_{MAX} (°F)	Modeled Average (1961–1990)	68.4	71.6	71.7	74.6
AAT_{MAX} (°F)	Projected Average (2070–2099)	75.8	80.3	79.3	82.4
AAT_{MAX} (°F)	Projected Range	70.8–78.3	76.8–83.9	76.6–82.7	79.3–85.7
AAT_{MIN} (°F)	Modeled Average (1961–1990)	38.9	47.7	41.9	50.5
AAT_{MIN} (°F)	Projected Average (2070–2099)	46.1	55.7	49.1	58.1
AAT_{MIN} (°F)	Projected Range	42.2–48.7	52.5–58.9	46.4–51.6	55.4–60.5
EHD (Days/Yr.)	Modeled Average (1961–1990)	3	3	5	4
EHD (Days/Yr.)	Projected Average (2070–2099)	27	53	42	45
EHD (Days/Yr.)	Projected Range	2–48	29–79	22–73	24–94

[7] AATMAX is calculated as the average of the maximum daily air temperatures recorded at a site over the entire year. AATMIN is likewise calculated as the average of all minimum daily temperatures for the year. The number of extreme heat days per year (EHD) is the modeled number of days when the daily maximum temperature is above a location-specific threshold temperature for the site. The threshold for a site is defined as the 98th percentile value of historical daily maximum temperatures (from 1961–1990, between April and October) observed at the location.

Precipitation change projections are less consistent than those for temperature, but recent studies indicate increasing variability in precipitation in California, with some areas getting a greater proportion of annual precipitation delivered by intensive atmospheric river storms, while others face an increased likelihood of extreme drought primarily due to rising temperatures (Cayan et al. 2005; Williams et al. 2015; Gershunov et al. 2019; Huang et al. 2020; OEHHA 2022). Similar to temperature rises, recent changes in precipitation and water availability have also not occurred equally throughout California. In the past century, Southern California experienced a decline in average total annual precipitation, while much of central and Northern California had an increase (Rapacciuolo et al. 2014). With increased temperatures and decreased precipitation, the southern third of the state (including the southern Sierra Nevada) experienced a dramatic increase in mean annual climatic water deficit—the amount of water plants would use if it were available in the soil – between the early 20th century (1900–1939) and the late 20th century (1970–2009) (Ibid.).

Increasing severity and frequency of drought is another consequence of climate change in California. From 2014–2017, 25-80% of California experienced extreme or exceptional drought and there was another serious drought period from 2021–2022 (Fig. 19; NIDIS 2022). Recent modeling predicts the average amount of drought from 2050–2099 in the southwestern U.S., inclusive of California, will likely exceed the Medieval-era megadrought between 1100–1300 CE, under both moderate and high greenhouse gas emissions models (Cook et al. 2015). The same study estimated the probability of a multidecadal (35-year) drought occurring during the late 21st century is greater than 80% (Ibid.). This would represent a climatic shift that not only falls outside of contemporary variability in aridity but would also be unprecedented in the past millennium (Ibid.).

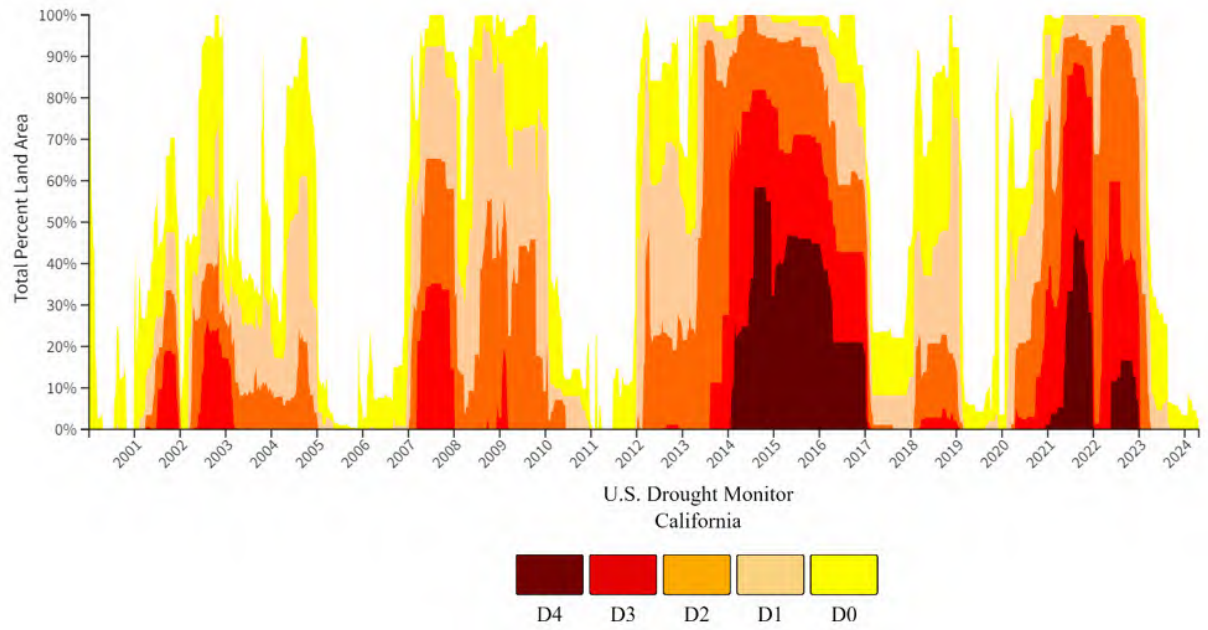


Figure 19. Percent of California land area in each Palmer Drought Index category, Jan 2000–April 2023. DO = Moderately Dry, D1 = Moderate Drought, D2 = Severe Drought, D3 = Extreme Drought, D4 = Exceptional Drought. Source: NIDIS (2024)

Drought can also exacerbate the effects of other environmental stressors. During the 2012–2017 drought, tree mortality increased dramatically and approximately 129 million trees died in California (OEHHA 2018). Multiple years of high temperatures and low precipitation left them weakened and more susceptible to pathogens and parasites (Ibid.). Vast areas of dead and dying trees are also more prone to severe wildfires (CNRA 2016).

The frequency and extent of wildfire is influenced by factors including temperature, fuel loads, and fuel moisture (Carter et al. 2008). As temperatures have warmed and mountain snowpack has tended to melt earlier, large-wildfire frequency and duration have increased, and wildfire seasons have lengthened (Westerling et al. 2006; OEHHA 2018). California's top three years for total acreage burned by wildfire were 2018, 2020, and 2021, and all but two of the 20 largest fires recorded in California occurred during those years (OEHHA 2024b). A positive feedback loop between climate change and wildfires exists as wildfires can accelerate the impacts of climate change through the emission of short-lived climate pollutants like black carbon (soot) and methane that have a warming effect that is tens to thousands of times greater than longer-living carbon dioxide (the focus of many greenhouse gas reduction efforts). Short-lived climate pollutants are responsible for 40% or more of global warming to date, and 64% of black carbon emissions are sourced from wildfires (CNRA 2016). For more discussion of the impacts of fire on mountain lions, see section 4.7.

Research suggests that most suitable mountain lion habitat in California is moderately vulnerable to climate change (Thorne et al. 2016; Dellinger et al. 2020a). As previously discussed, mountain lion habitat could be degraded if increased wildfire frequency and intensity convert shrublands to grasslands, which are generally avoided by mountain lions (Burdett et al. 2010; Jennings et al. 2016; Riley et al. 2021). Further, aspects of climate change may impact mountain lions via influence on prey populations. For example, low rainfall has been found to negatively influence mule deer doe and fawn survival in parts of the western U.S., likely because there is less food available (Marshal et al. 2002; Bender et al. 2007; Monteith et al. 2014). With precipitation levels expected to become increasingly variable as the climate continues to change, mountain lion populations could be adversely impacted if their key prey species become less numerous. Reductions in the area and quality of suitable habitat and carrying capacity could negatively influence mountain lion population sizes and possibly gene flow.

Acute heat stress may also impact mountain lions and their prey. As large-bodied mammals, both mountain lions and deer may be sufficiently large enough not to be strongly affected directly by moderate increases in environmental temperature, which more drastically affect small-bodied mammals (Fuller et al. 2016; Naya et al. 2018). Further, the generally nocturnal habits of mountain lions and their prey may mitigate impacts from warmer environments. As mountain lions in California are currently able to survive across a variety of ecoregions and climatic conditions ranging from deserts to montane and coastal forests, their adaptability suggest broad near-term shifts in their distribution from the direct effects of a warming climate are unlikely.

4.10 Risks to Small, Isolated Populations

Small, isolated mountain lion populations—such as those in the Santa Monica Mountain portion of CC-S, and the SA and SGSB genetic populations, which are each estimated to number less than 75 individuals (Table 3)—are inherently vulnerable to extinction due to multiple factors. These factors may include

demographic stochasticity[8], genetic drift[9], lack of immigration, and inbreeding, which can eventually lead to inbreeding depression[10]. Genetic drift and inbreeding both reduce genetic variation which can diminish the ability of a population to adapt to changes in the environment (Primack 1993; Reed and Frankham 2003). Each of these effects can amplify the impact of the other effects, further reducing population size and accelerating local extinction in what has been termed an extinction vortex (Primack 1993).

4.10.1 Demographic and Environmental Stochasticity

Reproduction and survival rates vary among individuals and between years in wildlife populations. This variation leads to demographic stochasticity, which tends to average out in large populations but has a much greater effect on the rate of growth or decline in small populations. If a small population declines, subsequent generations become even more susceptible to demographic stochasticity. Additionally, unpredictable changes in the natural environment can cause the size of small populations to vary dramatically while larger, more widely distributed populations would remain more stable because these changes normally occur only in localized areas of the entire population's geographic range (Primack 1993). For example, changes in vegetation, abundance of resources, or disease and parasite exposure can cause the size of small, isolated wildlife populations to fluctuate wildly, possibly leading to local extinction (Primack 1993). Additionally, natural disasters such as droughts, fires, and severe storms can lead to dramatic population changes when populations are small and isolated to one location.

While the statewide population of mountain lions is large enough that demographic and environmental stochasticity is unlikely to be an issue, the smaller and more isolated populations (those in the Santa Monica Mountains portion of CC-S, and the SA and SGSB genetic populations) are potentially vulnerable to those impacts. Of specific concern are the increasingly large and severe fires leading to direct death or injury or significant habitat changes (see section 4.7). For example, the Woolsey Fire in 2018 burned about 39,235 ha (96,949 acres) in the center and western part of the Santa Monica Mountains National Recreation Area. According to the National Park Service, two of the 11 mountain lions with working radio-collars in and around the Santa Monica Mountains at the time of the Woolsey Fire succumbed to the fire or its impacts (Blakey et al. 2022). In such a small population (Table 3), the impact of just one event like the Woolsey Fire on the population could be substantial, especially if the animals killed or adversely affected were breeding adults.

4.10.2 Inbreeding and Genetic Drift

Inbreeding and genetic drift can both result in decreased genetic variation in wildlife populations. Deleterious alleles (maladaptive genes) can be present at low frequency even in large, healthy

[8] Population changes such as sex and age ratios resulting from random variation in birth and death rates.

[9] Change in frequency of an existing gene variant in the population due to random chance. Genetic drift may cause gene variants to disappear completely and thereby reduce genetic variation. It could also cause initially rare alleles to become much more frequent and even fixed (NIH 2024).

[10] Reduced biological fitness (health and fertility) resulting from the concentration of deleterious alleles in the population from the mating of closely related individuals.

populations. But as populations become smaller, these maladaptive genes can increase in relative frequency, and populations may suffer the effects of inbreeding depression, resulting in offspring with a reduced ability to survive and reproduce (Frankham 2005; Harding et al. 2016). Genetic drift may also lead to the loss of beneficial alleles or the fixation of deleterious alleles in a small population due to a limited breeding pool (Hedrick and Kalinowski 2000). Deleterious fixed alleles can result in decreased fitness for all individuals and lead to population declines (Hedrick and Kalinowski 2000; Frankham 2005).

Multiple genetic studies have shown that certain mountain lion genetic populations along the southern coast of California have particularly low genetic variation (Ernest et al. 2003; Ernest et al. 2014; Riley et al. 2014; Gustafson et al. 2019; Gustafson et al. 2022) which may be the result of habitat fragmentation and genetic isolation. Linkage decay analysis by Gustafson et al. (2022) showed evidence of inbreeding between closely related[11] individuals in at least four of the fine scale genetic populations (see details in section 4.9.4 below). Saremi et al. (2019) investigated mountain lion genomes and found additional evidence of recent inbreeding among closely related individuals (i.e., long runs of homozygosity) in the Santa Monica and Santa Cruz Mountains.

However, the results of Gustafson et al. (2022) suggest the problems of inbreeding and homozygosity do not occur in all California populations. Several larger California populations (e.g., Sierra Nevada) display little evidence of inbreeding (see section 4.9.4 below for details). Additionally, genetic variation in the broad-scale genetic populations may minimize the impacts of inbreeding depression in many of the fine-scale populations if gene flow can be enhanced (Gustafson et al. 2022). This conclusion is consistent with the results of Saremi et al. (2019) that indicated even though inbreeding had reduced variation in the genomes of many individual mountain lions, these low-heterozygosity genome regions were generally not shared between populations. These studies suggest genetic restoration is possible even among genetically depauperate populations. When considering that genetic variation is high in the WSN and ESN genetic populations (Gustafson et al. 2022), there is potential for long-term persistence of mountain lions throughout much of the state if adequate habitat can be protected and habitat connectivity can be restored and/or enhanced to facilitate increased genetic exchange between the genetic populations in the Sierra Nevada and those within the petitioned area (see Section 10.1 for more detail).

4.10.3 Loss of Genetic Variation

High levels of genetic variation have been shown to be positively correlated with survival and reproduction rates and decreased extinction risk (Hedrick and Kalinowski 2000; Reed and Frankham 2003). The concept of effective population size[12] (N_e) is useful for understanding the likelihood that a population will lose genetic variation through genetic drift or inbreeding. Ne is the size of an ideal population that would result in the same level of inbreeding or genetic drift as that of the population under study (Palstra and Ruzzante 2008). N_e is determined by several factors and its value is generally significantly smaller than the census population (i.e., the number of animals actually breeding in a

[11] "A common ancestor less than three generations ago" (Saremi et al. 2019) (i.e., first-cousins or closer).

[12] The number of individuals in a population that are contributing to the next generation (i.e., reproducing and passing on their genes).

population is usually significantly fewer than the total number of animals in the population; Palstra and Ruzzante 2008).

Both Franklin (1980) and Soulé (1980) reviewed the genetic considerations fundamental to species conservation. They proposed two primary considerations related to population viability: 1) an immediate danger in small populations due to inbreeding (i.e., inbreeding depression), and 2) the longer-term loss of additive genetic variation that would limit future evolutionary change (i.e., evolutionary potential). Their work led to the common adoption of what is now referred to as the 50/500 rule in conservation biology. Under this framework, in the absence of gene flow, a N_e of at least 50 should be maintained to avoid inbreeding depression in the short term for large mammal species (Harmon and Braude 2010). Franklin (1980) suggested that with a N_e below 500, genetic variance for complex traits would be lost significantly faster than it could be renewed by mutation. Soulé (1980) added that this size (500) was required to maintain sufficient genetic variation for populations to evolve to changing environments in the longer term (evolutionary potential).

Since then, the importance of conserving quantitative genetic variation has gained recognition, although there is disagreement about the appropriate value for N_e. Frankham et al. (2014) suggested that $N_e = 50$ would be raised to at least $N_e = 100$ to prevent inbreeding depression over short time scales (~5 generations). Frankham et al. (2014) also summarized several independent lines of theoretical and empirical evidence suggesting that at least $N_e = 1000$ is required to maintain evolutionary potential in perpetuity.

Regardless of whether $N_e = 50$ or $N_e = 100$ is used as a benchmark, nearly all the genetic populations within the petitioned area are below the population size needed to avoid inbreeding depression in the short term (Table 6). True extinction risk is often the result of the complicated interaction of both genetic and demographic factors. Recent analyses reveal that a minimum of 7,923 km^2 (3,059 mi^2) of protected suitable habitat[13] or 14,591 km^2 (5.633 mi^2) of overall suitable habitat is needed to allow mountain lions to maintain an $N_e \geq 50$ (Dellinger et al. 2020b). According to Dellinger et al. (2020b), the Central Coast (roughly equivalent to CC-C) is the only area where the mountain lions within the petitioned area occupy an area larger than this suitable habitat threshold; however, because of potential future development pressures, it is unknown whether the threshold will continue to be met over the long term. Dellinger et. al.'s conclusions (2020b) suggest that the long-term viability of mountain lions in the other genetic populations may be reduced unless suitable habitat and/or connectivity to other genetic populations is increased (Benson et al. 2016; Benson et al. 2019). While there are examples of small wild populations that persist below the suggested threshold, at least in the short term, it is not known whether the genetic populations within the petitioned area, facing increasing isolation and with low genetic variation, will ultimately maintain long-term viability (see examples in Harding et al. 2016)

[13] Dellinger et al. (2020b) considered all public lands and private lands overlain with conservation easements "protected".

Table 6. Estimated population (CDFW unpublished data) and effective population sizes of genetically distinct mountain lion populations identified in Gustafson et al. (2019). The boundaries used to calculate the population sizes come from Dellinger et al. (2020b). Estimates from Gustafson et al. (2019) are adapted from Table 3 and include parametric 95% confidence intervals. Estimates from Gustafson et al. (2022) are adapted from their Table 1 and confidence intervals were not reported.

Genetic Population	Estimated census size	Estimated N_e (Gustafson et al. 2019)	Estimated N_e (Gustafson et al. 2022)
Central Coast North	174	16.6 (15.1-18.2)	19
Central Coast Central	393	56.6 (47.4-69.0)	26.9
Central Coast South	50	2.7 (2.5-2.9)	4.1
San Gabriel/San Berardino	74	5 (3.3-6.4)	2.3
Santa Ana Mountains	52	15.6 (13-18.7)	3.5
Eastern Peninsular Range	297	31.6 (29.1-34.4)	14.8

An important metric of genetic variation is expected heterozygosity (H_E)[14]. Adequate genetic variation is important for maintaining evolutionary potential, as variation is the raw material that allows populations to adapt to changing conditions over generations. The amount of heterozygosity in California mountain lion genetic populations is highly variable (Gustafson et al. 2019; range of H_E = 0.33–0.53; based on microsatellite loci), but lower on average than other western states, including Wyoming, Nevada, Arizona, Utah, Colorado, and New Mexico (range of H_E = 0.49–0.59; (Anderson et al. 2004; McRae et al. 2005; Andreasen et al. 2012)). Compared to California, mountain lion populations in these states show less population genetic structure due to higher rates of gene flow, which in turn counteracts the effect of genetic drift in reducing heterozygosity (Anderson et al. 2004; McRae et al. 2005). The lower overall heterozygosity, as well as the large variance in heterozygosity among local genetic populations, observed in California is most likely driven by barriers to dispersal such as mountain ranges and contemporary patterns of urban and transportation development (Ernest et al. 2003; Gustafson et al. 2019; Gustafson et al. 2022).

Assessing heterogeneity among the four broad-scale mountain lion groups in California, Gustafson et al. (2022) found they have retained substantial heterozygosity, particularly in the Sierra Nevada region with its large stretches of undeveloped contiguous habitat (Dellinger et al. 2020b). Multiple genetic investigations have now demonstrated the importance of the Sierra Nevada region as a reservoir of genetic variation (Ernest et al. 2003; Gustafson et al. 2019; Gustafson et al. 2022). Bi-directional migration rate models based on genetic data indicated the WSN genetic population has served as a significant source of migrants into other regions of California, importantly the EPR, CC-N, and SGSB (Fig. 4; Gustafson et al. 2019).

Isolated populations can also become structured through natural selection as locally adaptive genes become more prevalent in the population. However, mountain lions are long-distance dispersers and

[14] Heterozygosity refers to having inherited two different alleles for a particular trait compared to homozygosity, in which the inherited alleles are identical at a given location of the genome.

inhabit all major mountain ranges in California (Dellinger et al. 2020b), suggesting local adaptation may be unlikely, despite current connectivity challenges. Gustafson et al. (2022) found no evidence for local adaptive differences among the four broad-scale geographic mountain lion groups, or among the 10 fine-scale genetic populations. Though the appropriateness of using reduced representation genome sequencing data (in this case, restriction site-associated DNA sequencing data) to detect local adaptation has been questioned within the scientific literature (Lowry et al. 2017), this approach has been employed successfully in other studies (Catchen et al. 2017). The results of Gustafson et al. (2022) found no evidence for local adaptive traits warranting specific conservation status, nor risk of outbreeding depression resulting from the mixing of genetic groups as a result of active management (e.g., translocations) (Frankham et al. 2011). However, the South Coast group contained some private alleles which were not found in other genetic groups and which should be conserved to help preserve statewide genetic variation (Gustafson et al. 2022).

While genetic risks may significantly increase a small population's risk of extinction, implementation of a well-planned conservation strategy can substantially mitigate risks associated with small populations. A comprehensive plan for long term viability should include the principles of representation, resiliency, and redundancy (Shaffer and Stein 2000; Wolf et al. 2015).

4.10.4 Genetic Impacts on the Populations Within the Petitioned ESU

Heterozygosity within the genetic populations of petitioned ESU is highly variable. Of the broad-scale groups, SC and CC have relatively low genetic variation while SN and NC have retained sufficient variation to be capable of serving as sources of genetic rescue under various management scenarios (e.g., improved connectivity, assisted gene flow). Maintaining and enhancing connectivity within and among broad-scale groups has the potential to counteract the effects of genetic drift and inbreeding to at-risk coastal genetic populations.

Sierra Nevada Group

Gustafson et al. 2019 and 2022 consider the Sierra Nevada region to be a major source of genetic diversity for mountain lions in California. This group is of critical importance to sustaining statewide gene flow as the Tehachapi range at its southern end is the only known area where there is current gene flow from outside the petitioned area into the CC and SC groups. Enhancing connectivity through the Transverse Ranges, including the Tehachapi, Sierra Pelona, San Gabriel, and San Bernardino Mountains, represents a critical conservation priority (Gustafson et al. 2019)

Central Coast Group

The three fine-scale genetic populations in the Central Coast Group differ significantly in their levels of genetic variation. The CC-C has the highest diversity with the Central Coast Group and the largest N_e estimates, though neither N_e estimate exceeds 100. The CC-N and CC-S genetic populations have low estimated N_e and represent areas of genetic management concern because the area they inhabit contains insufficient suitable habitat to sustain a mountain lion population with $N_e \geq 50$ (Gustafson et al. 2019; Dellinger et al. 2020b; Gustafson et al. 2022).

Central Coast-North. Lack of connectivity and inbreeding are concerns in CC-N. Gustafson et al. (2022) found evidence of close inbreeding in CC-N, which is consistent with the whole genome

sequencing results of Saremi et al. (2019) from the Santa Cruz Mountains which suggested close and recent inbreeding led to runs of homozygosity in the lion genomes. A long-term research project in the Santa Cruz Mountains has collared 147 adult and juvenile mountain lions with GPS and/or VHF collars over the past 15 years. During that time no collared animal has left the Santa Cruz Mountains to the east across the Coyote Valley to the Diablo Range or to the south across Highway 101 to the Gabilan Range (pers. comm C. Wilmers 2024). This suggests that there is very limited current connectivity between the major mountain ranges in CC-N, and further inbreeding is a concern.

Central Coast-Central. The CC-C population is currently the largest and most genetically robust of the genetic populations within the petitioned ESU, with N_e estimates of 57 (Gustafson et al. 2019) and 27 (Gustafson et al. 2022; Table 6). However, the amount of suitable habitat in the area that is currently conserved (6,780 km^2; 2,618 $mi.^2$) is more than 1,000 km^2 below the threshold Dellinger et al. (2020b) considered necessary to support an $N_e \geq 50$ and long-term population stability. Additionally, bi-directional migration rate models indicate CC-C serves as the most significant source of migrants to CC-S, and along with WSN, is one of only two occasional sources of migrants to CC-N and SGSB (Gustafson et al. 2019). This suggests protecting CC-C is key to maintaining the entire Central Coast Group and for maintaining what little genetic connectivity remains between the Central Coast Group and the South Coast Group (Figs. 4, 9, 10). Thus, maintaining or expanding this genetic population and its connectivity to adjacent genetic populations is critical for the long-term viability of the entire petitioned ESU.

Central Coast-South. As with CC-N, Gustafson et al. (2022) and Saremi et al. (2019) found evidence of close inbreeding in CC-S. Within CC-S, the Santa Monica Mountains in particular appear to have very low genetic variation and are exhibiting both genetic and phenotypic evidence of inbreeding (Ernest et al. 2014; Riley et al. 2014; Benson et al. 2019; Gustafson et al. 2019; Gustafson et al. 2022; Huffmeyer et al. 2022). This population is one of two in the petitioned ESU (see SA below) to have the lowest genetic variation observed for the species globally, apart from the endangered Florida panther (Riley et al. 2014). There are multiple known cases of close inbreeding, for example a male that had kittens with daughters, granddaughters, and great granddaughters (Riley et al. 2018a, S. Riley pers. comm. 2024). Phenotypic evidence of inbreeding depression in the form of kinked tails, failed descension of the testes, and abnormal sperm morphology have been observed. These irregularities have also been observed in Florida panthers (Roelke et al. 1993; Ernest et al. 2014; Huffmeyer et al. 2022). Freeway traffic and urban development have largely isolated the Santa Monica Mountains from animals in the rest of CC-S and therefore from the rest of the Central Coast and from the Sierra Nevada groups, severely limiting contemporary gene flow (Riley et al. 2014). For example, 2009 was the last time a mountain lion was documented crossing U.S. 101 and entering the Santa Monica Mountains (Benson et al. 2016). That male bred successfully and increased the genetic diversity of the Santa Monica Mountain population (Riley et al. 2014). Similarly, very few animals have been documented dispersing from the main body of the Santa Monica Mountains. A male lion, identified as P-22, which established a territory in Griffith Park in 2012 after migrating from the western Santa Monica Mountains, almost certainly crossing U.S. 101 and I-405 along the way, was the most famous of these. He died in 2023 without fathering cubs; however, in 2024, another mountain lion of unknown origin was sighted in Griffith Park (Gammon 2024). Models predict a 16–28% probability of the extirpation of the Santa Monica Mountains population within 50 years if immigration levels

remain the same or are reduced, in part due the impacts of inbreeding depression (Benson et al. 2016; Benson et al. 2019). In contrast, in the CC-S genetic population north of U. S. 101, two radio collared males dispersed from their natal range, crossed highways, and established home ranges as adults in the area of the Santa Susana Mountains, Simi Hills, and Los Padres National Forest (Riley et al. 2014). Therefore, the threat of isolation and potential inbreeding depression is more acute in the Santa Monica Mountains than in the CC-S genetic cluster as a whole.

South Coast Group

The South Coast Group is comprised of 3 genetic populations: Santa Ana Mountains (SA), Eastern Peninsular Range (EPR), and the San Gabriel/San Bernardino Ranges (SGSB).

San Gabriel/San Bernardino. The SGSB genetic population has low observed genetic variation, a very small estimated N_e (2.3–5; Table 6), and exhibits evidence of inbreeding (Gustafson et al. 2019; Gustafson et al. 2022). Additionally, the SGSB area is comprised of two discreet mountain ranges that area separated by roads and largely surrounded by urbanized areas and desert containing little shrub or tree cover. This isolation increases the genetic population's risk of inbreeding depression (Gustafson et al. 2019).

Santa Ana Mountains. The SA genetic population has an estimated N_e of 3.5–15 and concerningly low genetic variation (Gustafson et al. 2019; Gustafson et al. 2022) and available suitable habitat (Dellinger et al. 2020b). Along with the Santa Monica Mountains population, the SA has the lowest genetic variation of any known mountain lion population other than Florida panthers (Ernest et al. 2014; Riley et al. 2014; Gustafson et al. 2019). Like the Santa Monica Mountains, genetic and phenotypic evidence of inbreeding depression in the form of kinked tails and teratospermia (> 60% abnormal sperm production) has been observed in the SA (Ernest et al. 2014; Huffmeyer et al. 2022). As with the Santa Monica Mountains, the main barriers to movement appear to be freeways and adjacent urban/developed areas, which have limited gene flow in recent decades (Ernest et al. 2014; Riley et al. 2014; Vickers et al. 2015; Huffmeyer et al. 2022). While there is genetic evidence that individual animals from EPR historically were able to successfully move into the SA and breed (see the full red and half red samples in the Santa Ana Mountains in Fig. 10), that connectivity may no longer be viable due to the strength of I-15 as a barrier between the populations as traffic and nearby development have increased in recent years (Vickers et al. 2015). For example, a thirteen-year study (2001–2013) that collared 74 mountain lions in the SA and EPR observed only one animal move between the populations, and that individual was killed for depredating sheep before it could breed and introduce genetic material to the group (Vickers et al. 2015). The impact of this isolation and inbreeding has led to an estimated "16–21% probability of local extinction in the (Santa Ana Mountains) due purely to demographic processes over 50 years with current low levels or no immigration" (Benson et al. 2019).

Eastern Peninsular Range. The EPR genetic population has an estimated N_e of 15–32 and shows little evidence of inbreeding (Gustafson et al. 2019), although there has been a report of teratospermia (Huffmeyer et al. 2022). The EPR appears to have retained sufficient variation to be capable of serving as a source of genetic rescue for other genetic populations (Gustafson et al. 2019; Gustafson et al. 2022), and could perform an important role in increasing connectivity and gene flow within the broad-scale SC group if connectivity is improved (Figs. 4, 10). The EPR is the only genetic population

known to exchange migrants with the Santa Ana Mountains, and management actions which enhance gene flow between these areas are critical to SA's population viability. Gene flow between EPR and the adjacent SGSB genetic population appears limited. The degree of dispersal from Arizona, Nevada, and Mexico into EPR remains unknown (Gustafson et al. 2019). Connectivity between EPR and adjacent populations in Mexico and Arizona may be curtailed by physical barriers along the border and the damming and major channelization of the Colorado River. Immigration and emigration patterns of mountain lions in the eastern area of EPR have not been studied, and mountain lion density may be low in that area. Some gene flow may occur across the Colorado River from the Kofa National Wildlife Refuge into California, and one mountain lion has been documented moving between EPR and Mexico, suggesting genetic connection to Mexico may exist (Vickers et al. 2015; W. Vickers, unpublished data).

In summary, multiple genetic populations in the petitioned area are at risk from genetic factors associated with small, isolated populations. However, these genetic populations identified in Gustafson et al. (2019) are nested within two broader-scale genetic groups identified by Gustafson et al. (2022) that each contain more robust, but still less than ideal levels of genetic diversity. This suggests that if connectivity can be improved among the smaller, nested genetic populations and between CC, SC, and SN, low genetic variation in the at-risk populations can still be mitigated with intentional management.

5. Existing Management

5.1 Land Ownership within the Petitioned Southern California/Central Coast ESU

The area of the petitioned ESU is approximately 15,273,700 ha (37,742,134 acres) (Table 7). Approximately 52% of the area is public land and 48% is private. The Bureau of Land Management (BLM) manages the largest amount of land at 21%, followed by the U.S. Forest Service (9%), the National Park Service (6%), the Department of Defense (5%), and the California Department of Parks and Recreation (3%). Local (city or county) and nonprofit special districts combined represent 5% of the public land. Tribal lands total 167,700 ha (414,396 acres), which is 1% of the non-private land within the petitioned ESU (Table 7, Fig. 20).

Public (and private) lands are managed for many different purposes including recreation, extractive uses (timber harvest and mining), grazing, and wildlife habitat. Thus, while some specific projects on public lands may not benefit mountain lions, most public lands in California are managed for multiple uses including wildlife conservation and sustainability.

Table 7. Land ownership within the petitioned Southern California/Central Coast ESU, percentage of total ESU area by manager, and percentage of public land area by manager in the petitioned ESU.

Land Ownership within Petitioned Evolutionarily Significant Unit	Hectares	Acres	% of total land	% of public land
Total Public Land	7,905,421	19,534,644	51.8%	—
Total Private Land	7,368,327	18,207,458	48.2%	—
U.S. Bureau of Land Management	3,183,887	7,867,525	20.8%	40.3%
U.S. Forest Service	1,430,387	3,534,548	9.4%	18.1%
U.S. National Park Service	928,264	2,293,781	6.1%	11.7%
U.S. Department of Defense	781,100	1,930,132	5.1%	9.9%
California State Parks	435,636	1,076,476	2.9%	5.5%
Nonprofit, Special District, and Joint	383,076	946,597	2.5%	4.8%
Local (City or County)	231,070	570,984	1.5%	2.9%
Tribal Land	168,135	415,469	1.1%	2.1%
California Department of Fish and Wildlife	111,462	275,428	0.7%	1.4%
California State Lands Commission	97,683	241,379	0.6%	1.2%
U.S. Bureau of Reclamation	57,731	142,656	0.4%	0.7%
U.S. Fish and Wildlife Service	39,090	96,594	0.3%	0.5%
Other State	32,864	81,207	0.2%	0.4%
California Department of Water Resources	15,183	37,518	0.1%	0.2%
Other Federal	9,853	24,348	0.06%	0.1%

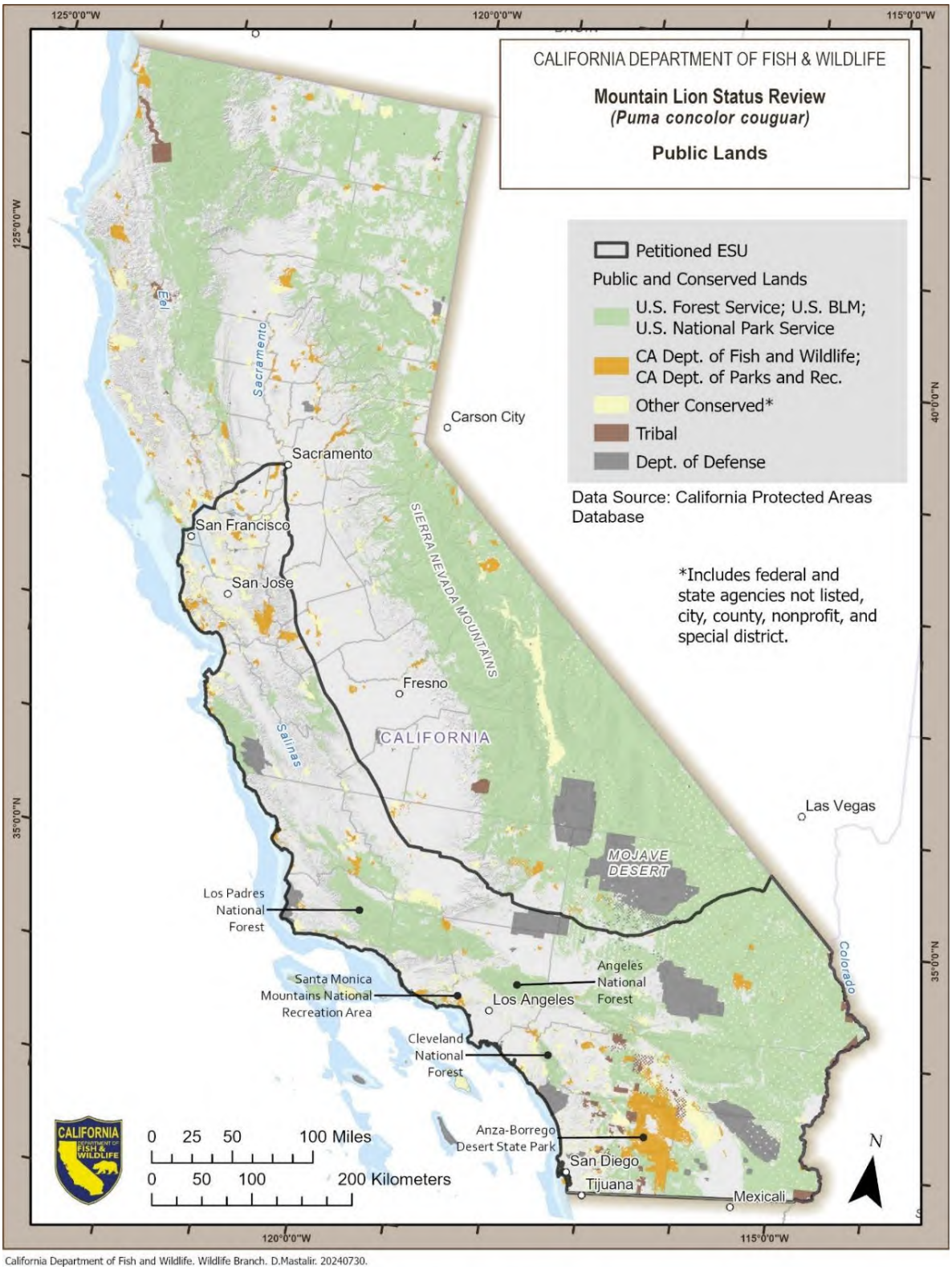


Figure 20. Public and tribal lands within the petitioned Southern California/Central Coast mountain lion ESU.

5.2 California Wildlife Protection Act

California voters through Proposition 117 adopted the California Wildlife Protection Act of 1990 (Act), codified in part as Fish and Game Code section 4800, et seq. Among other things, the Act specifically called out the loss of deer, mountain lion, and other wildlife habitat within California's mountain ranges and foothills, including the Simi Hills, and the Santa Lucia, Santa Susana, Santa Monica, San Gabriel, San Bernardino, San Jacinto, and Santa Ana Mountains in Southern California as well as the need to preserve habitat corridors to maintain the genetic integrity of California's wildlife. The Act, through the establishment of the Habitat Conservation Fund, included an ongoing annual appropriation of $14,500,000 for the acquisitions of deer and lion habitat in those areas. More generally, the Act emphasized the use of funds to acquire habitat needed to maintain connectivity between isolated or fragmented habitats to promote the genetic integrity of wildlife populations. To date, the Act's Habitat Conservation Fund has protected nearly 405,000 ha (1,000,000 ac.) of habitat across the state, including over 76,890 ha (190,000 ac.) of habitat within the petitioned ESU (California Wildlife Conservation Board unpublished data). The Act also designated mountain lions as specially protected mammals and prohibited their taking, injury, possession, or sale, except for instances where a lion represents an imminent threat to public safety or has damaged livestock or other property damage.

5.3 State and Federal Land Use Laws

The laws and regulations governing actions within the mountain lion's range vary by ownership. Several state and federal environmental laws apply to activities undertaken in California, and while they may not specifically address mountain lions, they may indirectly provide some level of protection for the species and its habitat. The primary environmental laws are summarized below.

5.3.1 California Environmental Quality Act (CEQA)

The California Environmental Quality Act (CEQA) requires state and local agencies to identify, analyze, and consider alternatives to, and to publicly disclose environmental impacts from, projects over which they have discretionary authority (Pub. Resources Code, § 21000 et seq.). CEQA requires an agency find that projects may have a significant adverse effect on the environment if they have the potential to substantially reduce the habitat, decrease the number, or restrict the range of any rare, threatened, or endangered species (Cal. Code Regs., tit. 14, §§ 15065(a)(1), 15380). CEQA establishes a duty for public agencies to avoid or minimize such potentially significant adverse effects where feasible (Cal. Code Regs., tit. 14, § 15021), and it differs substantially from the National Environmental Protection Act in requiring potentially significant adverse effects be mitigated to a less than significant level unless the lead agency adopts a statement of overriding considerations. In practice, implementation of CEQA by state and local governing bodies typically results in projects incorporating impact avoidance, minimization, and mitigation measures into project design and construction. A lead agency is not required to make a mandatory finding of significance conclusion for a project unless it determines on a project-specific basis that the project has the potential to: substantially reduce the habitat of a fish or wildlife species*;* cause a fish or wildlife population to drop below self-sustaining levels*;* threaten to eliminate a plant or animal community*;* or substantially reduce the number or restrict the range of an endangered, rare or threatened species. Under CEQA, a lead agency should identify and evaluate potential impacts to mountain lions, and if the impacts are found to be significant, mitigate them under

the Biological Resources section of an environmental document prepared pursuant to CEQA or adopt a statement of overriding considerations.

Another important component of CEQA is the requirement that governing bodies disclose and consider project-related impacts that when considered alone may not be significant, but when viewed in concert with other past, present, and foreseeable related projects cumulatively result in a significant impact to the environment (i.e., cumulative impacts; Cal. Code Regs., tit. 14, § 15355). This requirement often results in the incorporation of wildlife movement corridors into local development and infrastructure projects (e.g., open space setbacks along stream corridors and property lines) which can provide opportunities for mountain lions to pass through urban and suburban landscape, although such corridors are not always wide enough or vegetated with adequate shrub and tree cover to encourage use by mountain lions.

Section 21080.5 of the Public Resources Code provides that a regulatory program of a state agency shall be certified by the Secretary for Resources as being exempt from the CEQA requirements for preparing EIRs, negative declarations, and initial studies if the Secretary finds that the program meets the same criteria as CEQA. A certified regulatory program (CRP) remains subject to other provisions in CEQA such as the policy of avoiding significant adverse effects on the environment where feasible. These CRPs include the regulation of timber harvest by CAL FIRE and the State Board of Forestry through the Forest Practice Act; the regulation of coastal development permits by the California Coastal Commission through the California Coastal Act of 1976, Division 20 (commencing with Section 30000) of the Public Resources Code and the preparation, approval, and certification of local coastal programs as provided in Sections 30500 through 30522 of the Public Resources Code; and the pesticide regulatory program administered by the Department of Pesticide Regulation and county Agricultural Commissioners. While these CRPs are exempt from some of the procedural requirements of CEQA, courts have consistently held that they remain subject to the broad policy goals and substantive standards of CEQA, including requirements to consider feasible alternatives and cumulative impacts and to recirculate environmental review documents in certain circumstances.

5.3.2 Z'Berg–Nejedley Forest Practice Act

The Z'Berg–Nejedley Forest Practice Act was originally enacted in 1973 to ensure that forest practices, including timber harvesting, are undertaken in a manner that will also preserve and protect California's fish, wildlife, forests, and streams. The Forest Practice Rules are regulations that implement the provisions of the Z'Berg–Nejedley Forest Practice Act in a manner consistent with other laws, including CEQA, Porter-Cologne, CESA, and the Timberland Productivity Act of 1982. CAL FIRE enforces these laws and regulations governing timber harvesting and other forest practices on state and private land. The only area within the petitioned ESU where commercial timber harvest commonly occurs is the redwood forest zone of Santa Cruz County and nearby minor areas of San Mateo and Santa Clara Counties (CDTFA 2021). The CC-N genetic population occurs in these areas.

5.3.3 Natural Community Conservation Plans and Habitat Conservation Plans

Habitat Conservation Plans (HCPs) and Natural Community Conservation Plans (NCCPs) are federally and state authorized conservation plans that permit incidental take of species listed under the federal Endangered Species Act (ESA) or CESA, respectively. Take authorization may be applied to species not

currently listed but which may become listed as threatened or endangered over the term of the plan, which is typically 25–75 years. Non-federal entities can obtain authorization for take of federally threatened and endangered species incidental to otherwise lawful activities through development and implementation of an HCP pursuant to Section 10 of the ESA. California's companion law, the Natural Community Conservation Planning Act of 1991, takes a broader approach than either CESA or ESA. An NCCP identifies and provides for the protection of plants, animals, and their habitats, while allowing compatible and appropriate economic activity. There are currently four HCPs in California that include mountain lions as a covered species; all four are also NCCPs, but only three of those NCCPs include mountain lion as a covered species.

The 1998 San Diego Multiple Species Conservation Program (MSCP) is a 50-year NCCP/HCP that covers 233,099 ha (576,000 acres) in the southwestern portion of San Diego County and includes mountain lion as a covered species. The Program includes coverage for mountain lions as 81% of the core areas (± 42,492 ha, ± 105,000 acres) that will be conserved contain lion habitat, and the core areas have multiple connections to help maintain ecosystem balance. While the MSCP generally notes linkage areas were designed to accommodate "large animal movement," it does not identify linkages designed for mountain lions or contain specific measures designed to protect them. While the MSCP addresses specific design criteria for linkages, and road crossings/under crossings are included in subarea plans, not all subarea plans are complete.

The San Diego Water Authority NCCP/HCP also includes mountain lion as a covered species. The Plan Area encompasses 401,448 ha (992,000 acres) in western San Diego and southwestern Riverside Counties. The plan includes general conditions to avoid and minimize impacts to habitat linkages and wildlife movement corridors and includes habitat-based mitigation for unavoidable impacts. The plan estimates that approximately 139 ha (344 acres) of potential mountain lion habitat could be impacted over the 55-year permit term with approximately 284 ha (702 acres) of potentially suitable habitat provided within the existing Preserve Area.

The Orange County Transportation Authority NCCP/HCP (OCTA Plan) lists the mountain lion as a covered species for purposes of the federal HCP, but not for purposes of the NCCP permit. The Plan covers all of Orange County (2,070 km^2; 800 $mi.^2$). The OCTA Plan contains four "Species Goals" intended to offset impacts to mountain lions, including: (1) acquiring 410 ha (1,013 acres) of suitable habitat; (2) realigning fencing near the Highway 241 toll road; (3) funding for the North Coal Canyon Restoration Project; and (4) a "wildlife crossing policy" requiring pre-construction surveys to ensure existing crossings "maintain or improve functionality" if modified by new freeway projects. However, the OCTA Plan does not require the construction of specific wildlife crossings.

The Western Riverside County Multiple Species HCP/NCCP, which covers approximately 510,227 ha (1,260,800 acres) in western Riverside County and proposes to set aside 202,343 ha (500,000 acres) for habitat, also lists the mountain lion as a covered species. Plan implementation is expected to result in the loss of 53,418 ha (132,000 acres) of suitable mountain lion habitat and includes three biological objectives to mitigate these impacts related to the Conservation Area, Conservation Area Linkages, and maintaining or improving dispersal route functionality.

5.4 Local Ordinances

There are three local ordinances within the petitioned ESU that are relevant to mountain lions.

5.4.1 Ventura County Habitat Connectivity and Wildlife Movement Ordinance

Ventura County's Wildlife Connectivity Ordinances were adopted by the Ventura County Board of Supervisors in 2019 to facilitate wildlife connectivity and minimize habitat fragmentation for mountain lions, mule deer, California gnatcatchers (*Polioptila californica*), bobcats, least Bell's vireos (*Vireo bellii pusillus*), California red-legged frogs (*Rana draytonii*), and other species. Two of the linkages targeted in the Connectivity Ordinances are the Santa Monica Mountains—Sierra Madre Mountains connection and the Sierra Madre Mountains—Castaic Connection, which together connect wildlife habitat in the Santa Monica Mountains, Santa Susana Mountains, Simi Hills, and Los Padres National Forest. While implementation of the Connectivity Ordinances should help wildlife to move more easily through private lands between core habitat areas, it would not address connectivity across major roads and highways, which is outside its jurisdiction (Country of Ventura Resource Management Agency 2024).

5.4.2 Los Angeles County Significant Ecological Areas Ordinance

The Los Angeles County Significant Ecological Areas Program recently updated its Significant Ecological Areas (SEAs) Ordinance. The ordinance is intended to protect biodiversity in SEAs from incompatible development and ensure that projects reduce habitat fragmentation and edge effects by providing technical review of impacts and requiring mitigation. Like Ventura County's Connectivity Ordinance, the SEAs designations can lead to compact development and allow wildlife to move across private lands more easily between core habitat areas. However, the SEA ordinance is not specifically designed to protect mountain lions (Los Angeles County Planning (LACP) 2023).

5.4.3 City of Los Angeles Draft Wildlife Ordinance

The City of Los Angeles Department of City Planning has developed draft regulations for the protection of wildlife within the city limits, including the promotion of wildlife movement corridors. One stated goal of the draft regulations is to improve wildlife mobility and connectivity opportunities along waterways, ridgelines, and natural open spaces. The Wildlife Pilot Study is intended to result in regulations that will help to preserve wildlife and promote habitat connectivity on small to medium size residential developments in a pilot study area in the Santa Monica Mountains between the 405 and 101 freeways (Los Angeles County Planning (LACP) 2024).

5.5 Management on Federal Lands

5.5.1 National Environmental Policy Act

Most federal land management actions must undergo National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. § 4321, et seq.) analysis. NEPA requires federal agencies to document, consider alternatives, and disclose to the public the impacts of major federal actions and decisions that may significantly impact the environment. The Department is not aware that the mountain lion is afforded any federal special status, and as such, impacts to the species are not required to be considered during NEPA analysis. The law directs federal agencies to adopt all practical means to minimize or mitigate adverse effects when selecting preferred alternatives or justify not doing so.

5.5.2 National Forest Service and Bureau of Land Management

The U.S. Department of Agriculture's Forest Service is responsible for developing forest management plans consistent with the National Forest Management Act requirements. These plans guide land use and development within national forests and grasslands in a way that balances use and protection of natural resources to support ecological, social, and economic sustainability. Within the petitioned Southern California/Central Coast ESU, the USFS has adopted Forest Management Plans for the Los Padres, Angeles, San Bernardino, and Cleveland National Forests. These plans identify conservation strategies for mountain lion related to land acquisition, preventing habitat fragmentation, monitoring, and fire management. The Forest Service also manages several Wilderness Areas in the major National Forests within the petitioned area. Wilderness Areas are the most protected public lands in the US. Extractive uses are prohibited, as well as building roads or structures. The Angeles National Forest has five Wilderness Areas, the Cleveland National Forest has four Wilderness Areas, the Los Padres National Forest has 10 Wilderness Areas, the San Bernardino NF has eight Wilderness Areas. National Forest Wilderness in the petitioned ESU area totals approximately 485,000 ha (1.2 million acres).

The U.S. Department of Interior's Bureau of Land Management prepares Resource Management Plans to provide broad-scale direction for managing public lands in accordance with the principles of multiple use and sustained yield, as mandated by the Federal Land Policy and Management Act. These plans establish goals, objectives, and decisions for air quality, biological resources, cultural resources, lands with wilderness characteristics, paleontological resources, visual resources, water resources, fire ecology and management, trail and travel management, lands and realty, land use authorizations, livestock grazing, minerals management, recreation and visitor services, and areas of critical environmental concern. Within the petitioned Southern California/Central Coast ESU, adopted BLM plans include the Southern Diablo Mountain Range RMP, the Central Coast of California RMP, the Carrizo Plain National Monument RMP, the Clear Creek RMP, the South Coast RMP, the West Mojave RMP, the Eastern San Diego County RMP, the Santa Rosa and San Jacinto Mountains National Monument RMP, the Northern and Eastern Colorado Desert Coordinated Management Plan, and the Desert Renewable Energy Conservation Plan. While these plans may not specifically address mountain lions, they generally provide some level of protection for wildlife habitat. The BLM manages several Wilderness Areas within the petitioned area totally approximately 117,000 ha (290,000 acres), especially in the desert regions between the San Bernardino Mountains and the Arizona border.

5.5.3 Military Bases

The Sikes Act was established in 1960 to ensure conservation and protection of natural resources used by certain federal agencies, including the Department of Defense. The U.S. Congress amended the Sikes Act in 1997 requiring the Department of Defense to develop and implement Integrated Natural Resources Management Plans. These plans outline how each military installation will manage its significant natural resources holistically while maintaining military readiness. Since these lands are often protected from access and use by the public, they may contain large tracts of undeveloped land and thus be an important tool for species conservation and habitat connectivity especially in the desert regions. Military bases within the petitioned Southern California/Central Coast ESU include Fort Hunter Liggett, Camp Roberts, Camp San Luis Obispo, Vandenberg Space Force Base, Marine Corps Base Camp

Pendleton, Naval Weapons Station Seal Beach, March Air Reserve Base, Marine Corps Air Station Miramar, Naval Air Facility El Centro, Chocolate Mountain Aerial Gunnery Range, and other installations.

5.5.4 National Parklands

The guiding principles for managing biological resources on the U.S. Department of the Interior's National Park Service lands include maintenance of animal populations native to park ecosystems (NPS 2006). The NPS also commits to work with other land managers on regional scientific and planning efforts. NPS management plans provide direction and guidance on a variety of issues including resource preservation, visitor use, development, and boundary management. These plans generally specify management objectives and may vary in the type of plan, ranging from a general management plan to wilderness plans to strategic facility investment plans. For example, the Santa Monica Mountains National Recreation Area General Management Plan (GMP) provides a framework for the area's management, administered by the National Park Service, California State Parks, and the Santa Monica Mountains Conservancy. The GMP includes mountain lions as a "park species of concern" and includes construction best management practices, facility siting, fire management, vegetation, and habitat connectivity strategies intended to mitigate project impacts. However, the GMP does not include specific actions for mountain lions. Extensive mountain lion research has been carried out by The Santa Monica Mountains National Recreation Area under the leadership of Dr. Seth Riley.

Other NPS lands within the petitioned areas, such as Carrizo Plains National Monument, Fort Ord National Monument, Pinnacles National Park, Mojave National Preserve, and Golden Gate National Recreational Area, provide habitat and important habitat corridors for mountain lions.

5.6 Management on State Lands

5.6.1 California Department of Fish and Wildlife

The Department is responsible for over 445,000 ha (1,100,000 acres) of fish and wildlife habitat, managed through 749 properties throughout the state, including 111,462 ha (275,428 acres) within the petitioned ESU. These properties provide habitat for a rich diversity of fish, wildlife, and plant species and include representatives of most major ecosystems in the state.

Most Department lands are classified as either Wildlife Areas or Ecological Reserves. Wildlife Areas are acquired for the conservation of wildlife and the habitats on which they depend, and to provide opportunities for recreational uses that are compatible with those conservation goals (Fish & G. Code, §§ 1525–1530, 1745). Ecological Reserves are acquired primarily for the purpose of protecting rare and endangered native species and specialized habitat types (Id., § 1580). Certain public uses, deemed compatible with those goals, are authorized for ecological reserves—typically this includes hiking on established trails to observe native plants and wildlife (Id., § 1584). The Department prepares land management plans for Wildlife Areas and Ecological Reserves which are subject to public review under CEQA prior to being finalized.

The 167 Department properties within the petitioned Southern California/Central Coast ESU range from a fishing access property of less than 1 acre to the 117,197-acre Santa Rosa Wildlife Area in Riverside County. Of particular interest are Department properties in the coastal mountains of San Diego County, including Rancho Jamul Ecological Reserve, Sycuan Peak, Crestridge Ecological Reserve, and Hollenbeck

Canyon Wildlife Area. Mountain lion densities appear to be high in these areas as indicated by the concentration of vehicle strikes (Fig. 11). The Santa Margarita River Ecological Reserve was rated as the best potential site for a wildlife crossing over I-15 to help link the Santa Ana Mountains to the Palomar Mountains in the Eastern Peninsular Range (Riley et al. 2018b). Other significant Department properties within the petitioned ESU include the Cottonwood Creek, Cañada de Los Osos and San Luis Reservoir Wildlife Areas in Merced and Santa Clara Counties; the Chorro Creek Ecological Reserve in San Luis Obispo County; the Burton Mesa Ecological Reserve in Santa Barbara County; and San Jacinto Wildlife Area in Riverside County.

5.6.2 California State Parks

California's State Park System encompasses more than 607,000 ha (1.5 million acres) in approximately 280 parks. These parks are managed for public use and enjoyment and species and habitat protection through an integrated program of planning, restoration projects and evaluation, ongoing maintenance, and long-term monitoring.

A state park must have an approved general plan before major park facilities can be developed. These general plans direct the long-term management of the park. Some parks may also develop a more specific resource management plan. Big Basin Redwoods State Park in Santa Cruz County designates mountain lions as a species of special management concern, and the Park's Management Guidelines call for the protection of known wildlife habitat linkages to permit movement of wildlife, increase species abundance and diversity, and monitor the functionality of core wildlife habitat areas and wildlife linkages (California State Parks (CSP) 2013). Big Basin Redwoods State Park and surrounding parks including The Forest of Nisene Marks, Año Nuevo, Henry Cowell Redwoods, Wilder Ranch, Portola Redwoods, and Castle Rock State Park encompass over 22,250 ha (55,000 acres) of the Santa Cruz Mountains in the CC-N. Anza-Borrego Desert State Park in the EPR is the largest park in the state system at over 240,000 ha (600,000 acres) and contains over 161,000 ha (400,000 acres) of land managed as wilderness. Park system-wide management goals include being proactive in biological conservation and managing for subspecies, evolutionary units, ecologically functional units, populations, or other levels of biological organization to conserve biodiversity; and management that encourages natural ecological process such as hydrologic processes, wildfire, and biotic community interactions to continue. Other wildlife-related goals and guidelines include species inventory and monitoring programs, protection of special status plants and animals, control of non-native plants and animals, and the protection of habitat buffers and movement corridors (CA Parks 2005). Other notable parks within the petitioned Southern California/Central Coast ESU boundary include Butano, Garapata, Andrew Molera, Julia Pfeifer Burns, Portola, Henry W. Coe, Henry Cowell, Castle Rock complex, Montaña de Oro, Point Mugu, Malibu Creek, Topanga, Chino Hills, Lake Perris, and Cuyamaca Rancho.

5.6.3 Management on County and City Lands

Although generally smaller in size than conserved state and federal land units, city and county owned and managed lands conserve many key linkage areas or expand and buffer adjacent conservation lands. For example, a series of properties owned by the City of Los Angeles—including Runyon Canyon Park, Franklin Canyon Park and Stone Canyon and Encino Reservoirs—conserve portions of the easternmost extent of the CC-S and provide partial linkage to Griffith Park (also owned by the City of Los Angeles).

And Ventura County's Happy Camp Canyon Regional Park conserves an important part of the southern Santa Susana Mountains that may serve as a key piece of future linkages between the Santa Monica Mountains/Simi Hills and the Santa Susanas. In the Santa Anas, parks and preserves owned and managed by Orange County serve as linkages and buffers to larger conserved areas in the Sana Ana Mountains. Important units include Whiting Ranch and Irvine Ranch Open Space Preserves and the Ronald Casper Wilderness Park. In the coastal EPR of San Diego County, the County's open space preserves in the Otay area and mitigation bank in Marron Valley complement the Department's Rancho Jamul Ecological Reserve and the BLM's Otay Wildlife Management Area to create a large block of contiguous conserved lands in the San Ysidro Mountains adjacent to the Mexican border.

5.7 Management in Neighboring States and Nations

5.7.1 Arizona

Mountain lions are found throughout Arizona in desert and forested mountain habitat. They are not considered endangered or threatened in Arizona and are classified as a big game species by the Arizona Game and Fish Department (AGFD), with regulated hunting zones throughout the state. The population was recently estimated at 1,166 to 1,175 (95% CI = 622-2,558) adults and subadults statewide exclusive of the 28% of the state that is tribal land (Howard et al. 2020). Mountain lions have recently expanded into previously unoccupied areas in western Arizona near the California border where they were previously thought to be transient including the Kofa, Castle Dome, New Water, Palomas, and Eagle Tail Mountains where no evidence of mountain lions was detected during 1987 surveys (Thompson et al. 2008; Naidu et al. 2011).

The AGFD collects age and sex information and genetic material from harvested mountain lions to monitor populations and to evaluate metapopulations, connectivity and dispersal. Mountain lions are regulated by several statutes and Arizona Game and Fish Commission Orders. It is unlawful to harvest a female lion with kittens or to harvest a spotted kitten in Arizona. AGFD has established several mountain lion management zones in the state with harvest thresholds that require closing the season when the threshold is reached. Five different zones exist on the western border of Arizona abutting the California boundary, with a total of eight separate harvest units within those zones. For the 2022–2023 harvest season, the threshold quota for each of these units ranged from 3–17 mountain lions. AGFD has analyzed harvest data and considers the mountain lion population to be stable to increasing in many parts of the state.

5.7.2 Nevada

Mountain lions are classified as a game mammal in Nevada and both sexes can be hunted under special regulations. Hunting is allowed statewide, except for on the Sheldon National Antelope Refuge and within specific hunt zones in the Las Vegas area. There was a limit of 247 mountain lions in 2023–2024. From 1987 to 2015 the estimated mean population size statewide was 3,000–4,000, with the population generally found to be stable (Mahoney and Benson 2021). Andreasen et al. (2012) found that mountain lion populations in western Nevada commonly interbreed with individuals in the Sierra Nevada of California, and those populations are somewhat isolated from other Nevada populations by inhospitable playas in the Lahontan Basin. The authors also found that the Sierra Nevada population appears to receive more mountain lions from central and eastern Nevada than it contributes in return. In contrast,

Gustafson et al. (2019) found evidence of more movement from the Sierra Nevada to Nevada than vice versa.

5.7.3 Mexico

Mountain lions are distributed throughout Mexico in many areas and habitats including mountains, deserts, sub-tropical and tropical forests, and deciduous dry, conifer, and oak forests (Valdez and Ortega-Santos 2019). Populations are found in most states except in urban areas with large human populations and areas of intensive agricultural production, including central Mexico and much of the Mexican Altiplano (Chávez and Ceballos 2014).

Threats to mountain lion survival in Mexico include habitat fragmentation, prey depletion, and illegal hunting (Valdez 1999; Rosas-Rosas et al. 2003; Rosas-Rosas et al. 2008). Additionally, widespread cattle ranching, agriculture expansion, and unlawful human settlement in protected natural areas threaten their survival in the long term (Galindo et al. 2016). Ranchers often resort to predator control without following a scientific management plan due to a lack of federal and state conservation intervention programs (Rosas-Rosas et al. 2003; Rosas-Rosas et al. 2008; Rosas-Rosas and Valdez 2010; Chávez and Ceballos 2014).

Despite the international border wall, some contemporary connectivity is known to exist between EPR and the contiguous Mexican lion populations where there is not a US Border fence (Vickers et al. 2015). While the 226 km (140 mi.) border is largely fenced, significant areas, primarily in more rugged mountainous terrain occupied by mountain lions, remain unfenced. In 2009, a radio collared male from EPR crossed into Mexico at an unfenced section (Fig. 21). However, it is unknown if he fathered cubs in Mexico, and genetic exchange between lion populations on either side of the border has not been examined in close detail. Genetic contributions from Mexico to EPR in the absence of concerted mountain lion conservation efforts in northern Mexico are not ensured, and cooperative international wildlife conservation efforts should be explored to ensure the persistence of this linkage.

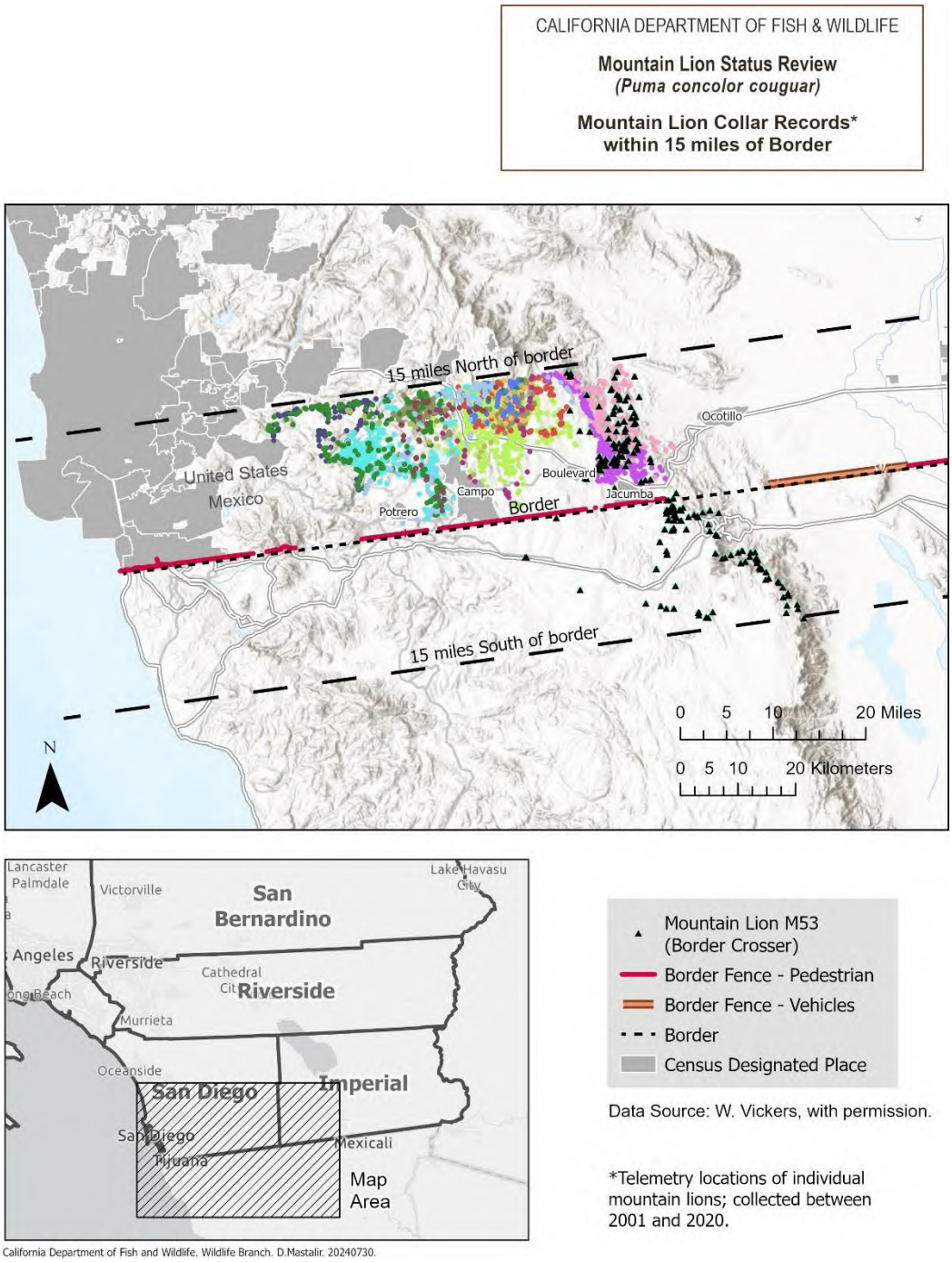


Figure 21. US/Mexico border showing locations of GPS-collared mountain lions within 15 miles of the border, including M53, the only tracked mountain lion to have crossed the border (W. Vickers data used with permission). Locations of border fences are also shown. The sections marked pedestrian are made of materials designed to stop the movement of people which would likely present a significant barrier to mountain lions. The vehicle fence likely does not create a significant barrier to mountain lions.

6. Assessment of Listable Groups

6.1 Assessment of Evolutionary Significant Units

The petitioners propose listing the petitioned area, which includes the approximate area occupied by six genetic populations, as a single ESU. Alternatively, they request the Commission consider whether any of the six genetic populations, individually or in combination, comprise one or more ESUs and meet the criteria for listing under CESA (see Fig. 1).

To determine whether a population could be considered an ESU under CESA, the Department has typically followed the general approach used by the federal government for the ESA (Waples 1991) which consists of two main criteria:

1) The population must be substantially reproductively isolated from other conspecific population units.
2) It must represent an important component in the evolutionary legacy of the species.

For criterion 1, isolation does not have to be absolute, but it must be strong enough to permit evolutionarily important differences to accrue in the different population units. It must also be of substantial ecological/genetic importance to the species as a whole (criterion 2). To make the determination for criterion 2, the following questions are relevant:

a) Is the population genetically distinct from other conspecific populations?
b) Does the population occupy unusual or distinctive habitat?
c) Does the population show evidence of unusual or distinctive adaptation to its environment?

Waples (1991) highlights the following types of information as useful for answering the above questions[15]

1) Genetic traits. Examples include presumably neutral characters detected by protein electrophoresis or DNA analyses as well as other genetically based traits that are more difficult to quantify.
2) Phenotypic traits. Examples include morphological and meristic characters, occurrence of parasites, and disease and parasite resistance.
3) Life-history traits. Examples include time, size, and age at reproduction; reproductive behavior; fecundity; migration patterns; and timing of emergence and outmigration.
4) Habitat characteristics. This category includes such physical characteristics of habitat encountered during the entire life cycle.

Waples (1991) notes:

"The existence of substantial genetic differences from other conspecific populations based on protein electrophoresis or DNA analyses would strongly suggest that evolutionarily important, adaptive differences also exist. The failure to find such differences (or the absence of genetic

[15] Waples's examples are written to be specifically relevant to Pacific salmon, so the Department has altered the language to make them more applicable to terrestrial organisms.

data) would not rule out the possibility that such adaptive differences exist, but it would place a greater burden of proof on data for other characters. Data for habitat characteristics should be interpreted in a similar fashion: habitat differences suggest (but do not prove) the possibility of adaptive differences, whereas the inability to detect habitat differences constrains the scope of possible local adaptations but does not prove they do not exist. In evaluating data for phenotypic and life-history traits, every effort should be made to account for environmental effects that are manifested in periods shorter than one generation (and therefore do not reflect adaptations)."

When evaluating the petition, CDFW's first consideration was whether the petitioned ESU meets the criteria for being considered an ESU. The second consideration was whether any of the populations within the petitioned ESU area meet the definition of an ESU, singly or in combination.

It is important to understand the adaptive differences described in the ESU criteria are unlikely to develop when populations are isolated over short time scales (i.e., decades, or even hundreds of years). Mountain lions occupy much of California, except for heavily urbanized areas, intensively farmed areas of the Central Valley, and low elevation areas of the southern deserts. As noted earlier, when the landscape is permeable, they can disperse over long-distances (Sweanor et al. 2000; Hawley et al. 2016) and they inhabit all major mountain ranges in California (Dellinger et al. 2020b). This widespread distribution and dispersal potential suggest local adaptation is unlikely to develop, and there is little evidence of morphological, mitochondrial, or adaptive genomic differences between mountain lions within the petitioned ESU or any of the genetic populations and the broader statewide population to suggest the presence of distinct evolutionary lineages (Gustafson et al. 2022). While gene flow between the petitioned ESU and the NC and SN groups is limited, it does still occur (Gustafson et al. 2019; Gustafson et al. 2022). Several of the fine-scale genetic populations are small and somewhat isolated as connectivity to the statewide population has been drastically reduced in the last 50–100 years due to expanding human development. However, based on current scientific information there are no groups of mountain lions within the petitioned ESU boundary that have been isolated for much longer periods such that they represent important portions of the evolutionary legacy of the mountain lion species.

The Department used several lines of genetic and ecological evidence to evaluate the potential ESU, however, taken as a whole, the genetic evidence does not support applying the ESU concept to the overall petitioned area nor to any of the genetic populations individually, as a subspecies or ESU for the following reasons:

1) There is only one recognized subspecies of mountain lion in North America (*P. c. cougar*) based on mitochondrial DNA data (Culver et al. 2000; Caragiulo et al. 2014; Kitchener et al. 2017), suggesting a reduced potential for adaptive localized genetic variation among North American mountain lion populations.
2) Genetic investigations conducted by Gustafson et al. (2022) failed to detect local adaptation, suggesting that the identified California genetic populations do not represent an important component of the evolutionary legacy of the species.
3) Genetic data indicate habitat fragmentation and dispersal barriers have recently limited the ability of mountain lions to move freely between certain geographic areas and local populations in Southern California and the central coast area (Gustafson et al. 2019). However, this fragmentation has mostly occurred within the last 200 years and has not yet resulted in genetic

differentiation sufficient to represent an important component of the evolutionary legacy of the species. Gustafson et al. (2022) found no outlier loci, which, when present, suggest local adaptation (Ibid.). The same study used SNPs to characterize variation across more of the genome, which suggests many of these local genetic populations separated by barriers have considerable shared ancestry (Figs. 7, 8) and are more genetically similar than was suggested by the result of Gustafson et al. (2019).

While the Department concludes that the mountain lion populations within the petitioned area do not comprise one or more listable ESUs, the Department recognizes that several of those populations are imperiled due primarily to small population sizes and isolation. In the sections below the Department uses other criteria to further evaluate whether mountain lions within the petitioned area warrant potential listing under CESA.

6.2 Assessment of Distinct Population Segments

While the petition is focused on ESUs and the Department has recommended listing ESUs in the past, the Department has also previously recommended listing other sub-species entities, such as DPSs (e.g., Southern California steelhead) and clades (e.g., foothill yellow-legged frog). The U.S. Fish and Wildlife Service (USFWS) and NMFS (the Services) have also identified and listed DPSs pursuant to the ESA and have developed a policy for evaluating DPSs pursuant to the ESA (61 Fed Reg. 4722-4725 (February 7, 1996)). Per that policy, a DPS is a vertebrate population or group of populations that is discrete from other populations of the species and significant in relation to the entire species. DPSs have been used 137 times by USFWS to list imperiled populations rather than listing a species across its full range. Examples from California include the Southern Sierra Nevada fisher (85 Fed. Reg. 29532-29589 (May 15, 2020)), the Peninsular bighorn sheep (63 Fed. Reg. 13134-13150 (March 18, 1998)), and the Sierra Nevada bighorn sheep (64 Fed. Reg. 19300-19309 (April 20, 1999)). While the ESU designation and supporting policy has primarily been applied to fish populations, the DPS designation has been more widely applied to, and policy is more relevant for, terrestrial species.[16]

To guide its evaluation of whether a possible DPS might warrant listing as threatened or endangered, the Services first evaluate two elements to determine if the population segment should be considered a DPS:

1) Discreteness of the population segment in relation to the remainder of the species.
2) Significance of the population segment in relation to the remainder of the species.

If the population segment being considered is a DPS, then the Services then evaluate its conservation status (i.e., is the population segment, if treated as if it were a species, endangered or threatened?) (61 Fed. Reg. 4722-4725 (February 7, 1996)).

The elements are interpreted as follows:

Discreteness: A population segment may be considered discrete if it meets either of two conditions:

[16] The Department has previously found DPSs to be a helpful approach for assessing certain populations and concludes it is an appropriate approach to consider for mountain lion.

a) It is markedly separated from other populations of the same taxon because of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation.
b) It is delimited by an international government boundary, and there are significant differences between the countries in control of exploitation, management of habitat, conservation status, or regulatory mechanisms.

Significance: If a population segment is found to be discrete under one or more of the above conditions, its biological and ecological significance will then be considered. This consideration may include, but is not limited to, the following:

a) Persistence of the discrete population segment in an ecological setting unusual or unique for the taxon.
b) Evidence that loss of the discrete population segment would result in a significant gap in the range of a taxon.
c) Evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range.
d) Evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.

Imperiled Status: If a population segment is found to be both Discrete and Significant, and if treated as a species, could it be found to be threatened or endangered based on the listing factors established in the ESA?

Adopting this approach, the Department evaluated the petitioned area to determine if it should be considered a DPS.

6.2.1 Boundary Assessment

Considering the petitioned area as a potential DPS is consistent with the Petitioners' interest in examining the status and viability of major genetic groupings of mountain lions in California and is also consistent with prior Department evaluations of portions of widely distributed species' ranges. The Department has previously recommended listing the Southern California steelhead DPS for listing, as well as several clades (groups descended from a common ancestor) of foothill yellow-legged frog (*Rana boylii*). As a first step in the DPS assessment, the Department considered the boundary of the petitioned ESU. The boundary must be supported by the best available science and be demarcated unambiguously. After consideration, the Department developed a potential DPS boundary that is modified from the ESU boundary proposed in the petition.

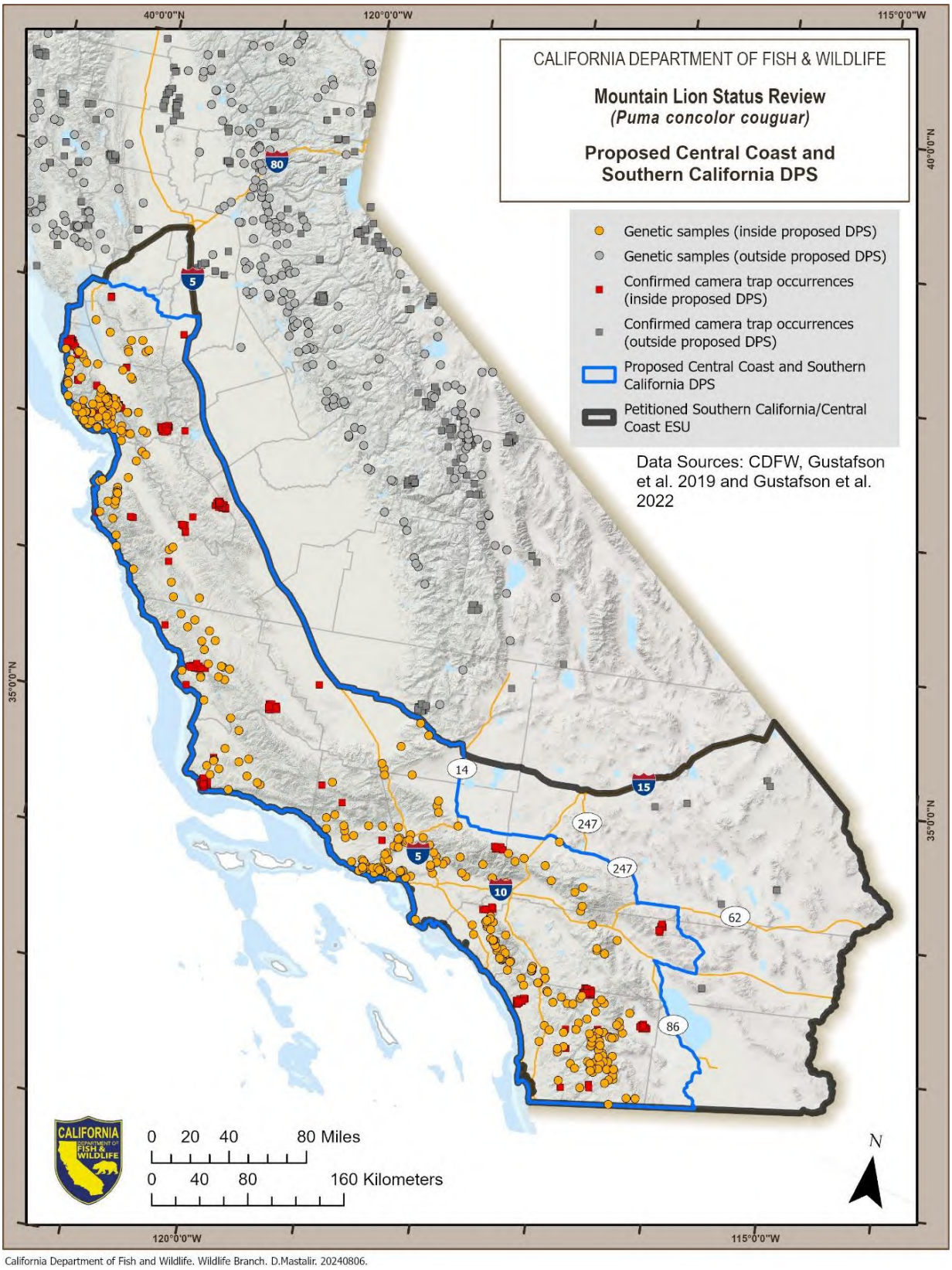
The petitioned ESU boundary includes extensive areas of California's southeastern deserts in eastern San Bernardino, Riverside, and Imperial Counties where mountain lion detections are few. Although Gustafson et al. (2019) and Gustafson et al. (2022) include this area in the EPR, the authors did not examine genetic material from mountain lions east of the Eastern Peninsular Mountains (see sample locations in Fig. 6). Mountain lions are known to occur in the desert regions of California and in Death Valley National Park (Lundgren et al. 2022), but camera trap data suggest they exist at low densities (Dellinger et al. 2019). Genetic material from the eastern deserts has not been systematically collected,

and, consequently, mountain lions in those areas have not been assigned to a genetic population nor has local gene flow been characterized.

The next nearest location from which genetic samples have been analyzed is the Mojave Desert region of southern Nevada (Andreasen et al. 2012). In a statewide genetic study of mountain lion population structure, Andreasen et al. (2012) found that animals from southern Nevada were genetically similar to individuals from the Great Basin and the Sierra Nevada region of California. However, the analysis did not include samples from the EPR or other genetic populations within the petitioned area, so it did not shed light on the genetic relationships between the mountain lions of EPR and Nevada. Another study compared samples from the coastal areas of the SC group (including EPR) and southwest Arizona (Naidu 2015). There was minimal evidence of gene flow between the mountain lions in the coastal area of the SC group and those along the border or in Arizona. In fact, the individuals sampled in south coastal California were found to be more genetically similar to those sampled from the North Rim of the Grand Canyon than those directly across the desert in southwest Arizona (Naidu 2015). However, the study had a small sample size, and did not include samples from the inland desert regions of California. Therefore, the results provide little information regarding the genetic assignment of mountain lions in the desert regions of California.

Due to this limited information, it is not currently possible to assign the mountain lions occupying the deserts of southeastern California to one of the genetic populations described by Gustafson et al. (2019). Since mountain lions in this region cannot be assigned to the petitioned genetic populations, the Petitioners' boundary which included the deserts east of the Peninsular Ranges would not meet the DPS criteria for discreteness as mountain lions in those deserts may belong to other genetic populations. The Department, therefore, does not find it appropriate to include large portions of the Mojave and Sonoran deserts within the area to be assessed as a DPS. When considering where to bound the proposed DPS, the Department also evaluated the distribution of suitable mountain lion habitat in the Mojave and Sonoran Deserts (Dellinger et al. 2020) as well as the distribution of verified mountain lion camera trap detections from recent Department monitoring projects related to drought impact monitoring and bobcat management. The petitioned ESU boundary extended from the Tehachapi Mountains east along I-15 to the Nevada border and then south along the Colorado River to Mexico, while our proposed Central Coast and Southern California DPS boundary instead runs south from the Tehachapi Mountains and then closely follows the eastern bases of the San Gabriel, San Bernardino, and Little San Bernardino Mountains before extending south along the western edge of the Salton Sea (Fig. 22).

The petitioned ESU boundary also includes an area of intensively farmed agricultural land in San Joaquin, Sacramento, and Solano Counties. This area contains little native vegetation and little cover for mountain lions, and while there are few contemporary records of mountain lions occurring there, they are likely transient individuals. Therefore, this area is not included in the proposed DPS (Fig. 22). For a more detailed description of the proposed Central Coast and Southern California DPS boundary see section 9 (Listing Recommendation).



California Department of Fish and Wildlife. Wildlife Branch. D.Mastalir. 20240806.

Figure 22. Proposed boundary of Central Coast and Southern California Distinct Population Segment.

6.2.2 Assessment of Proposed DPS Discreteness

The first test of whether a portion of a species' range constitutes a DPS is whether the population segment is discrete or markedly separate from the remainder of the species range. The Department concluded the proposed DPS is a discrete population based upon the evidence below.

Physical, physiological, ecological, or behavioral factors:

- Physical boundaries separating mountain lion populations within the evaluated DPS from other lion populations include the San Francisco Bay and Sacramento-San Joaquin Delta, the intensive agriculture in the Central Valley, large areas of unsuitable habitat in portions of the inland deserts in the east, high density urban areas, the wall along parts of the southern border with Mexico, and significant highways such as Interstates 5, 10, and 15. These are not absolute barriers but, in combination with existing geographic and habitat features, represent sufficient hindrance to gene flow that the mountain lions within the potential DPS represent two of the four broad-scale distinct genetic groups in California identified by Gustafson et al. (2022). These two broad-scale groups (SC and CC) are moderately genetically differentiated from the other broad-scale groups in California as measured by F_{ST} values (see section 2.4). This points to separation and isolation of the populations over time due to the barriers discussed above. There is evidence of historical gene flow between the genetic populations in the evaluated DPS and the Western Sierra Nevada (which is in turn connected with the Eastern Sierra Nevada and North Coast) in the ancestry assignment data using SNPs (see section 2.4). The Tehachapi Mountains and surrounding areas are considered the only area where contemporary gene flow is known to occur between the evaluated DPS and the other genetic populations in California (via the western Sierra Nevada Mountains; Fig. 10). Current substantial barriers to mountain lion movement in that area include I-5 and Highway 58, the latter of which is identified by the Department as an area of top priority for connectivity for mountain lions (Fig. 12, Vickers unpublished data).
- Connectivity between mountain lions in the EPR and those in Baja California, Mexico and Arizona is poorly understood. Although most of the 226 km (140 mi.) border with Mexico is fenced, portions in the rugged San Ysidro and Jacumba Mountains remain unfenced. Mountain lions have been observed on the California–Baja California border (J. Dellinger pers. comm.), and in 2009, one GPS-collared study animal was documented crossing the border multiple times in the vicinity of Jacumba, California, indicating the opportunity for the cross-border exchange of individuals still exists (Fig. 21, Vickers et al. 2015). In the Mojave and Sonoran deserts, sporadic detections of individuals suggest at least the potential for genetic exchange between mountain lions in the EPR and those living along the Colorado River in California and Arizona. However, such movement has not been studied or confirmed to date.

International Border: The assessment of discreteness in the federal DPS policy includes the criterion of the presence of an international border. However, the jurisdiction of CESA is the State of California, and considerations of differences in management or regulatory mechanisms across borders are not usually a major part of the listing decision process. In this case, however, the border between California and Mexico is relevant to the EPR genetic group. While portions of the international border are marked by walls and fences that attempt to manage human migration, significant sections of the border, including

a large section of the Eastern Peninsular Mountains, remain unfenced (Fig. 21). However, the status of the mountain lion population in Baja California, Mexico, and the frequency of lion movement across the border is unknown. One collared mountain lion is known to have crossed from the Eastern Peninsular Range into Mexico and back in 2009. While the frequency of genetic exchange between Californian and Mexican mountain lion populations is unstudied and unknown, it is likely that the border wall serves as a semi-permeable obstacle to lion movements. However, without more information about gene flow, California should not make assumptions about Mexican mountain lions' contribution to genetic diversity in the EPR and South Coast populations.

6.2.3 Assessment of Proposed DPS Significance

Having established that the proposed DPS is a discrete population, the Department next evaluated the biological and ecological significance of the segment in consideration using the following factors.

Unique Ecological Setting: While there are diverse environments including many unique plants and vegetation types within the proposed DPS, the relevance of these unique areas to the mountain lion—an adaptable, wide-ranging, habitat generalist—is unclear. The mountain lion's primary prey (deer) occurs across the many habitats of the potential DPS and there is little evidence that mountain lions have adapted their general behaviors or occupied different ecological niches to exploit specific habitat types. Mountain lions typically have large home ranges that may include many habitat types, and an individual lion may disperse and establish a home range dominated by a habitat type other than the one that dominated its home range when it was a juvenile. Mountain lions within the proposed DPS largely make use of habitats that are compositionally and structurally similar to habitats outside the evaluated DPS, and they tend to exhibit the same hunting, feeding, breeding, and denning behaviors both within and beyond the proposed DPS boundary, including making use of the interface between natural habitats and cities by occasionally occupying urban and suburban areas.

Gap in Range: The evaluated DPS represents 97,230 km^2 (37,541 mi^2), which is 23.7% of the state of California. The loss of the mountain lions from this area would be a significant overall loss in range in California and would further limit the statewide population's connectivity with populations in Mexico and Arizona. Within the petitioned area, mountain lions occur in many mountain ranges, valleys, deserts, parks, and Wilderness areas, and the loss of the largest carnivore from these areas would fundamentally change wildlife community dynamics across a large portion of the state.

Only Surviving Natural Occurrence: Mountain lions within the proposed DPS are not the only surviving natural occurrence of the species in the state.

Markedly Different Genetic Characteristics: The petitioned area consists of two of the four broad genetic groups identified in Gustafson et al. (2022), which are "moderately differentiated from each other based on F_{ST} estimates." Those two broad groups can be further divided into six smaller genetic populations. While there are multiple lines of evidence that these genetic groups have different characteristics from each other and from the groups outside of the petitioned area, to date there is no evidence that these discernible genetic differences are evidence of adaptations to local conditions (see section 2.4 Genetic Structure).

Conclusion: The mountain lions in the petitioned area are markedly separated from other populations in the state due to natural and human-created barriers. There are six distinct genetic populations in the

petitioned area that broadly nest into two broad-scale genetic groups that are discernible from those in the rest of the state. The mountain lion population within the petitioned area is significant due to its markedly different genetic characteristics, and the very large, geographically diverse area that it occupies, comprising nearly one quarter of California's land area. Therefore, the petitioned area meets the criteria to be considered a Distinct Population Segment and treated as a subspecies for CESA listing purposes.

6.2.4 Assessment of Whether Proposed DPS is Imperiled

The final test for determining if listing a population segment as a DPS is warranted is assessing whether the population segment, if treated as species, could be found to be threatened or endangered. The Department estimates the total population of the six genetic populations within the proposed DPS to be 947 mountain lions (95% CI: 777–1,123). Each of the genetic populations has some degree of isolation from, and limited genetic exchange with neighboring populations. Thus, mountain lions within the proposed DPS are not a single, well-mixed population. For long-term conservation planning, effective population size (N_e) is a better metric for evaluating the risks of isolation and inbreeding than census population size. The estimated total effective population size of these six genetic populations combined has been estimated in two studies: $N_e = 70.6$ (Gustafson et al. 2022), and $N_e = 128$ (Gustafson et al. 2019). However, the petitioned area is not a single intermixed population, instead it is a collection of smaller, somewhat isolated genetic populations which each have effective population sizes that are too low to prevent the risks of inbreeding over the long-term. This fact, coupled with the other threats to the genetic populations such as vehicle strikes, management killing, diseases, and the interrelated effects of fire and climate change has led the Department to conclude that the proposed DPS is imperiled.

See Section 7 for a more detailed discussion of threats.

6.3 Assessment of Significant Portion of Range

CESA provides that the Department and the Commission must consider whether a species is endangered or threatened "throughout all, or a significant portion, of its range." (Fish & G. Code, §§ 2062, 2067.) If the Commission ultimately determines a species is endangered or threatened throughout all of its range, the Commission need not analyze whether the species warrants listing throughout a significant portion of its range, an area subsumed within the entire range. For purposes of this analysis, the "range" to be assessed depends on the level at which listing is being analyzed by the Department and the Commission (i.e., the entire species, an ESU, a DPS, or another subspecies unit). Petitioners submitted a petition requesting the listing of one or more ESUs of mountain lions located in areas of the Southern California and the Central Coast. The Department has considered the petitioned unit(s) and determined that the correct subspecies unit for mountain lions in this area of California is a DPS, not an ESU. The Department recommends that the Commission list the entirety of the proposed DPS described in Sections 6 and 9 and shown in Figure 22. Therefore, an analysis of whether a significant portion of the species' range within the described DPS warrants listing is not required.

7. Summary of Listing Factors

CESA's implementing regulations identify key factors relevant to the Department's analysis and the Commission's decision on whether listing a species as threatened or endangered is warranted. A species will be listed as endangered or threatened if the Commission determines that the species' continued existence is in serious danger or is threatened by any one or any combination of the following factors: (1) present or threatened modification or destruction of its habitat; (2) overexploitation; (3) predation; (4) competition; (5) disease; or (6) other natural occurrences or human-related activities (Cal. Code Regs., tit. 14, § 670.1, subd. (i)).

This section provides summaries of information from the foregoing sections of this status review, arranged under each of the factors to be considered by the Commission in determining whether listing is warranted.

7.1 Present or Threatened Modification or Destruction of Habitat

The main threats affecting mountain lions in the proposed DPS are habitat loss and fragmentation from historical and ongoing transportation infrastructure development (including residential and commercial structures, intensive agriculture, highways and freeways, high-speed rail lines, canals, and reservoirs), and lack of sufficient connectivity between remaining habitat patches, which has resulted in isolated populations with reduced genetic exchange. The amount of suitable habitat available to mountain lion populations has been significantly reduced in and adjacent to areas such as the Central Valley, San Francisco Bay area, and the greater Los Angeles and San Diego urban areas. Over time significant barriers have developed which impede mountain lion movement and isolate populations, and ongoing residential and commercial development is projected to exacerbate isolation. The lack of sufficient gene flow between isolated populations has resulted in inbreeding in some smaller populations which may reduce survival and reproductive fitness, as evidenced by physical abnormalities in some mountain lions in the small and isolated Santa Ana and Santa Monica Mountains populations.

Long-term maintenance of genetic variation within the genetic populations in the proposed DPS is reliant on habitat conservation and connectivity. Maintenance and enhancement of gene flow between the proposed DPS and the larger, more genetically diverse mountain lion populations in the Sierra Nevada through the Tehachapi Mountains is required to maintain viable populations in the proposed DPS. Additionally, there needs to be increased connectivity between and within the fine-scale genetic populations in the proposed DPS to counteract or prevent the negative impacts of inbreeding.

As noted earlier in this report, some smaller genetic populations have well-documented significant risk factors at this time. In the most isolated habitat patches (e.g., Santa Monica Mountains, Santa Ana Mountains), it is estimated that there is a substantial probability of local extirpations within less than 50 years in the absence of efforts to improve habitat connectivity and remove barriers to movement. Developing broad wildlife crossing infrastructure will require adequate funding and concerted and sustained commitment by many parties to ensure proper design, placement, maintenance and monitoring of crossing structures for effectiveness.

7.2 Overexploitation

From the early 20th century until 1964, mountain lions were a bountied predator in California. During the bounty period approximately 12,580 mountain lions were killed across California. When California bounties ended in 1964, mountain lions were classified as a nuisance or vermin species and mountain lions could be killed year-round without a hunting license and with no limits, but there was no longer paid incentive for removal. Lions were classified as game and two legal hunting seasons were held in 1970 and 1971 before a legislative moratorium on hunting was enacted. In 1986, mountain lions were reinstated as a game species, but before a hunting season was held a ballot initiative (Proposition 117) approved by California voters classified mountain lions as a "specially protected mammal species" in 1991 (Fish & G. Code, § 4800). That classification continues today.

Poaching and other unpermitted take is rarely reported but has been observed in the CC-S, SA, and EPR as well as in the CC-N. 26 out of 199 mortalities from known causes in the years 1974–2020 were due to poaching, a 2%-3% annual rate of mortality. Overexploitation alone likely poses little threat to the statewide population or to any of the genetic populations, although additive mortality from poaching may exacerbate the inherent threats faced by small, isolated populations.

7.3 Predation

As large-bodied predators, adult mountain lions in California are subject to little predation pressure. Gray wolves sometimes kill both adult and juvenile mountain lions, and black bears are known to occasionally kill mountain lion kittens but rarely adults. However, predation by wolves and black bears is not known to be a significant cause of California mountain lion mortality nor is it known to threaten the persistence of lion populations. Therefore, and given the current absence of gray wolves within the proposed DPS, predation is not currently considered to present a significant threat to California mountain lion populations, although this topic may need to be revisited if wolf packs establish within the proposed DPS in the future.

7.4 Competition

Black bears and gray wolves are known to sometimes displace mountain lions from their kills, which potentially forces mountain lions to expend additional energy hunting to procure more prey. Given the current absence of wolves in the proposed DPS, wolf competition currently has no effect on central coast or Southern California lion populations. The potential impact of black bears in these areas remains unknown and warrants further study. Within the proposed DPS, intraspecific competition between mountain lions is likely the chief source of competition. In the Santa Monica Mountains within the CC-S, intraspecific conflict has been identified as the leading cause of mortality for the nearly isolated population. Statewide, there is a 3% risk of annual mortality attributable to intraspecific strife resulting from competition. Intraspecific aggression appears to be a significant mortality factor where individual mountain lions occupy small patches of suitable habitat within habitat-limited landscapes, and therefore, this form of competition should be considered a threat to lion populations in the Santa Monica and Santa Ana Mountains.

7.5 Disease

Mountain lions are susceptible to various viral, bacterial and parasitic pathogens. While there are documented lion mortalities and sickness from multiple pathogens, mortalities from disease alone are not likely to threaten the genetic populations in the proposed DPS. Diseases pose a less than 1% annual mortality risk to California mountain lions. The Department does not consider disease, in isolation, a significant threat to the species in California. However, pathogens may be harmful to individuals and small populations, and, when combined with other threats (e.g., habitat loss and fragmentation, climate change, wildfires, inbreeding and genetic drift, etc.), their impacts potentially further reduce the likelihood of long-term persistence for small, isolated mountain lion populations.

7.6 Other Natural Occurrences or Human-related Activities

7.6.1 Vehicle-Related Mortality

Vehicle-related mortality is the second most frequent cause of known death for mountain lions in California. It is difficult to accurately assess the actual magnitude of the problem due to lack of systematic data collection. One estimate is that 100 mountain lions are killed every year by vehicle strikes, while a more recent report puts that number at 70 per year during the period from 2015 to 2022. Between 2001-2013 vehicle strikes were the leading known cause of death for radio collared mountain lions in SA, and the second leading known cause of death in EPR. In the Bay Area (CC-N), vehicle strikes are also a significant source of mortality. California State Routes (SR)-12, SR-17, SR-1, and especially Interstate-280 have high numbers of mountain lion mortalities. The 20 mile stretch of I-280 northwest of San Jose was the deadliest highway in California for mountain lions from 2015-2022 with 20 reported deaths. Well-designed wildlife crossing structures in association with fencing to funnel animals to the crossing can reduce vehicle-related mortalities. While such structures are costly and require careful planning, an undercrossing on Highway 17 in the Santa Cruz Mountains (CC-N) has been completed, construction of the Wallis Annenberg Wildlife Crossing is underway in the CC-S, and several other structures are being planned in the EPR. If wildlife crossing structures and fencing become widespread within the proposed DPS, mortality from vehicle strikes may be substantially reduced.

7.6.2 Permitted Take

From 1974 to 2020, permitted take of mountain lions was the leading known cause of death for radio collared mountain lions statewide. Permitted take is primarily composed of lethal lion removals in response to depredation of livestock and pets, although lethal removals to protect endangered bighorn sheep populations and lethal removals for human safety are also included in the category. However, changes in 2017 and 2020 to the Department's approach to issuing mountain lion depredation permits have significantly reduced the number of animals killed statewide in recent years. Under current management, occasional lethal take of individual mountain lions due to repeated depredations on a single property or for public safety in the proposed DPS is foreseeable and may exacerbate the detrimental effects associated with habitat loss, small population size and limited genetic exchange, and other threats in isolated mountain lion populations such as the Santa Monica Mountains, SGSB and SA.

7.6.3 Toxicants

Mountain lions throughout California are exposed to toxic chemicals in their environment which can be lethal, debilitating, or have no clinical effect, depending on the quantities ingested. Lions with toxicant-impaired functions may be more susceptible to other forms of mortality such as starvation and vehicle strikes. Lions can encounter ARs used to control vertebrate pests throughout the state, including remote locations where legally prohibited rodenticides are used to protect illicit cannabis plantations. Necropsies have verified that nearly all tested mountain lions in California have been exposed to ARs. While toxicants are not known to directly cause significant mortality statewide, their effects may be additive to other sources of mortality. In the relatively small population in the Santa Monica Mountains National Recreation Area, AR toxicosis was the third leading cause of death after vehicles strikes and intraspecific strife.

7.6.4 Wildland Fire and Fire Management

The effect of wildfire on mountain lions is complex. Fire is a regular ecological process in many California vegetation types, and many native plants display adaptations to fire such as thick fire-resistant bark, post-fire crown-sprouting, and smoke-induced seed germination. Many native plants grow vigorously after wildfires, which can improve forage for deer, the main prey of mountain lions. Mountain lion response to recently burned areas appears variable with one study showing use of burned landscapes more frequently than expected based on availability during the first nine years following a wildfire, and others showing less use during the first few years post fire, then more use as vegetation recovers over time. Wildfires can also cause mountain lion injury and direct mortality, which is likely additive to other sources of mortality. Fires are projected to become more frequent and severe as the climate changes, potentially resulting in the conversion of some preferred mountain lion woodland and shrubland habitat to grasslands, which are documented to be largely avoided by lions. The impact of wildfire on the statewide mountain lion population or on individual genetic populations is difficult to predict; however, small lion populations in some relatively small mountain ranges (e.g., the Santa Monica and Santa Ana Mountains) may be vulnerable to large, severe fires (e.g., the Woolsey Fire Los Angeles and Ventura Counties in 2018) that could substantially modify large areas of extant lion habitat rapidly, and large fires in key connectivity zones such as the Tehachapi Mountains may temporarily reduce the probability of genetic exchange between populations.

7.6.5 Climate Change

Projections indicate the California climate will continue to warm, and precipitation events will become less predictable and droughts more frequent. These changes will influence the condition and distribution of vegetation types and the animal communities that depend upon them. For example, warming temperatures and/or changing precipitation patterns could affect the quality and density of forage plants relied on by deer in certain areas, thereby potentially affecting mountain lion density. However, the Department is not aware of any bioclimatic modeling studies investigating projected changes in the geographic range of the mountain lion nor their main prey species (mule deer) based on climate variables. As large-bodied mammals, it may be that both mountain lions and mule deer are sufficiently large enough not to be adversely affected directly by moderate increases or decreases in environmental temperature, which more drastically affect small-bodied mammals with higher surface

area to volume ratios. The generally nocturnal habits of mountain lions and their prey also help alleviate impacts from warmer environments. Mountain lions are known to occur across a wide variety of ecoregions ranging from deserts to temperate and coastal rainforests in California demonstrating their ability to tolerate a wide range of climates. The mountain lion's body size, foraging habits, and climatic breadth suggests the direct effects of climate change are unlikely to lead to near-term shifts in distribution of the species or population declines.

7.6.6 Risks to Small, Isolated Populations

Small, isolated populations are inherently vulnerable to extinction due to demographic stochasticity, inbreeding depression, and genetic drift. In small populations, these factors, individually or collectively, can result in a loss of genetic variability and a reduced genetic capacity for the population to adapt to changes in the environment. A lack of immigration can also prevent isolated populations from recovering from stochastic extinctions or population declines, independent of genetic effects. In wildlife populations, genetic variation has been shown to be strongly correlated with high survival and reproduction rates, as well as decreased extinction risk. Genetic effects can amplify the impact of the other identified threats and random environmental effects to further reduce population sizes and accelerate populations towards extirpation in what has been termed an extinction vortex.

There are an estimated 947 mountain lions (95% CI: 777–1,123) in the proposed DPS area, with some of the areas like the CC-C and EPR estimated to contain hundreds of mountain lions. However, the smaller and more isolated areas like CC-S, SA, and SGSB each have estimated populations of fewer than 75 individuals each. These genetic populations have effective population sizes less than 50 and may already be adversely affected by inbreeding. In contrast CC-C, and EPR genetic populations show little evidence of inbreeding. Enhancing gene flow between the genetic populations in the proposed DPS and the Sierra Nevada broad-scale group would enhance the potential of long-term persistence of mountain lions throughout the proposed DPS, but until connectivity is significantly improved, the risks associated with small populations will threaten the long-term persistence of mountain lions in the proposed DPS.

8. Protection Afforded by Listing

It is the policy of California to conserve, protect, restore, and enhance any endangered or threatened species and its habitat (Fish & G. Code, § 2052). If the Commission votes to list mountain lion populations as threatened or endangered under CESA, the act would prohibit take[17] except under certain circumstances where both CESA and Fish and Game Code section 4800, et seq. allow CDFW to authorize take.

Additional protection of mountain lions following listing would also occur during required state and local agency environmental review under the California Environmental Quality Act (CEQA). CEQA requires affected public agencies to avoid or substantially reduce project related environmental effects and contains specific requirements for analyzing and mitigating impacts to listed species. Where significant impacts are identified under CEQA, the Department expects the required avoidance, minimization, and

[17] "Take" is defined as hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill (Fish & G. Code, § 86).

mitigation measures included in approved projects will afford additional protections that would be absent if mountain lions are not listed.

CESA listing may also result in increased priority for limited conservation funds such as those administered by the Wildlife Conservation Board, Local Assistance, and State Wildlife Grants, along with land acquisition assistance from non-governmental organizations (NGOs) such as The Nature Conservancy.

9. Listing Recommendation

CESA directs the Department to prepare this report regarding the status of the mountain lion in the petitioned Southern California/Central Coast ESU based upon the best scientific information available (Fish & G. Code, § 2074.6). CESA also directs the Department, based on its analysis, to indicate in the status report whether the petitioned action (i.e., listing as threatened) is warranted (Id., § 2074.6; Cal. Code Regs., tit. 14, § 670.1, subd. (f)).

Under CESA, an endangered species is defined as "a native species or subspecies…which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease" (Fish & G. Code, § 2062). A threatened species is defined as "a native species or subspecies…that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by [CESA]" (Id., § 2067).

The Legislature left to the Department and the Commission, which are responsible for providing the best scientific information and for making listing decisions, respectively, the interpretation of what constitutes a "species or subspecies" under CESA (*Cal. Forestry Assn. v. Cal. Fish and G. Com.* (2007) 156 Cal.App.4th 1535, 1548-49; *Central Coast Forest Assn. v. Fish & G. Com.* (2018) 18 Cal. App. 5th 1191, 1198-99). The Commission's authority to list necessarily includes discretion to determine what constitutes a species or subspecies (Id. at p. 1237).

The Department has determined, based upon the best available scientific evidence, that there is currently insufficient evidence that the mountain lions within the petitioned area and the genetic populations within the petitioned area boundary meet the criteria to be considered ESUs. The petitioned ESU, or any combination of its genetic populations, cannot be considered ESUs because they are not both substantially isolated from other populations *and* important components of the evolutionary legacy of the mountain lion species. Although movement of individuals beyond the petitioned area is increasingly restricted, there has been some gene flow between the petitioned ESU and other mountain lion populations, and neither the petitioned ESU nor the genetic populations within it are totally reproductively isolated. Nor are the mountain lions within the petitioned area sufficiently genetically or morphologically differentiated from the larger California population to suggest the presence of distinct evolutionary lineages or evolutionarily important differences. Therefore, the Department concludes there is insufficient scientific evidence to classify the portions of the California mountain lion population petitioned for listing as one or several ESUs.

The Department also examined the petitioned ESU area and population through the lens of federal DPS policy. While the Department did not find the petitioned area to meet the federal criteria to be considered a DPS, the best available scientific evidence shows that a separate but similar area is discrete and biologically significant and meets the criteria to be considered a DPS. Furthermore, evidence indicates that mountain lions in the proposed DPS will become imperiled if management actions do not conserve habitat and restore connectivity between the genetic populations within the DPS as well as with the larger statewide population. Therefore, the Department recommends that the Central Coast and Southern California DPS of mountain lions, as delineated below, be listed as threatened under California law.

The Department's proposed DPS boundary (Fig. 22) would deviate from the petitioned ESU boundary near Mojave California where the petitioned ESU boundary runs east along Highway 58 to Interstate 15 to the California-Nevada border. Instead, the Department proposes a boundary that extends south from Mojave along Highway 14 to its intersection with Highway 138, then east to the intersection with Highway 18, along Highway 18 (which briefly becomes 7th Street in Victorville) to its intersection with Highway 247 in Lucerne Valley, then along Highway 247 to Highway 62, east along Highway 62 to Utah Trail/Park Boulevard/Pinto Basin Road south through Joshua Tree National Park to Interstate 10, then west along I-10 to Highway 86, and south along Highway 86 to the Westside Main Canal of the Imperial Irrigation District near Brawley, then south along the Westside Main Canal to its intersection with the All American Canal; from that intersection due south to the Mexico border and then west to the Pacific coast.

The Department also recommends deviating from the boundary at Interstate 5 near Stockton and using Highway 4 to the west as the DPS boundary until it intersects with Highway 160, then north along 160 to the Contra Costa County line, and from there along the Contra Costa and San Francisco County lines (which are in the middle of San Pablo and San Franciso bays) to the Pacific Coast.

The Department recommends including parts of the Tehachapi Mountains south of Highway 58 in the proposed threatened DPS (as was proposed as the boundary for the petitioned ESU). The genetic characteristics of mountain lions in this and adjacent areas show evidence of connectivity between the primary genetic populations within the DPS and the Western Sierra Nevada genetic population. Therefore, the Department concludes the area is critical for maintaining connection between the proposed DPS and the rest of the state. Highway 58 has been identified as a major barrier to movement of mountain lions (CDFW 2022c), and recent GPS collar location data indicated most lions with home ranges adjacent to or near the highway do not cross it (Vickers unpublished data). Therefore, Highway 58 appears to be the functional boundary between the large Western Sierra Nevada genetic population and smaller genetic populations of the central and south coast of California, and as such, the area south of the highway should be considered part of the proposed threatened DPS.

10. Management and Recovery Action Recommendations

California's statewide mountain lion population is complex and diverse. Large areas of the state appear to have robust, genetically diverse, and well-connected lion populations (e.g., NC and SN groups) while other populations show evidence of inbreeding depression and genetic isolation (e.g., SA, Santa Monica Mountains of the CC-S Genetic investigations have demonstrated the importance of the Sierra Nevada

region as a reservoir of genetic variation and a source of migrants into other regions of California (Ernest et al. 2003; Gustafson et al. 2019). The overarching goals of mountain lion management in the state should be:

- Maintaining and enhancing landscape connectivity between robust core populations and the smaller, more isolated populations within the proposed threatened Central Coast and Southern California DPS
- Protecting important patches of remaining habitat within the DPS from development and enhancing degraded habitats where feasible
- Reducing human-related mortality rates within the populations of the DPS

Increased connectivity would help offset the risks to small populations that result from demographic and genetic factors. Benson et al. (2019) found that sustaining mountain lion populations in isolated mountain ranges in greater Los Angeles (Santa Monica and Santa Ana Mountains) is feasible with relatively modest increases in landscape connectivity.

One area critical to restoring and maintaining genetic exchange between genetic populations is the Tehachapi Mountains which serve as the link between the relatively robust Western Sierra Nevada genetic population and the more tenuous Transverse Range populations in the CC-S and SGSB. Mitigating the barriers of Highway 58 and Interstate 5 to allow safer and easier dispersal across those roads should be considered high priorities, as well as the conservation of suitable habitat in the Sierra Pelona, Topatopa, and San Emigdio Mountains. Another critical area is the connection between EPR and SA. The EPR is the only genetic population known to exchange migrants with the SA population, and management actions which enhance gene flow between these areas will be critical to the sustainability and recovery of mountain lions in SA. Dispersal into and out of EPR is limited and the degree of dispersal across the border between the U.S. and Mexico remains unknown (Gustafson et al. 2019). While self-sustaining connectivity through a network of corridors, highway wildlife crossings, and habitat patches with functional ecosystem processes would be ideal for long term sustainability, assisted gene flow between populations through targeted translocations should be considered as a short-term management action to augment the genetic variation of the most isolated small populations.

The specific recommendations below are compiled from sources including the Petitioners, mountain lion researchers, Gustafson et al. (2022), the Department, and others, and are designed to facilitate the above goals.

10.1 Connectivity

- Identify the most strategic locations for wildlife crossing structures at existing roads and highways to improve wildlife connectivity and permeability, and design and build those structures while also protecting adjacent habitat to ensure perpetual wildlife access to the crossing structures and connections (South Coast Wildlands 2008). Crossing infrastructure should include, but is not limited to, overcrossings, underpasses, culverts, and exclusionary fencing that guides animals to safer crossing areas (Vickers et al. 2015). The following crossing locations have been identified by mountain lion experts and should be among the top priorities for the implementation of crossing infrastructure:
    1) Highway 58 near the town of Tehachapi

2) I-5 between the Grapevine and Gorman
3) I-15 Freeway at Temecula Creek Bridge to enhance the Palomar Linkage and connect the Santa Ana and Eastern Peninsular Range (Ernest et al. 2014; Gustafson et al. 2017; Zeller et al. 2017; Riley et al. 2018b)
4) I-280 between San Bruno and Cupertino, which is the "deadliest highway for mountain lions in California" according to Shilling et al. (2023)
5) Highway 101 in the Coyote Valley south of San Jose and at the recently conserved Rocks Ranch in Monterey and San Benito Counties
6) Highway 152 at Pacheco Pass
7) I-15 Freeway at the Santa Margarita Ecological Reserve near Temecula.

- In recognition of the importance of the Sierra Nevada region as a reservoir of genetic variation and significant source of migrants into other regions of California (Ernest et al. 2003; Gustafson et al. 2019; Gustafson et al. 2022), acquire, maintain, and enhance corridors and patches of suitable habitat linking the SN, CC-S, and SGSB, as well as corridors that connect the SA and EPR populations to one another and to SGSB. Emphasize the retention and expansion of protected habitat in the Tehachapi, Sierra Pelona, San Emigdio, Santa Ana, Santa Monica, and San Gabriel Mountains.
- Encourage land use and planning agencies at federal, state, county, and local levels of government to identify important corridors within their area of concern, to develop management plans, and to analyze connectivity impacts from projects, especially in the Tehachapi and Sierra Pelona Mountains (Gustafson et al. 2019) and between the SA and EPR (Vickers et al. 2015).
- Explore conservation translocations of outbred animals (i.e., genetic rescues) to quickly increase genetic variation in small, isolated mountain lion populations such as the Santa Monica Mountains (CC-S) and SA (Johnson et al. 2010). Translocations should only be used as a short-term strategy to help rescue declining populations from the adverse genetic effects of isolation and small population size (e.g., inbreeding). Translocations should not be considered a substitute for actions needed to support self-sustaining viable, genetically diverse populations over the long term, such as removing barriers and increasing landscape connectivity.
- Fund monitoring programs to evaluate the success of wildlife crossing structures, including monitoring the genetic variation and movements of mountain lion populations on either side.
- Dedicate sufficient funding from the Wildlife Conservation Board, Habitat Conservation Fund, and other state funding sources towards acquiring key mountain lion and wildlife habitat and for establishment of highway crossing infrastructure.
- Encourage the maintenance and restoration of riparian vegetation and habitats in the DPS to provide prey habitat, resting and feeding cover, and viable movement corridors between remaining patches of mountain lion habitat. This could include limiting water diversions in these areas if such diversions adversely affect riparian vegetation and wildlife communities.

10.2 Research and Monitoring

While the recommendations below apply statewide, priority should be given to projects that enhance understanding of mountain lion populations and behaviors in the proposed DPS.

- Periodically replicate genetic analyses similar to Gustafson et al.'s (2019 and 2022) work to monitor genetic variation within the genetic populations and signals of mountain lion immigration and emigration.
- Investigate whether heritable local adaptations are present within any of the identified broad-scale and/or fine-scale mountain lion genetic populations.
- Determine mountain lion distribution, abundance, resource selection at multiple spatial scales, movements and dispersal patterns, foraging ecology, and landscape genetics in the Sonoran and Mojave deserts, including the lower Colorado River region. Work collaboratively with tribes, adjacent states, Baja California, universities, other government entities (e.g., Caltrans, BLM, NPS, State Parks, USGS, Military), IUCN and IUCN Species Survival Commission Cat Specialist Group, and other NGOs.
- Develop rigorous population estimates for the individual genetic populations using available demographic data and/or population modeling techniques.
- Monitor wildfire responses to assess how mountain lions, other carnivores, and their prey will be affected by changes in fire frequency and severity.
- Evaluate trans-highway movements, resource selection, home range placement, and vehicle-related mortality of adult and subadult mountain lions (Cougar Management Guidelines Working Group 2005; McKinney 2011). Focus primarily on interstates in the South Coast Group (i.e., I-5, I-10, I-15, 101, 405).
- Investigate the influence of variation in black bear seasonal density on mountain lion kill rates and prey selection, habitat use, and kitten and adult survival. Also investigate areas where bears and mountain lions overlap with gray wolves to understand interactions.
- Design and fund collaborative surveillance programs to rapidly detect, diagnose, and determine the significance of disease outbreaks and emerging diseases such as avian influenza.
- Continue AR screening of livers from mountain lion carcasses to further study the locations and effects of AR exposure on mountain lion health and mortality. Continued monitoring should also measure the effectiveness of regulatory changes intended to reduce exposure of non-target wildlife to rodenticides (Rudd et al. 2018).
- Investigate potential correlations between habitat, genetics, and prevalence of health and disease issues.
- Refine understanding of the conditions associated with human-mountain lion conflict hotspots.
- Assess efficacy of non-lethal measures for mitigating/deterring mountain lions from depredating domestic animals.

10.3 Regulations and Policy

- Work with the California Department of Pesticide Regulation to improve the regulation of, and foster improved management of, second-generation ARs such as brodifacoum, bromadiolone, difenacoum, and difethialone to reduce mountain lion exposure, with an emphasis on Southern California and central coast mountain lion habitat areas and linkages and explore outreach efforts on this issue.
- Improve law enforcement for areas where second-generation AR use is restricted to ensure compliance with the state's regulations.

10.4 Partnerships and Coordination

- Continue to collaborate with Caltrans and others to analyze how projects in the State Highway Operation Protection Program and State Transportation Improvement Program can be designed to facilitate wildlife connectivity through wildlife passage features such as culverts, under crossings, overcrossings, bridges, directional fencing, scuppers, barrier breaks, roadside animal detection systems, signage, etc.
- Continue to collaborate with Caltrans and the Road Ecology Center at UC Davis to help collect and analyze roadkill data to identify hotspots where mountain lions, deer, and other animals are killed. Investigate funding channels for creating an open access statewide roadkill database for data download and analysis as needed by multiple interested parties.
- Encourage local governments to place conditions on new developments to minimize negative impacts on riparian systems and native vegetation by buffering the riparian areas to allow use by mountain lions and their prey. Conditions and measures should include provisions for the long-term management of such areas to maintain their viability as wildlife corridors and minimize wildfire threat and human disturbances. Promote efforts to restore riparian ecosystems and protected lands in the vicinity of wildlife crossing structures.

10.5 Public Education

- Continue to promote awareness and education regarding mountain lions, human safety, pet and livestock conflict prevention, pesticide exposure, and conservation messaging throughout the central coast and Southern California.
- Develop and implement outreach and education activities to promote use of predator-resistant enclosures for domestic animals (Vickers et al. 2015).

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Appendix A – Acronyms, Abbreviations, and Definitions

Caltrans – California Department of Transportation

CAL FIRE – California Department of Forestry and Fire Protection

CDFW – California Department of Fish and Wildlife

CEQA – California Environmental Quality Act

CESA – California Endangered Species Act

Commission – Fish and Game Commission

Department – California Department of Fish and Wildlife

Distinct Population Segment (DPS) – A vertebrate population or group of populations that is discrete from other populations of the species and significant in relation to the entire species.

Effective Population Size (Ne) – The number of individuals in a population that effectively participate in producing the next generation.

Evolutionary Significant Unit (ESU) – A term related to the federal Endangered Species Act originally applied to anadromous fish populations that designates a population that is substantially reproductively isolated from conspecific populations *and* represents an important component of the evolutionary legacy of the species.

F_{ST} – Fixation index. A statistic that measures population differentiation based on genetic structure.

Fine-Scale Genetic Populations – Populations of conspecifics whose growth rate depends predominantly on local births and deaths rather than immigration. Genetic populations discussed in this report include:

Central Coast North (CC-N) – The genetic population identified by Gustafson et al.'s (2019) microsatellite marker analyses which includes mountain lions in the Santa Cruz Mountains and east bay hills, extending south to approximately the Monterey County line.

Central Coast Central (CC-C) – The genetic population identified by Gustafson et al.'s (2019) microsatellite marker analyses which generally includes the mountain lions in the coastal mountain ranges from southern Monterey Bay to Ventura County.

Central Coast South (CC-S) – The genetic population identified by Gustafson et al.'s (2019) microsatellite marker analyses which includes the mountain lions in the Santa Monica Mountains, Santa Susana Mountains, Sierra Pelona Mountains, and Simi Hills.

Eastern Peninsular Range (EPR) – The genetic population identified by Gustafson et al.'s (2019) microsatellite marker analyses which includes the mountain lions in eastern San Diego County to the Colorado River and the border with Arizona and is bounded on the south by the border with Mexico.

Eastern Sierra Nevada (ESN) – The genetic population identified by Gustafson et al.'s (2019) microsatellite marker analyses which includes the mountain lions in the mountains of San Diego County,

extending east possibly as far as the Colorado River and the Arizona border, and bounded on the south by the border with Mexico.

Nevada (NV) – The genetic population identified by Gustafson et al.'s (2019) microsatellite marker analyses which encompasses mountain lions in most of the state of Nevada.

San Gabriel and San Bernardino Mountains (SGSB) – The genetic population identified by Gustafson et al.'s (2019) microsatellite marker analyses and includes mountain lions in the San Gabriel and San Bernardino mountain ranges.

Santa Ana Mountains (SA) – The genetic population identified by Gustafson et al.'s (2019) microsatellite marker analyses that encompasses mountain lions in the Santa Ana Mountains.

Western Sierra Nevada (WSN) – The genetic population identified by Gustafson et al.'s (2019) microsatellite marker analyses that includes mountain lions from the Oregon border through the Cascades and Sierra Nevada Mountains to the Tehachapi Mountains and includes the Sierra Nevada foothills and much of the Central Valley.

Genetic Groups / Broad-Scale Genetic Groups – The four genetic groups for which Gustafson et al. (2022) found the strongest support through SNP analysis. These groups include:

Central Coast Group – Mountain lions from the San Francisco Bay and Sacramento-San Joaquin Delta south through the Santa Monica Mountains inclusive of Gustafson et al.'s (2019) Central Coast-North, Central Coast-Central, and Central Coast-South genetic populations.

North Coast Group – Mountain lions north of San Francisco Bay through the Coast Ranges to border with Oregon. Largely coincident with Gustafson et al.'s (2019) North Coast genetic population.

Sierra Nevada Group – Mountain lions from the Klamath, Cascades, and Sierra Nevada mountains from the Oregon border south through the Tehachapi Mountains inclusive of Gustafson et al.'s (2019) Western Sierra Nevada and Eastern Sierra Nevada genetic populations.

Southern Coast Group – Mountain lions in the San Gabriel and San Bernardino, Santa Ana, and Eastern Peninsular mountains inclusive of Gustafson et al.'s (2019) San Gabriel-San Bernardino, Santa Ana, and Eastern Peninsular Range genetic populations.

Microsatellite Markers – Repetitive segments of DNA scattered throughout the genome in noncoding regions between genes or within genes.

NMFS – National Marine Fisheries Service

NPS – National Park Service

Principal Component Analysis (PCA) – A statistical multivariate technique which transforms a large number of correlated variables into few uncorrelated variables which represents the whole data set.

Single Nucleotide Polymorphism (SNP) – a variation in nucleotides at a single position in a DNA sequence among individuals.

State Wildlife Action Plan – California's comprehensive plan for examining the health of wildlife populations and prescribing actions to conserve wildlife and vital habitat before they become more rare and more costly to protect.

USFS – U.S.D.A. Forest Service

USFWS – United States Fish and Wildlife Service

WDFW – Washington Department of Fish and Wildlife

APPENDIX B – Solicitation of information and comments received

Tribal Notification and Information Solicitation

Pursuant to Fish and Game Code section 2074.4, the California Department of Fish and Wildlife (Department) and the California Fish and Game Commission (Commission) notified affected and interested parties and solicited data and comments on the petitioned action to list mountain lions in central and southern California as one or more threatened or endangered evolutionarily significant units (ESU) under the California Endangered Species Act (CESA).

Tribal notifications were distributed by letter and email to tribes identified by the Native American Heritage Commission as having a cultural or traditional affiliation within the geographic area of the mountain lion. The tribal notice for the status review was dated May 13, 2020, and is provided at the end of this Appendix.

The Department received six comments in response to tribal notifications.

Summary of Tribal Comments Received

All six tribal responses came via email, and four tribes were supportive of protecting mountain lions, while the San Manuel Band of Mission Indians (SMBMI) stated they did not need to consult with the Department, and the Yocha Dehe tribe indicated a cultural interest in the mountain lion and the petitioned ESU. A brief summary of the tribal input is provided below.

San Manuel Band of Mission Indians (SMBMI) - stated "the SMBMI does not elect to consult with CA DFW on the status review of mountain lions in California".

Pala Band of Mission Indians - Pala agrees the mountain lions need protections...and Pala actively works to protect their lands and have cooperated with researchers such as Dr. Vickers, and they hope no undue burdens will be placed on their management on Tribal lands and that their sovereignty is respected in all decisions on this ESU.

Dunlap Band of Mono Indians - Dirk Charley (Tribal Secretary) spoke via telephone with Department staff on June 10, 2020, with an elder tribal member listening in. Notes from the conversation were recorded for the record by the Department at Mr. Charley's request. Summary of Mr. Charley's comments:

We admire and respect mountain lions; a creature of beauty; we know where they live and we don't disturb their caves and dens; we don't see them as a threat; humans have always lived with them; they should not be bountied, there are too few of them; we leave them alone; they have remained in the same number. He added that he worked as a firefighter for the USFS in the past and was able to see a mountain lion in the San Gabriel mountains while flying over the area in a helicopter in 1979-1980.

Rincon Band of Luiseño Indians - In their July 16, 2020 letter to the Department, the tribe asked to be notified and updated throughout the review process. They support listing of the mountain lion as an endangered species and consulted with the Department on June 24, 2020.

Yocha Dehe Cultural Resources - "The Cultural Resources Department has reviewed the [Mountain Lion ESU Review Policy] policy and concluded that it applies to areas within the aboriginal territories of the Yocha Dehe Wintun Nation. Therefore, we have a cultural interest and authority in the proposed policy and would like to receive updates on the policy".

Santa Ynez Band of Chumash Indians - "The Chumash people have a special relationship with Mountain Lions and support this continued CESA listing". Their ancestral land is near the highway 101 Wallis-Annenberg overcrossing that is now under construction. They attached a large report depicting connectivity maps from the Santa Monica Mountains to points north toward the Simi Hills, Los Padres National Forest, and the Santa Clara River (State of the Linkage Report: East Branch of the Santa Monica-Sierra Madre Mountains Connection, dated January 2021).

All communications are on file with the Department and can be provided on request by emailing wildlifemgt@wildlife.ca.gov.

Public Solicitation

Pursuant to Fish and Game Code section 2074.4, the Department and Commission notified affected and interested parties and solicited data and comments on the petitioned action to list mountain lions in central and southern California as one or more threatened or endangered ESUs under CESA.

Requests for information were distributed by several methods:

On May 1, 2020, the Commission published a Notice of Findings regarding the candidacy and status review of the petitioned mountain lion ESU in the California Regulatory Notice Register (Cal. Reg. Notice Register 2000, No. 18-Z, p. 692).

On May 21, 2020, at the request of the Department, Fish and Game Commission staff utilized their confidential CESA Interested Parties list to notify interested parties of the initiation of the status review and to solicit data and comments on the petitioned action from interested and affected parties. Comments were directed to the Department contact.

Notifications were sent to the Petitioners (Center for Biological Diversity and Mountain Lion Foundation), and researchers studying mountain lions in California.

Notifications were sent to California Assemblyman Frank Bigelow, California Senator Henry Stern, California Cattlemen's Association, California Building Industry Association, California Association of Winegrape Growers, California Farm Bureau Federation, and California Woolgrowers Association.

Notifications were sent to 27 county-level Fish and Game Commissions and 32 county Board of Supervisors offices in California from counties within and adjacent to the petitioned area.

State of California departments notified included Caltrans, Pesticide Regulation, Parks and Recreation, and Food and Agriculture.

Federal agencies notified included select military bases, U.S. Forest Service, National Park Service, and the Bureau of Land Management. Additionally, the U.S. Geological Survey and the U.S. Fish and Wildlife Service (USFWS) in southern California was notified. The USFWS then forwarded the notice to the southern California Tri-County Connectivity Group via email.

Environmental entities notified included Defenders of Wildlife, National Wildlife Foundation, and the Sierra Club. Multiple county and city land managers, land trusts and conservancies were also notified. The Coachella Valley Association of Governments was also notified.

The public notification can be found at the end of this Appendix.

Summary of Public Comments Received

The Department received 253 letters or emails in total, including 226 form letters in support of listing from the public, some of whom were affiliated with Born Free USA, or In Defense of Animals. The Humane Society of the United States sent a letter in support of listing. Six letters were from state or local governments, though some were only acknowledgement of receipt of notice. Caltrans commented that they would like to work in partnership with the Department to minimize mountain lion mortality from vehicle strikes and to cooperate on building safe crossing structures for mountain lions. California State Park biologists provided information on lion distribution on State Parks lands. Mountain lion researchers in California provided reports of their work, publications, roadkill information, and various maps, for example, home ranges and dispersal paths of mountain lions. Dr. Fraser Shilling at UC Davis Road Ecology Center provided lion roadkill locations.

The Center for Biological Diversity sent two supplemental comment letters after their initial response to the public notice and provided e-copies of the literature they cited. Tanya Diamond with Pathways for Wildlife sent reports and roadkill data for the San Francisco Bay Area. One respondent needed assistance in engaging with the method to communicate with the Commission and provide comments on the petition. Six of the responses were from the public with no affiliation noted and were in support of listing. Other letters or emails supported research and connectivity efforts for mountain lions in the petitioned ESU but did not directly advocate for listing.

Two respondents sent similar emails in opposition to the ESU petition for listing of mountain lions in regard to the significant impact mountain lions can have on deer, bighorn sheep, and pronghorn antelope populations, along with livestock and pets.

The Department also received two substantive comments as follows:

The Tulare County Board of Supervisors sent a letter to register their opposition to the mountain lion ESU petition. Their concerns included the potential for impacting new development and limiting construction, along with changing how state and local agencies plan and build infrastructure which in turn could lead to higher costs and bigger roadblocks to development. They also voiced concern that listing could threaten local government's ability to thrive in a changing economy.

The Colusa County Fish & Game Advisory Commission requested that the petition to list the evolutionary significant unit (ESU) of mountain lions be denied. Their email stated that mountain lions are already protected in the State of California, and additional protections will only be detrimental to the other species, such as deer that have been negatively impacted by the lion population in the State.

All communications are on file with the Department and can be provided on request by emailing wildlifemgt@wildlife.ca.gov.

APPENDIX C – External Peer Review Comments

Pursuant to Fish and Game Code section 2074.6, the review process included independent peer review of the draft status review by persons in the scientific/academic community acknowledged to be experts on mountain lions and related topics and possessing the knowledge and expertise to critique the scientific validity of the status review contents. Appendix C contains the version of the status review sent to external reviewers, specific input provided to the Department by the individual peer reviewers, and the Department's written response to the input (Fish & G. Code, § 2074.6; Cal. Code Regs., tit. 14, § 670.1, subd. (f)(2)). Independent experts that reviewed the Status Review are listed below (Table C1).

Table C1. Status Review peer reviewers.

Name	Affiliation
Seth Riley	National Park Service
Winston Vickers	University of California Davis
Chris Wilmers	University of California Santa Cruz
Holly Ernest	University of California Davis University of Wyoming
Paul Beier	Northern Arizona University

Comments by external reviewers are below, along with responses from the Department. Line numbers refer to the lines in the version of the status review sent to external reviewers (available at the end of the Appendix).

GENERAL COMMENT (Riley): Overall, the draft status review is an impressive document, covering a great deal of different topics about science and conservation related to mountain lions in the state, and in the coastal areas in particular. We appreciate the large amount of work that many folks in the Department have put into producing it. I enjoyed reading it and thinking about all of these important issues. I have many comments about the document, which I hope are helpful as you work to finalize it. Most of my comments, and all of the more substantive ones, I have put into the excel spreadsheet that you provided. There are also some comments or suggestions that are more minor, such as grammatical suggestions, typos that I noticed, or references that need more information. If those would also be useful, we could figure out a way to communicate those, just let me know. Although I have more than 180 comments overall, I will note that there is some repetition, since a particular comment is relevant in multiple places in the document (for example, mentioning that we have directly documented cases of close inbreeding in our study population). I will note also that in places where I suggest referencing or including mention of work that we have been involved with or results that we have found, it is because I think doing so would add clarity and value to the document, not to increase our citations or draw further attention to our work. Overall, in reference to the specifics of the California Endangered Species Act and its implementing regulations that you reference in your letter of November 2, 2023, I would agree with the conclusion that for mountain lions in parts of the petitioned area, including in the South Coast DPS that is proposed on p.102 of the document, they are in serious danger of becoming extinct due to the causes of loss of habitat and especially the continued fragmentation of their remaining habitat, which represents a "human-related activity."

Relative to the approach of evaluating Distinct Population Segments, I agree that this approach makes

sense, and I definitely think it was valuable to evaluate smaller units that just the entire petitioned area. We do have thoughts on the boundaries of a potential South Coast DPS, as we provide below.

I would say the most significant comment that we have overall is that we believe that another management unit would be valuable to consider for listing as a distinct population segment, or rather as part of the proposed South Coast DPS. And that based on the current criteria, along with some other criteria that we believe are worthy of consideration, we believe that such a management unit may also qualify for listing in the same way that the current document proposes to list the Southern Coast DPS (p.100-103, map p.102). Specifically, we would propose extending the northern border of the proposed South Coast DPS to the west from where Highway 14 crosses the Santa Clara River, across the 5 Freeway and along the Santa Clara River and Highway 126 through Lake Piru, Fillmore, and Santa Paula to Ventura. This would mean that the South Coast DPS would include the Santa Monica Mountains, where we have been studying the species intensively for the last almost 22 years, and where the population is largely isolated from other areas of suitable habitat and faces multiple current challenges. Importantly, the DPS would also include the two areas of habitat to the north of the Santa Monica Mountains, the Simi Hills, which are north of the 101 Freeway but south of Highway 118, and the Santa Susana Mountains, which are north of Highway 118 and south of Highway 126 and the Santa Clara River. The Simi Hills and the Santa Susana Mountains both have mountain lions and mountain lion habitat currently, and they are critical areas for maintaining and improving connectivity between the Santa Monica Mountains and all other areas throughout the state. We would further propose that the Management Unit, and therefore the listed DPS, also include a 10 km wide buffer north of Highway 126, since it is critical that connectivity be maintained across this highway as well.

This management unit could be called something like “Santa Monicas to Los Padres” since the focus is on the Santa Monica Mountains, but in order to preserve mountain lions in them, the Simi Hills, the Santa Susana Mountains, and indeed the area along Highway 126 and the Santa Clara River, are all critical to connect the Santa Monicas and Los Padres National Forest.

We believe that this Santa Monicas to Los Padres management unit would potentially warrant being listed as part of the South Coast group, based on the criteria presently in the draft status review. However, we also propose that some other criteria for “significance” are worthy of consideration, along with the ones currently listed on p. 79. In terms of the criteria currently in the document, we believe the Santa Monica Mountains population clearly represents a discrete population, based on physical, genetic, and behavioral criteria. Physically, it is separated from all other areas to the north by the 101 Freeway, one of the largest and most heavily trafficked freeways in the state, and indeed in the country. Behaviorally and ecologically, we have documented very low levels of successful dispersal between the Santa Monica Mountains and other natural areas to the north. And we have documented strong genetic differentiation and low genetic diversity in the Santa Monicas. In terms of significance, we believe that the Santa Monica Mountains and the surrounding areas represent a “unique and unusual ecological setting,” as indicated in criterion a), because they represent a case of mountain lions in Los Angeles, a megacity of more than 10 million people. This is the only case in the state, or across their range, where mountain lions occupy such a setting, and there is only one other megacity in the world, Mumbai, India, that is occupied by a large felid (leopards). Wildlife in urban landscapes face unique challenges for survival and coexistence in the face of so many people and the human infrastructure, including things like freeways, that accompanies them. Though mountain lions persist on the edges of some other urban areas, such as Seattle, WA or Denver, CO, nowhere is the metropolitan area as large and fragmented, and the challenge as great, as in Los Angeles.

Aside from this criterion of a unique and unusual ecological setting for the taxon, we think there are three other criteria that it would be valuable to also consider for “significance”, both for our proposed Santa

Monicas to Los Padres MU and for other proposed MUs as well. The first is a criterion related to ecological role. Mountain lions represent the only apex carnivore that regularly preys on the largest herbivores in the system, generally adult mule deer, in many parts of California. While it is the mandate of the National Park Service to protect all species in the parks, and we believe that they are all important for a fully functional ecosystem, mountain lions are the only species that fills its role. Predators can affect their prey both by directly killing and eating them, but also through behavioral effects that can be widespread and profound. Although we may not fully understand all of the ways that mountain lions affect their prey populations, including their main prey, mule deer, losing them from an ecosystem removes this important role. We propose that mountain lion populations are of significance wherever they are filling that role of primary predator on the largest ungulate prey. Their loss would be significant blow to the ecology of any place in California where they disappeared, with the exception perhaps of far northern parts of the state where wolves are reestablishing themselves. This would mean that in MUs such as the Central Coast North, including the Santa Cruz Mountains, where mountain lions are markedly separate and imperiled (based on Table 7 in the draft document), they would potentially also be deemed "significant" based on this ecological role.

Another biological criterion that we think is worthy of consideration is whether the MU serves a critical role in connecting to other populations in the state. Perhaps this is similar enough to criterion b), about loss of the MU representing a significant gap in the range of the taxon, that it could be incorporated into this criterion, but we think for mountain lions in California, explicitly mentioning the importance of connectivity between populations is important. Based on this criterion, the Central Coast South MU (depending on where it is considered to be located exactly, see comment below about defining MUs) would be significant, because it represents connection between the entire Central Coast and the Tehachapi Mountains, and therefore the whole rest of the northern part of the state, including the Sierras (WSN and ESN) and the North Coast. A potential Santa Monicas to Los Padres MU would also be significant from a connectivity point of view, because it would represent the only place for connection between the Central Coast broadly and the San Gabriels-San Bernardinos MU, and therefore to the rest of the South Coast Group (including the Santa Anas and the Eastern Peninsular Ranges).

Finally, the last criterion that we think is worthy of consideration is not biological, but we think is also relevant for conservation, and that is whether the population is of significance culturally to the people of the area. We would argue that the mountain lion population of the Los Angeles area is extremely important to those living in Southern California, and that it would be a great loss to them, and indeed to the people of the State of California more broadly, if the species disappeared from the Santa Monica Mountains and the Los Angeles area. This significance was specifically manifested by the outpouring of grief and concern about the fate and eventual death of mountain lion P-22, who we tracked for more than 10 years in Griffith Park, including the filling of the Greek Theater above Hollywood for his celebration of life. But the care and concern is not just for this individual lion, but for the species in the area more broadly. This is manifested by the success of the SaveLACougars Campaign to help fund the Wallis Annenberg Wildlife Crossing, and by the huge interest from the public and from the media in the Los Angeles Area and far beyond, in the mountain lions of the Santa Monica Mountains and surrounding areas. It is an amazing fact that mountain lions persist in the megacity of Los Angeles, and it represents not just a unique ecological setting, but also a part of our wild heritage that many might have thought was lost in a place like Los Angeles, but wonderfully is not. The successful coexistence of humans and a large felid in Los Angeles also shows us what is possible for wildlife and people. If mountain lions can survive in Los Angeles, then perhaps we can make it work for wildlife populations overlapping with human populations anywhere. Along with the other criteria, we believe that the mountain lions of the Santa Monicas are significant based on a potential cultural criterion.

One other general comment, which comes up also multiple times in my specific comments, is that we think it is important to clearly delineate where the management units in the document are located. Genetic populations can, and do, have potentially fuzzy boundaries, which can depend on factors like how intensive the sampling is in particular areas or whether an individual animal might be a disperser from another population or how strong the differentiation is for particular genetic markers. However, while it may make sense to generally base management units on genetic data, in the end it needs to be clear where a management unit, if it is to serve a management purpose, begins and ends. Currently the document does not draw these boundaries, that I have seen, but I think it is important to make them clear. This is especially important for example for the boundary between Central Coast South and Central Coast Central, or between the San Gabriels-San Bernardinos and the Eastern Peninsular Ranges. The boundaries can certainly be reevaluated and changed over time, but if we are to evaluate the management units and whether they are discrete, and how they relate to each other, we need to know where they are.

RESPONSE: Many of these comments are addressed individually and in more detail later in this document. Given the comments received as a whole from external reviewers, the Department reworked the status review. Major changes relevant to the broad comments here are that we no longer use the Management Unit framework, and the expansion of the area the Department recommends that should be listed to include CC-S including the Santa Monica Mountains.

GENERAL COMMENT (Beier): The writing is clear. Words are used appropriately. Well cited. The authors explained how the concept of Evolutionary Significant Unit works poorly for wide-ranging mammals under CESA. The authors could have used this to simply walk away from the task, but instead of taking that cowardly exit, they used the conceptual framework of Distinct Populations Segment. I greatly respect the thoughtful hard work that the authors put into this difficult assignment.

The main difficulty with the MU/DPS approach is that all these DPS's have arisen in the last century – a flash of time – and this part of California continues to experience such rapid changes in land use that the map could be dramatically different in 25 years. By the time these areas qualify as DPS, the better-off units may be endangered and some endangered units may be extinct... I wish we had a conceptual framework that does not have the 20-30 year time lag of the DPS framework. Populations in the Santa Anas, Santa Monicas, San Gabriels, and San Bernardinos have not been separated enough to qualify as DPS, and by the time they do qualify (in 20-30 years when genetic data lets us recognize them as DPS's), it may be too late to save them. Your report acknowledges this problem, e.g., Section 7.1 states “In the most isolated habitat patches (e.g., Santa Monica Mountains, Santa Ana Mountains), it is conceivable that local extirpations may occur in the absence of efforts to improve habitat connectivity and remove barriers to movement. Management intervention to develop a broad wildlife crossing infrastructure, including the protection and enhancement of large blocks of suitable habitat on each side of crossing facilities, to link MUs would increase connectivity and potentially alleviate the genetic and stochastic risks associated with small populations. Such an effort will require adequate funding and concerted and sustained commitment by many parties to ensure proper design, placement, maintenance, and monitoring for effectiveness.” Translation: "Santa Monicas and Santa Anas do not qualify as DPS, so somehow without waiting for DPS status, “many parties” (CalTrans, County land-use planners, P&Z Commissions, City Councils) must "do something."

Your charge was to determine if any of the petitioned populations qualify as ESU or DPS, and not to tell these "many parties" what to do today (before these popns qualify as DPS). But please do tell these Many Parties that the main things they must do is control land development and mitigate barrier effects of roads, canals, high-speed rail, etc. If Many Parties don’t take such steps, in another 20 years, we will be going through this same process all over again. CDFW is not obliged to prevent urbanization,

freeways, railroads, and intensive agriculture from causing future endangerment. But without a doubt, increasing connectivity among all MU's is the best action, and local land use planners and CalTrans are the key parties that can prevent DPS's from emerging.

RESPONSE: Due to this and other feedback, the Department reworked the status review and the areas mentioned are now included in the area recommended for listing, and there is a section on connectivity in the management and Recovery Action Recommendations section 10.1.

GENERAL COMMENT (Ernest): The staff and biologists at the California Department of Fish and Wildlife (CDFW) are to be commended for their work to compile and summarize information they gathered related to mountain lion ecology and research in California, in a report dated August 2023 in response to the 2019 "ESU Petition" for listing threatened populations. The CDFW report lists some of the many converging threats to coastal California mountain lions, threats which are acting in multiple and additive ways to degrade population viability throughout the California Central Coast and South Coast habitats. However, there are critical deficiencies in the CDFW proposal for mountain lions. The best scientific evidence and the projections for land use changes, and human-caused factors including climate change in California provide strong evidence that the geographic areas and mountain lion populations in the 2019 ESU Petition are appropriate for threatened listing protection. All of these regions have unique biota including endemic plant and animal species with which mountain lions have evolved.

The Southern Coast populations and the Central Coast populations are now effectively cut off from natural genetic interchange from other mountain lion populations. The Pacific Ocean bounds the west, the Central Valley and Mojave and Sonoran Deserts bound most of the east with effectively no, San Francisco Bay and Delta, major urban and industrial regions, and the border with Mexico bound the north and south.

One of the last vestiges of a critical migration corridor, necessary for genetic interchange with the Sierra Nevada - the Tehachapi Mountains - is rapidly closing due to massive housing developments in progress. The Central Coast habitats are now an island habitat, as are the South Coast Ranges. Declines and loss of mountain lions, a keystone species, in these areas would be a devastating loss in biodiversity and cultural history.

Therefore, not only the South Coast populations (Santa Ana Mountains and Eastern Peninsular Ranges) and the populations in the Transverse Ranges, but also the Central Coast Populations (those in the Santa Monica Mountains, the intervening Central Coast population, and north to the Santa Cruz population) warrant ESU status (substantially reproductively isolated from other conspecific population and represent an important component in the evolutionary legacy of the species) and/or DPS threatened listing per findings of "discreteness", "significance", and "conservation status".

In summary, the CDFW proposal is insufficient to protect mountain lions in the Central Coast Ranges, Transverse Ranges, and the South Coast Ranges. These populations are suffering "cuts by a thousand knives" from the threats outlined in the CDFW report, in the comments laid out here, and I'm sure, by other reviewers' comments. It is vitally important to recognize is importance of the very tenuous Tehachapi Mountains corridor to both the Central Coast Populations and those of the Transverse Ranges (including San Gabriel and San Bernardino Mountains), and South Coast Ranges (Santa Ana and Peninsular Ranges). Designation of Management Units alone as proposed by CDFW, without state threatened listing, is insufficient to prevent further degradation of intact populations for this keystone animal and its habitats. Listing protection is warranted for all mountain lion populations listed in the 2019 Petition. These populations fulfill requirements for an ESU for each of the Central Coast and the South Coast: substantially reproductively isolated from other conspecific population and represent an important component in the evolutionary legacy of the species). Each of the Central Coast and the South

Coast also fulfill the requirements for a DPS for each (per findings of “discreteness”, “significance”, and “conservation status”.

RESPONSE: Many of these comments are addressed individually and in more detail later in this document. Given the comments received as a whole from external reviewers, the Department reworked the status review. Major changes relevant to the broad comments here are the inclusion of the Tehachapis in the area recommended for listing, and we are no longer using the Management Unit framework. The Department’s conclusion as to whether the petitioned area qualifies as an ESU remains the same, and the argument can be found in section 6.1.

GENERAL COMMENT (Vickers): The California Department of Fish and Wildlife (hereafter the Department) personnel who undertook this review were faced with a monumental task, and I commend them for doing so. I am sure there were many people involved who undertook it with care and professionalism and they have my personal appreciation. Most of my comments either address methodological issues, choices of data, or conclusions based on their guidelines wherein I felt that other information should have also been given weight in the decision making. Though the genetic divisions in Gustafson 2019 and 2022 are a sensible organizing principle in evaluation of the risk to these six petitioned populations (collectively the ESU or individual ESU's in the petition but converted to Management Units in the Department's evaluation), it is wise to not lose sight of the fact that these genetic divisions exist predominantly because of manmade infrastructure on the landscape. This includes both highways and development of all sorts, much of which has been governed in its placement over time by very local land use decisions notwithstanding broader implications for this particular species, Puma concolor, or the mountain lion. The petition maintains that unless some modifications of current and future infrastructure decision-making occurs, and further fragmentation of the populations is prevented - especially in and between key connecting and source populations - that genetic deterioration will continue. That view is hard to dispute. The question at hand for reviewers is whether the conclusions the Department comes to when examining the question of additional legal protections for any or all of the six subpopulations is scientifically as sound as possible using current information. At several points in the report there is phraseology emphasizing the evidence of genetic exchange in the past suggesting that it will occur into the future, yet if that exchange had been happening at adequate levels up to now most of the current genetic divisions would not be there, and the Department would not be going through this exercise. . Current and expected changes in the state's development patterns and infrastructure should also be taken into account, though they are not a part of the formal decision making. Where I felt it appropriate I have pointed out expected impacts that I am aware of. Throughout the report, statements are made about census populations of the MU's that are being addressed - those population estimates are consistently based on one paper's estimates of Ne when not only is that regarded by geneticists as a misuse of that statistic, but it is suspect due to dramatically different values that are derived using Ne's from other analyses. I suggest that population estimates based on the Department's own research should be presented as well with information on strengths and weaknesses of all techniques since those estimates will be a part of how success or failure to prevent decline in these populations in the future is judged. Though population estimates did not enter directly into the decision matrix relating to Threatened listing determinations, population size is obviously a critical metric in the smaller populations, and one that needs to be monitored over time. The danger of an extinction vortex occurring with any of the smaller populations is always going to be present unless more substantial connectivity and in some cases lowered mortality rates are accomplished. In my opinion, use of MU's versus ESU's should be explained in more detail in the document. At numerous points in the report the comment is made that loss of one population or another would not significantly reduce the range of the species, however, both the central coast and south coast groups, and the ESU as a whole, seem to represent significant portions of the overall statewide mountain lion habitat in acreage terms, however

some terms like "significant" are not well defined when used at this and some other junctures. Given that the inherent meaning of the California Endangered Species Act is to prevent extirpation of wildlife populations, including subpopulations, it is odd that in this case the most at risk individual MU's are not being recommended in the report to be given extra protections. Obviously, the source populations for those smaller MU's are also both at risk and similarly isolated genetically, and dynamic increases in the built landscape that are inevitable in California make it more likely that they could become more so. A final broad concern is that in the final analysis matrix for the decisions regarding Threatened listing for any given MU, some of the most pertinent factors that go into population viability analyses (PVA's) such as survival rates, genetic factors such as inbreeding coefficients, heterozygosity, allelic richness, etc. were not included in the decision matrix at all. In my opinion, these factors are important in making the listing decision because they inform the likely trajectory of populations under current conditions absent further protections. Finally one challenging aspect of the evaluation of the CC-C and CC-S MU's was the question of where the Tehachapi Range fell within the MU structures. That range was noted multiple times in the report as an absolutely critical linkage for all six MU's that within the proposed ESU, but it didn't seem to be factored into the evaluations of either the CC-C or CC-S MU's as regards their importance as "gap" or "Significant" populations, which in turn was important in the decisions relating to being designated as Threatened. Other specific comments follow below.

RESPONSE: Many of these comments are addressed individually and in more detail later in this document. Given the comments received as a whole from external reviewers, the Department reworked the status review. Major changes relevant to the broad comments here are that we no longer use the Management Unit framework, the inclusion of the Department's most recent estimates of population size, and the expansion of the area the Department recommends that should be listed to include CC-C, CC-S, and the Tehachapis.

GENERAL COMMENT (Vickers): A final comment is that it seems to be acknowledged that these populations are as genetically restricted and isolated as they are from "business as usual". Thus an expectation that things will improve without intervention seems unreasonable. Perhaps, what may apply broadly to these populations in colloquial terms is the saying that "if you are in a hole, first stop digging".

RESPONSE: Noted

Line 84 (Ernest): The CDFW proposal also omitted sufficient protection for the increasingly bottlenecked migration corridor in the Tehachapi Ranges and Transverse Ranges, that comprise the last significant link of genetic interchange with the Sierra Nevada to the central and south coast populations. This will leave the Central Coast and South Coast Populations as fragmented habitat islands now, cut off from historic linkages for mountain lions that now lie heavily impacted Central Valley, San Francisco Bay and Delta regions, Los Angeles, San Diego, and adjacent urban, industrial, and agricultural areas. Without listing protection as geographically outlined by the ESU petition (which included alternate options in addition to a single ESU), these populations will continue on their population declines.

RESPONSE: Based on these and many other comments, the Department reevaluated the criteria for the recommendation and the area recommended for listing now includes the Tehachapis.

Line 293 (Vickers): Add the word "mountain" before "lion" and do so throughout the manuscript where it has been left out.

RESPONSE: Done

Lines 362-363 (Riley): This description of the Central Coast South population does not make sense, to include the Sierra Pelona Mountains, since these are on the other side of Highway 5, north of Highway

14. Highway 5 is a major barrier to mountain lion movement and gene flow, based on the work that we did on regional mountain lion genetics, in Riley et al. 2014, and in the Gustafson et al. papers, with animals in the San Gabriels and San Bernardinos being clearly differentiated from the Central Coast populations. Does the petition propose that the Sierra Pelona Mountains are part of Central Coast South? Either way, this does not make sense to include with the Santa Monicas, Simi Hills, and Santa Susanas. I'm wondering if the intent was to have the Sierra Madre Mountains, which are the next range north of the Santa Susanas, in the southern part of Los Padres National Forest, be included in the Central Coast South population? That would make much more sense. Either way, that would be the way to characterize it in this document generally, I think. The green areas in Figure 1, representing CC-S, definitely go up north of Highway 126 and the Santa Clara River into the Sierra Madre Mountains and Los Padres. Based on the genetic figures for southern California, figures 17 and 18, the Sierra Pelona samples would belong more with the Tehachapis and southern Sierra Nevada, it looks like.

RESPONSE: These descriptions of the geographic areas for the genetic populations are rough and meant to orient the reader, not to provide firm boundaries. Due to other comments from reviewers the Department reworked the status review, and the boundary of CC-S is less relevant.

Line 374-375 (Riley): Somewhere, the specific boundaries of the different Management Units that you are considering need to be made clear. They are not clear, in Figure 1, which is just the map from Gustafson et al. 2019. And the colors in the map are only as good as the coverage of genetic samples in the study, which though it was a huge number of samples and a great study overall, was certainly far from total coverage across the areas where mountain lions are present in the state. And so that limits exactly where these populations can be defined. But for management units, there need to be actual boundaries, it certainly seems to me. So I think it's important for those to be clear, somewhere in this document, at least once the Management Units are introduced on P. 75, which is not currently the case, I don't think. Incidentally, the Management Unit that we are proposing to be considered, the Santa Susana Mountains, the Simi Hills, and the Santa Monica Mountains, is very clearly delineated by major roads.

RESPONSE: Due to reviewer comments the Department reworked the status review and no longer uses the Management Unit framework. The genetic populations from Gustafson et al. 2019 and 2022 are discussed, but establishing firm boundaries is not necessary for the recommendation.

Line 445 (Riley): Does this "intraspecific predation" refer specifically to the killing and eating of kittens? If so, it would be good to make that clear. There is also intraspecific conflict between adult males and other animals, especially subadults, which is mentioned later in the document, and has been an important source of mortality in the Santa Monicas, especially early in the study (Riley et al. 2014, Benson et al. 2020). We have also documented predation on kittens by adult males, as I presume you mean that here.

RESPONSE: Text changed to “Adult males are also known to kill kittens, yearlings, subadults, and occasionally other adults (Logan and Sweanor 2010; Riley et al. 2014; Benson et al. 2020).”

Line 447 (Riley): It would be good to cite this statement about lower survivorship in dispersing animals, I think. It is definitely something that we have seen in our population, lower survival in subadults than in other age classes (Benson et al. 2016, Benson et al. 2020).

RESPONSE: Text changed to “Survivorship of dispersing mountain lions is low relative to adults with established home ranges (Benson et al. 2016; Benson et al. 2020), and dispersing young are more likely than resident mountain lions to be involved in depredation incidents or other conflicts with humans as they try to find prey without the advantage of an established home range (Torres et al. 1996).”

Line 465 (Riley): What does "numerous" mean here? It would be good to give the actual number, I think.

RESPONSE: "Numerous" is a direct quote from the paper, exact numbers aren't provided.

Line 477 (Riley): Riley et al. 2021 is not currently in the Lit Cited, so it needs to be added. Our averages, as given in this reference, are actually a bit higher than this, 370 km2 for adult males, and 135 km2 for adult females. Also, it would probably be valuable to add some other references from CA here, for home range size, such as a Wilmers and a Vickers reference. Home range sizes are similar, but not the same, in different areas; for example they are on average a bit smaller in Chris' study in the Santa Cruz Mountains. And Melissa's paper (Grigione et al.) is from 20 or so years ago, so it would be missing these more recent long-term studies. Finally, as regards this statement about home range size varying with prey density, it may be true, although I don't know how well documented it is. It would be worth citing, if possible (maybe Grigione et al. say that?). I think it's likely to be much more true of female home ranges, whereas males are generally more focused on having large home ranges to overlap as many females as possible, is the thought.

RESPONSE: Text changed to "Average home range size in California varies substantially depending on sex, season, and area of the state. The average male home range size is larger than the average female home range size. Home ranges change size depending on season and tend to be larger in the Sierra Nevada compared to the Coastal Ranges. In the Santa Ana Mountains and the Eastern Peninsular Range, Zeller et al. (2017) found that home range size varied from 41–497 km^2 (16–192 $mi.^2$; mean = 231 km^2; female mean = 188 km^2; male mean = 316 km^2). In the Santa Monica Mountains and surrounding areas, Riley et al. (2021) found the average home range size was 134 km^2 (52 $mi.^2$) for females and 372 km^2 (144 $mi.^2$) for males. In contrast, in the Sierra Nevada mountains the average home range size for females in summer was 541 km^2 (209 $mi.^2$) and 349 km^2 (135 $mi.^2$) in winter (Grigione et al. 2002). For males it was 723 km^2 (279 $mi.^2$) in summer and 469 km^2 (181 $mi.^2$) in winter. While male home ranges can overlap spatially, male mountain lions are territorial, making temporal overlap between males rare (Logan and Sweanor 2001). However, males attempt to overlap their home ranges with multiple female home ranges to enhance breeding opportunities (Logan and Sweanor 2010)."

Line 485-489 (Riley): Ken Logan has a recent paper in JWM (2019, vo. 83:1652), that looks comprehensively at what regulates mountain lion populations. It would definitely be valuable to look at and cite this paper, I think, for both of these last two sentences.

RESPONSE: text changed to "Given the importance of females to population growth, and because one male can breed with multiple females, mountain lion populations can be primarily limited by prey availability (Pierce et al. 2000; Logan and Sweanor 2001; Logan 2019)."

Line 482 (Riley): Somewhere in this section, probably in this paragraph, I think it's important to mention that in general for mountain lions all young males, and 1/2 of young females, disperse. This is a really important fact about mountain lions, both in general and specifically relative to connectivity and conservation, that I find that I often mention. I generally cite Logan and Sweanor 2010, from the Cougar book (Hornocker and Negri) for that.

RESPONSE: Text changed to "Mountain lions are known to move long distances while dispersing. One subadult male was documenting moving 2,450 km (1,522 mi.) from South Dakota to Connecticut (Hawley et al. 2016). Vickers et al. (2015) documented numerous southern California study animals dispersing > 80 km (50 mi.), and one young male moved approximately 150 km (93 mi.) from California south into Baja California, Mexico and back. Most long-distance dispersers are thought to be young males in search of available mates (Hawley et al. 2016). "

Line 501 (Riley): The Riley et al. 2014 reference here should be replaced by Blakey et al. 2022, which is the paper that talks about the fire and the mortality associated with it.

RESPONSE: Due to this and other feedback, this section has been extensively re-written.

Line 502 (Riley): We have documented many more cases of deaths from rodenticide poisoning since the 2007 paper. The best citation might be Benson et al. 2020 (in Biol Conserv, which would need to be added to the Lit Cited), which mentions 5 cases. You could also cite our reports to CDFW, specifically the ones covering 2018-2019 and 2019-2021. We have documented 7 total cases so far, 6 among collared animals and one uncollared.

RESPONSE: Due to this and other feedback, this section has been extensively re-written. Benson et al. 2020 has been added.

Line 502-504 (Riley): A few things about this sentence. First, and most importantly, it's not very useful in general to talk about raw numbers of mortalities from different causes, such as that 24% of deaths were from unknown causes. The raw numbers are misleading, and when you have data on how long he animals are tracked, computing rates of mortality, as was done in the paper, is a much more accurate and unbiased way to discuss the results. Second the specific statement here is not correct - it says 24% of tracked animals died of unknown causes, when in fact it was 24% of total deaths (64/263) - whereas it would be 11% of tracked animals (64/590, though that is even less useful to report). But also, I'm not sure what the point of this statement is, about the percentage of unknown mortalities being much larger than that for any other specific causes. That is true in just about any study of wildlife survival and mortality causes, for a number of reasons; it is often hard to determine what the cause of mortality is, despite intense vigilance and effort. The work that is included in the Dellinger et al. 2021b report and updated and made more rigorous in the Benson et al. paper is an amazing compilation of data on survival and mortality causes, unlike any that I know of for this species, for sure, and for many others as well. Since there are many different specific causes of mortality, and "unknown" is a broad category that is going to necessarily include many different things, it is not surprising that it would be large. If you did want to look at raw numbers of mortalities, I think perhaps one of the most striking things is that management killing alone, at 23%, makes up essentially the same percentage as the unknown category (24%). But as I said at the beginning, it is much more valuable to look at rates than numbers, and I'm also not sure what the point of this sentence is, so I would recommend deleting it.

RESPONSE: Due to this and other feedback, this section has been extensively re-written

Line After 504 or 521 (Vickers): Also note the effect on mountain lion survival that was exerted by patterns of voting on environmental issues as documented in Benson et al. 2023. Should Table 2 be based on Benson et al. 2023, or values from that analysis also included?

RESPONSE: Due to this and other feedback, this section has been extensively re-written

Line 505-511 (Riley): A few things about this paragraph. Most importantly, these are the same data that were analyzed in much more detail and more comprehensively, i.e. with a more complete dataset, in the paper on survival rates and mortality causes, Benson et al. 2023, and that paper should really be cited here. For example, just from our study alone, I know there were some animals that we followed that didn't make it into the analyses for the Dellinger 2021b report, but that did for the PNAS paper. I have spoken with both Justin, who is the senior author on the paper (by the way, many authors, including Justin, are currently left off of the citation in the Lit Cited), and John about this, and they would be happy to discuss it as well, if that would be helpful. The paper is also peer-reviewed, published in a very highly regarded journal, and more accessible to readers than the report, which are also good reasons to cite it. Also, the Dellinger et al. reference here is the wrong one, it should be 2021b, not 2021a (same thing for line 516). The 2021a reference is the report about depredation, not the one that includes survival rates. That is also leading to some confusion about the years included. The depredation report, 2021a, does go back to 1972 and 1973 apparently, but the survival data, both for the Dellinger et

al. 2021b report and for the Benson et al. paper, goes back to 1974 - so the survival analyses in the report are not "expanded" relative to the paper, and in fact, as I said, the paper includes more animals and mortalities than the report (e.g., the paper includes 263 deaths, while the report, as cited on line 507, includes just 246). Finally, just a comment about the organization of the section: it seems like this paragraph should go at the beginning of the section, as opposed to at the end, since it is presenting important overall information about survival of the species for the state.

RESPONSE: Due to this and other feedback, this section has been extensively re-written.

Line 513 (Riley): Again, it would be important to cite the detailed analyses of these same, but actually more complete and updated, data in Benson et al. 2023 here, along with the Dellinger et al. report.

RESPONSE: Due to this and other feedback, this section has been extensively re-written

Line 541 (Riley): I think we would say that mountain lions need sufficient tree or shrub cover to help them stalk and hunt deer, more than because those are areas that are favored by deer. Deer certainly use them too, although deer are often more abundant in areas with more open structure, such as grasslands, or at least a mix. We are working currently to learn more about what deer use and prefer in our region.

RESPONSE: Have added the text "and promotes cover for stalking"

Line 559 (Riley): I'm guessing that you mean "non-breeding" here, instead of "breeding"? Also, somewhat of a preference and stylistic thing, but my understanding is that in formal writing, "and/or" is discouraged at this point. In this case, I think you can definitely use "or." One thing that's interesting to think about in terms of "non-breeding" animals. In some cases, they may be capable of breeding, but just don't have any opportunities to do so. This is currently true of any animals that disperse out into the Midwest, east of Nebraska, or to the East Coast. There just aren't conspecifics out there for them to mate with. This was also true for P22, in Griffith Park. We tracked him there for 10 years, but we're confident that there were never any other lions there, including any females, and so he just didn't have any breeding opportunities. Same thing is likely true for a male lion that has been documented many times over the last few years in the eastern Santa Monicas, between 405 and the Hollywood Freeway (101, as it heads to downtown LA).

RESPONSE: Text changed to "may include non breeding or dispersing individual"

Line 563 (Riley): Justin's paper in JWM (Dellinger et al. 2020a), and so I presume what was in the 2021b reference as well, presented habitat selection patterns, not habitat use patterns, which are not the same thing. Selection involves examining use vs. availability, whereas use is the information on what the animals actually used. Selection analyses are very common and certainly valuable. Although personally I think it would be great if habitat use data was more regularly reported as well. For example, in the Burdett et al. paper (cited in this document), they found that chaparral was not selected for, since it's use was similar to its availability, but since it was the most common vegetation type, clearly it was important to the species.

RESPONSE: The quote comes from the 2021 conservation assessment, have added a definition of habitat selection in the footnotes.

Line 581 (Riley): It might be worth citing our recent habitat use and selection paper here, Riley et al. 2021 (which is currently cited elsewhere, but still needs to be added to the Lit Cited), since we directly addressed the use of selection of these scrub habitats, including both coastal sage scrub and chaparral in particular. We did not separate out chaparral into different ages, but chaparral was consistently both the most used and most strongly selected vegetation type for all age and sex classes. So we certainly did

not see evidence that there was chaparral that they were avoiding. As you say here, this statement from Burdett et al was speculation. We did also find that they avoided open parts of the landscape such as grasslands and landscaped areas such as golf courses or cemeteries (what we call "altered open" areas). We found that they were very rarely actually in urban areas, and in fact were often far from them, but we did find that from a distance-based perspective, they were closer to urban areas than expected, perhaps because deer are often in or close to developed areas such as low density residential areas.

RESPONSE: Have included suggested reference. Text now reads “Riley et al. (2021) found that mountain lions in the Santa Monica Mountains and surrounding areas selected “chaparral, riparian woodland, and coastal sage scrub. The two features of the landscape that they consistently avoided were grasslands and altered open areas, which were also the most open portions of the landscape. These results are consistent with previous work showing that mountain lions select areas with dense stalking cover and avoid open areas to facilitate hunting success.” However, Burdett et al. (2010) speculated that dense, mature late seral chaparral may be avoided because mule deer prey cannot easily move through such stands and thus may select against them.”

Line 603 (Riley): One point that I want to make clear about the genetics of mountain lions in the Santa Monica Mountains and the surrounding area, and the two state-wide Gustafson et al. papers that we participated in. In our 2014 paper (Riley et al. 2014), we found clear differentiation between mountain lions north and south of the 101 Freeway, before male P12 crossed the freeway in early 2009. After P12 crossed, survived, and began regularly mating in the Santa Monicas, that differentiation was not as strong, since he was clearly genetically assigned to the population north of the freeway. The Gustafson et al. papers used samples up through 2015 for our population (see Methods in Gustafson et al. 2022), so this was at the height of the influence of P12. It was also the case, for various reasons, that a number of the earliest samples from the Santa Monica Mountains were not included in the Gustafson et al papers. So it is potentially not surprising that the Santa Monica Mountains came out, in those statewide analyses, as part of the Central Coast South Cluster. Those papers gave a picture at a certain point in time, as of 2015. But as I've said multiple times in other comments, we then documented repeated cases of P12 mating with his daughters, close inbreeding events which would both reduce genetic diversity and increase the genetic similarity of animals in the Santa Monicas. And effective genetic dispersal in and out of the Santa Monicas has continued to be very rare. So doing the analyses with samples from a few years earlier, say 2010, or a few years later, say 2020, might give different results about genetic differentiation between the Santa Monicas and areas north. The genomic work happening at UC Santa Cruz, as well as work we are doing currently with UC Davis, will shed further light on the current situation, genetically. Regardless, we know from dispersal and tracking data that mountain lions in the Santa Monicas are a very small population isolated by a massive and busy freeway (Riley et al. 2014), that we have seen physical evidence of potential inbreeding depression (Huffmeyer et al. 2022), and that the population is in significant danger of going extinct, based just on demography, and especially if inbreeding depression worsens (Benson et al. 2016).

RESPONSE: CC-S is now included in the area recommended to be listed, which makes the details of genetic isolation of the Santa Monicas less relevant to the listing recommendation as a whole. The Department has included more details of the evidence of inbreeding in the Santa Monica Mountains later in the status review.

Line 603 (Riley): I think the Ernest et al. 2014 and Riley et al. 2014 papers might also be worth citing here. They aren't about the entire state, the way the Ernest et al. 2003 and the Gustafson et al ones are, but they are definitely about gene flow between different areas of the state, and in fact between different areas that are very relevant to the petitioned area.

RESPONSE: References added.

Line 608-635 (Vickers): The blanket statement that microsatellites operate on a scale of 100s of years and SNPs on 1,000s-to-10,000s of years is not accurate. Microsatellites mutate more quickly and have other characteristics that can inform contemporary population assessments, but because of interpretation differences between labs and other deficiencies, the information those analyses produce may or may not be as pertinent to the questions at hand as SNP analyses - though they too are subject to variation based on a number of other factors.

RESPONSE: Due to this and other feedback, the references of the time scales have been removed.

Line 610-614 (Vickers): The sentence "Though these populations show significant genetic differentiation, they are not fully isolated (Fig. 3)." is true but "full" isolation is not necessary for populations to continue to decline in heterogeneity and inbreeding levels, and be at risk of extirpation secondary to inbreeding depression and other factors. Benson et al. 2019 shows that though the populations in the Santa Ana and Santa Monica Mountains have some low level of current connectivity, that they will continue to decline in genetic diversity and be at significant risk of extirpation if current levels of genetic introduction are not improved. If the gene flow between the populations were as vigorous as the next sentence seems to suggest, the populations would not have become differentiated / separated genetically and as at risk of decline as they now are. Though some genetic exchange has occurred in the recent past and may be continuing, levels of gene flow have not been adequate to prevent the current genetic structural isolation from developing in the first place. In my opinion, it is safe to assume that absent improvements in current rates of gene flow that further genetic differentiation and deterioration will occur not only in the SA MU and SMM/CSU MU as predicted in Benson et al. 2019, but also in the other petitioned populations.

RESPONSE: This section has been rewritten and this sentence is no longer in the document.

Line 616 (Beier): A staggering amount of information, clearly displayed. Thank you, Gustafson et al. (2019)!

DOES NOT REQUIRE A RESPONSE

Line 631(Riley): So, the two Gustafson et al. papers that we did, are obviously two papers that used different genetic markers. But I think it's a bit misleading to say that they are two entirely different studies. They used the same overall sample of animals, it's just that the 2022 paper used a smaller number of them, less than 1/2. So it is not like the two papers and analyses were on different animals, or from different places in the state. I think it's important to make that clear somewhere. At the moment, the impression is that they are two entirely independent studies, which is not the case.

RESPONSE: The first sentence of the methods section of Gustafson et al. 2022 states "We obtained 354 tissue samples collected by the California Department of Fish and Wildlife between 2011–2017 from pumas which had never been used in any previous genetic survey. Therefore the majority of samples were novel. A smaller proportion of samples from Gustafson 2019 were reused in the 2022 study. These were limited to "the Los Angeles region of southern California"

Line 635-637 (Vickers): The following blanket statement "SNPs are known to resolve population genetic structure with higher resolution and greater statistical power than the microsatellites that were used in the 2019 study (Narum et al. 2013, Vendrami et al. 2017, Hohenlohe et al. 2018)." may or may not be true dependent on numerous factors including the wildlife population, qualities and quantifies of each set of SNPs or Msats, genetic diversity in the populations, genetic bottleneck demography, and more. Thus the statement should be reworded as with the statement about timescales noted above (lines 608-635).

RESPONSE: This section has been rewritten and no longer includes this sentence.

Line 661 (Vickers): From the report line 661 "the CC-S genetic population is of critical importance to sustaining statewide gene flow because of the intersection of dispersal corridors connecting the SN, CC, and SC broad scale genetic populations." thus it seems incongruous not to regard it as a critical "gap" later in the same document (lines 2586-2608) , especially given that the Santa Monica Mountains at-risk population is contained within it.

RESPONSE: This section has been rewritten, and this sentence has been removed.

Line 662 (Riley): I totally agree about the importance of the CC-S group for connectivity for the state overall, both for connections of the coast to the Sierras, and therefore to the North Coast, and for connections to the San Gabriels and thereby to the rest of the South Coast Group. As we say later, we think the CC-S area overall may be important enough to consider for listing because of this importance for connectivity.

RESPONSE: Due to this and other feedback, CC-S is now in the area proposed for listing

Line 663 (Riley): This statement indicates the value of the SNP data, along with the microsat data, for evaluating relatively recent land use changes, such as anthropogenic development, and their effects on connectivity and landscape genetics. I mention this here because later there is a statement about SNP data not being useful for these kinds of changes, which I disagree with, and which I have discussed with other population genetics researchers, who also don't feel that it is true.

RESPONSE: Have reworked this section and references to the time scale that can be illuminated by SNP and microsatellites data.

Line 667 (Riley): What is the relevance and meaning of this "horseshoe"? It's not clear to me why this matters, and what it means that the South Coast Group and the Santa Monica Mountains are not part of it, as mentioned at the end of the paragraph.

RESPONSE: Have reworked section to remove mention of a horseshoe.

Line 678 (Riley): As I also say in other places, it is reasonable to use genetic data to guide the determination of management units, but somewhere the actual boundaries of these management units need to in fact be delineated. Genetic clusters can, and do, have somewhat nebulous boundaries, based on exactly how intensive the sampling is in particular areas, and any particular sampled mountain lion can also potentially be a disperser from somewhere else. So the boundaries of genetic clusters can be fuzzy. But the boundaries of a management unit need to be real and understood, I would argue, if management may vary between them. Right now, nowhere in this document are the boundaries of the MUs made clear, that I know of. This is especially important for the boundaries between the various MUs in the petitioned area, such as between CC-N and CC-C, between CC-C and CC-S, between CC-S and SG-SB, and between SG-SB and EPR.

RESPONSE: Due to feedback on our previous lack of consideration of the whole petitioned area as a DPS, the Department evaluates the petitioned area as a whole and the Management Unit framework is no longer necessary to the assessment of what areas to potentially list. This section has been deleted.

Line 669 (Vickers): This line has an example of a tendency within the whole report to mix descriptions of the CC-S MU between referring to it as CC-S MU and referring to it as the Santa Monica Mountains (SMM) population, even though the CC-S MU extends substantially to the north of the SMM. This leads to some confusion later since the small SMM population is treated as its own entity in some of the report, but is generally characterized as a part of the rest of the CC-S MU. By evaluating the SMM population's justification for listing as Threatened only if the CC-S MU as a whole is listed ignores the Benson et al. 2019 work and makes the assumption that the Wallis Annenberg wildlife bridge under

construction over US 101 assures adequate connectivity to remove the risk to the SMM population segment. That assumption is unproven at this point and that should be noted. Also see my comments later in the report regarding the CC-S MU.

RESPONSE: There is increased specificity about when the document is referring to the animals within in CC-S genetic population, the broad area of CC-S, or specifically the Santa Monica Mountains. The recommendation for listing now includes CC-S.

Line 670 (Vickers): In Gustafson et al. 2019, allelic richness for all six populations proposed for listing as threatened was significantly below the values found for the ESN, WSN, and NC MU's . In the Gustafson et al. 2022 paper, allelic richness corrected for sample size was similarly significantly lower for all 6 petitioned populations than the ESN and WSN populations, though this is a less valuable parameter in SNP analyses than in microsatellites. Allelic richness is important for assessing population stability and risk of decline but is not mentioned at all in this report. Other genetic parameters such as heterozygosity, inbreeding coefficients, etc. that vary between the populations are discussed, but values are not factored ultimately into the population assessments used to make the determination about Threatened status. I suggest that this should be corrected and that genetic factors other than connectivity be included in evaluation of each MU in order to present the most complete picture possible of the risks to the various petitioned MU's. This can also inform expectations of population trajectories in the absence of the extra protections afforded by the Threatened listing - i.e. a "steady as she goes" situation.

RESPONSE: The Department uses effective population size estimates as one factor in evaluating risk. Other measures of genetic diversity mentioned in the comment do not have general 'rules of thumb' regarding how low levels can be before there is risk. Therefore discussing additional metrics of genetic diversity would be more descriptive rather than helpful in assessing risk and informing the recommendation.

Line 672-717 (Vickers): This comment refers to the section on Management Units, which is no longer included in the status review. The Department considers the justification for using the DPS criteria as outlined in section 6.2 to be sufficient.

Line 692 (Riley): All of these factors are especially challenging for the population in the Santa Monicas: habitat loss and fragmentation, vehicle mortality, wildfire impacts, and mortality from rodenticides. The one exception is depredation mortality.

RESPONSE: Noted, and the impacts of these threats on the Santa Monicas are mentioned in Section 4 Factors affecting the ability to survive and reproduce.

Line 700 (Riley): The lack of dispersal into or out of the Santa Monicas is another important way in which they are discrete from other areas to the north. As we mention first in Riley et al. 2014 but have also continued to document since then, there is very little successful dispersal in or out of the Santa Monicas. As we discuss in more detail later, we suggest considering the Santa Monicas as an MU as well, or more specifically the Santa Monicas, Simi Hills, and Santa Susana Mountains, since the latter two areas are critical for persistence of the Santa Monicas, as an MU called "Santa Monicas to Los Padres."

RESPONSE: The area mentioned is included in our updated recommendation for listing, which removes the relevance of defining the boundaries of this particular management unit.

Line 710 (Riley): So based on this measure, since none of the 6 MUs have at least 10% migration between them, it seems like they should all be determined to be "discrete," in the Table later in the document, Table 7 on page 81. Why would this criterion not be used, or at least discussed and included, in that assessment?

RESPONSE: Based on feedback from external reviewers, The Department no longer uses the Management Unit framework, nor do we evaluate whether the individual genetic populations meet the criteria of being a DPS, and have removed the mentioned table.

Lines 714-717 (Vickers): The text suggests that the SNP data from Gustafson et al. 2022 is less suitable than the data from Gustafson et al. 2019 for defining MU's for evaluation in the rest of the report. The report also eschews use of the Gustafson et al. 2022 for certain aspects of the evaluation because it is more informative of more ancient genetic structure, yet many samples used in the 2022 analysis were quite contemporary. Also, despite the statement in the report that the Gustafson et al. 2022 analysis is less suitable for individual MU evaluations, later in the report the Department chooses to group MU's into Central and South Coast Groups based on the Gustafson et al. 2022 data.

RESPONSE: Based on feedback from external reviewers, the Management Unit framework is no longer used.

Line 745-747 (Riley): What were these estimates, of 600 mountain lions and 2,400 mountain lions based on? I think at least some indication of where they come from would be valuable.

RESPONSE: Text amended to read “McLean (1954) presented bounty numbers from 1907-1950 and estimated there were 600 mountain lions in California at the time. Over a decade after the end of the bounty period, Sitton (1977) estimated that there were approximately 2,400 mountain lions in California.”

Line 752 (Riley): I don't think Paul and Winston would refer to the Santa Anas as rural, would they? There are certainly places there that would feel more rural, but in general, Paul's study of lions in the Santa Anas in the early 90's is considered to be the first ever study of mountain lions in a more urban landscape! And that is certainly how Winston has portrayed work there as well, and I know he and his colleagues have followed animals going close to and even into developed areas.

RESPONSE: This section has been deleted.

Line 755 (Riley): The better reference for survival rates in our study would be Benson et al. 2020 (Biol Conserv. 2020 241:108294), which is where we directly measured and report survival rates for the first 18 years of our study and for 58 tracked animals.

RESPONSE: This section has been deleted.

Line 757-760 (Vickers): Benson et al. 2023 actually found that the SA MU population survival rate fell within cluster 1 in his statewide survival analysis. Cluster 1 is the cluster with the greatest human presence and a higher survival rate than cluster 2, which included the EPR MU - one that exists in an area of more rural development overall. Definition of what constitutes a population "sink" might be useful here if either MU is being characterized that way. This should also apply to discussions of the other MU's.

RESPONSE: This section has been deleted.

Line 760 (Riley): The Benson et al. 2023 paper also provides survival rates from areas across the state, in the most comprehensive analysis of mountain lion survival in CA to date. So it seems like that could be valuable to discuss more in this section if it is addressing survival.

RESPONSE: The sections on survival and mortality have been reworked to focus on Benson et al. 2023.

Lines 762-798 (Vickers): The Department relies strictly on extrapolation from Ne to arrive at approximate population census numbers for the MU's in the document. Though the Department cites its use in the case of the Florida panther as justification, it is my understanding that Ne is not in fact

regarded by most geneticists as an appropriate way to arrive at those population numbers. My comments regarding Ne and its most appropriate use for this overall evaluation may be seen elsewhere in the review. The Department's own current and former scientists in concert with most of the mountain lion researchers in the state have calculated population density values for the populations in the geographic regions covered by the proposed ESU. The Department utilizes one of the outputs from that modeling when it lists the statewide population as 3,242. That population estimate is derived from two of the three models that were developed in that effort. A breakdown of estimated population levels in each of the petitioned population segments as a function of all three models, alongside values derived from the Ne's in both Gustafson papers, would be most informative to readers and the most complete presentation of information known at this time.

RESPONSE: Due to this and other feedback this section has been extensively reworked. The Department uses an estimate based on fecal DNA data only because it is the method in which there is the most confidence. Adding telemetry data to the model would potentially bias the estimates high. The Department has a contract with UC Berkeley to better figure out how to incorporate telemetry data into the population estimates. The Department's estimate has not yet peer reviewed and may receive feedback and change before publication in a peer reviewed journal. Included are populations level estimates based on SCR modelling and removed were estimates of population size based on effective population size. While it would be possible to present multiple population estimates with a discussion of the strengths and weakness of each method, that sort of technical discussion is more appropriate in the peer reviewed literature and would not change the end outcome, that there are multiple small populations that are isolated and face a variety of threats.

Line 766 (Vickers): The models utilized to date in the Department's statewide population estimate are pending peer review and result in a range of values for the statewide estimate depending on the model. These should be included in the discussion here with ranges and comparisons to the Ne-based population values derived from different Ne values in various analyses.

RESPONSE: Due to this and other feedback this section has been extensively reworked. The Department uses an estimate based on fecal DNA data only because it is the method in which there is the most confidence. Adding telemetry data to the model would potentially bias the estimates high. The Department has a contract with UC Berkeley to better figure out how to incorporate telemetry data into the population estimates. The Department's estimate has not yet peer reviewed and may receive feedback and change before publication in a peer reviewed journal. Included are populations level estimates based on SCR modelling and removed were estimates of population size based on effective population size. While it would be possible to present multiple population estimates with a discussion of the strengths and weakness of each method, that sort of technical discussion is more appropriate in the peer reviewed literature and would not change the end outcome, that there are multiple small populations that are isolated and face a variety of threats.

Line 770 (Vickers): This statement is not accurate that populations could not be estimated for each of the petitioned populations. The fecal DNA study that the Department cites to state a statewide population estimate was conducted in such a way as to provide the ability to estimate density of the lion populations in each of the six petitioned population segment areas or MU's as the Department is defining them. As an example, density estimates from that study averaged from 1.5-1.84 animals per 100 sq km, resulting in a population estimate of 30 - 37 animals in the SA MU. This is consistent with other studies that have been done in the range (Beier et al. 1993, Vickers et al. 2022). It is possible to calculate these values for each petitioned area and I would recommend that those values be included in the report for comparison with the values derived from Ne that are presented.

RESPONSE: Due to this and other feedback this section has been reworked. The estimate based on fecal

DNA data is the method in which the Department has the most confidence. Included are populations level estimates based on SCR modelling and removed are estimates of population size based on estimated population size.

Line 774 (Vickers): The following statement "Effective population size essentially estimates the number of breeding adults in a population that successfully pass their genes on to future generations, recognizing that only a portion of adult animals in a population breed (see section 4.9.3 for more information on Ne)." is not accurate. The wording may be from literature that is commonly misinterpreted, and if used to predict population census size tends to be inaccurate due to the variation in factors that influence Ne. Presenting the values simplistically as a direct way to predict population census is not appropriate. As can be seen from comparisons of the multiple estimates of Ne from the two Gustafson papers that the resulting population census statewide or in any of the genetic clusters would vary widely. From Waple 2022, "Few doubt that effective population size (Ne) is one of the most important parameters in evolutionary biology, but how many can say they really understand the concept? Ne is the evolutionary analog of the number of individuals (or adults) in the population, N. Whereas ecological consequences of population size depend on N, evolutionary consequences (rates of loss of genetic diversity and increase in inbreeding; relative effectiveness of selection) depend on Ne. Formal definitions typically relate effective size to a key population genetic parameter, such as loss of heterozygosity or variance in allele frequency. However, for practical application to real populations, it is more useful to define Ne in terms of 3 demographic parameters: number of potential parents (adult N), and mean and variance in offspring number. Defined this way, Ne determines the rate of random genetic drift across the entire genome in the offspring generation. Other evolutionary forces (mutation, migration, selection)-together with factors such as variation in recombination rate-can also affect genetic variation, and this leads to heterogeneity across the genome in observed rates of genetic change. For some, it has been convenient to interpret this heterogeneity in terms of heterogeneity in Ne, but unfortunately, this has muddled the concepts of genetic drift and effective population size. A commonly repeated misconception is that Ne is the number of parents that actually contribute genes to the next generation (NP). In reality, NP can be smaller or larger than Ne, and the NP/Ne ratio depends on the sex ratio, the mean and variance in offspring number, and whether inbreeding or variance Ne is of interest."

RESPONSE: Due to this and other feedback this section has been reworked and no longer uses Ne to estimate population size. The discussion of effective population size has been moved to section 4.10.3 Loss of Genetic Variation. The definition now reads "Ne is the size of an ideal population that would result in the same level of inbreeding or genetic drift as that of the population under study (Palstra and Ruzzante 2008). Though Ne is determined by several factors, it is generally significantly less than the census population (i.e., the number of animals actually breeding in a population is usually significantly fewer than the total number of animals in the population; Palstra and Ruzzante 2008, Table 6). "

Line 778 (Ernest): Effective Population Size, Ne, should not be used to infer or in any way calculate census size, N – Table 3 – this table and all references to such calculations of N from Ne in the report should be deleted from use in the CDFW proposal. See Waples 2022. Ne is an index calculated on genetic data in this case (or demographic data in other cases) but has too many generalizing assumptions that mountain lions do not meet, to in anyway infer the number of lions in a population.

RESPONSE: Thanks to this and other feedback this section has been reworked and no longer uses Ne to estimate population size.

Line 779 (Vickers): As noted above, the population estimates in Table 3 are not calculated using a well-supported technique. The assumption in the report that the breeding structure of the Florida panther at a time in the past is identical to the current breeding structure in each of the California populations is

inappropriate. Each population estimate has major assumptions built in. I suggest that the report should list (in tables) Ne estimates from both Gustafson et al. analyses (2019 and 2022) and possibly those based on earlier work (Ernest et al. 2014, Benson et al. 2019) along with explanations of the deficiencies and cautions related to use of Ne when applied to population census estimation. Substantial variation in values can arise from differences in algorithms, sample selection, microsatellite selection, SNP selection, and level of inbreeding present, as well as other factors. As an example relating to Ne, the population estimates based on the two Gustafson analyses vary substantially for many of the subpopulations being assessed. An example is the SA MU population, where the 2019 value of 15.6 for the SA Ne results in an estimated adult population of 31-62, whereas the Ne calculated in the 2022 paper for the SA population of 3.5 results in an adult population estimate of 7- 14. Because populations lose heterozygosity at the rate of -1/(2Ne), SNP estimates put that rate at 1/7 whereas microsatellites put it at 1/40ish. Because Gustafson et al. 2019 and 2022 used the LDNe metric means based on linkage disequilibrium, SNP's would provide more information for that estimate. This suggests that the Ne of 3.5 in Gustafson et al. 2022 is likely more accurate, though the resulting population estimate is lower than suggested by recent total population estimates derived from non-invasive sampling and telemetry studies in the SA MU (Vickers et al. 2022, Vickers and Dellinger unpublished data). The two analyses may be substantially different because the Gustafson et al. 2019 analysis used fewer microsatellites that are not closely linked, the usual goal of a microsatellite project. Also, many contemporary samples were used in the 2022 SNP analysis, which included many of the offspring of M86, a male who produced eleven offspring that were in the sample set (Gustafson et al. 2018). This would have reduced Ne due to the 1:1 breeding ratio. Population estimates for the six petitioned MU's that result from density estimates developed by present and former Department personnel and statewide researchers should also be presented in the Table with the acknowledgement that these estimates are not just adult animals, but they do give a comparison point and likely a more accurate overall picture of the populations in the petitioned ESU's/MU's.

RESPONSE: Due to this and other feedback this section has been reworked and no longer uses Ne to estimate population size. The discussion of effective population size has been moved to section 4.10.3 Loss of Genetic Variation. The definition now reads "Ne is the size of an ideal population that would result in the same level of inbreeding or genetic drift as that of the population under study (Palstra and Ruzzante 2008). Though Ne is determined by several factors, it is generally significantly less than the census population (i.e., the number of animals actually breeding in a population is usually significantly fewer than the total number of animals in the population; Palstra and Ruzzante 2008, Table 6). "

Line 791: The estimate of 12-24 adult mountain lions in the Santa Anas based on the Ne of 6 in Benson et al (derived from telemetry studies and calculations based on available habitat) is substantially below the adult population estimate of 31-62 in Table 3. More recently in 2021 and 2022, spatial mark-recapture based density estimates from non-invasive sampling (hair and scat) resulted in estimates of approximately 30 to 40 individuals (not all adults) (Vickers et al 2022, Vickers and Dellinger unpublished data). Scat based individual ID's lack age information, so it is presumed that those numbers are representing all animals above young kittens, thus the adult population would be expected to be substantially lower, and unlikely to be within the range of 31-62 adults in Table 3. Calculations of the likely territorial adult population based on habitat availability and territory sizes in the SA MU (Benson et al. 2019), also are substantially lower than the values in Table 3.

RESPONSE: Based on these and other comments, there are no longer estimate population size based on effective population size. Instead estimates are derived from a statewide model, presented in Table 3.

Line 798 (Vickers): Add Gustafson et al. 2022 to the references there.

RESPONSE: Done

Line 815 (Riley): What is the "South Coast Province"? Where does that include? This is not a term that I'm familiar with.

RESPONSE: Have modified text to read "Development impacts have been extensive in the greater San Francisco Bay area, Sacramento, and San Joaquin valleys (water diversions, agricultural development, and residential development), and the Los Angeles Basin and adjacent mountain ranges south to San Diego (residential, commercial, agricultural, and industrial uses). "

Line 827 (Riley): I think you need a reference, or 2 or 3, here that are actually focused on fragmentation, instead of referencing the Wildlife Action Plan which, though it may mention it, is not a publication that is addressing fragmentation. There are probably some references in there that could work. Same thing with the next sentence.

RESPONSE: The information in this section is relatively broad, and the SWAP is the most up to date statewide resource for these issues.

Line 838-840 (Riley): What are you defining as "southern California" and the area where there are 24 million people? I think this needs to be clear.

RESPONSE: Added reference to Wikipedia's page on Southern California which lists population from the 2020 census and the 10 counties in the area.

Line: 857 (Vickers): Add Burdett et al. 2010 after "2030" at the end of the sentence

RESPONSE: Done

Line 863 (Riley): I would add "across the 5 Freeway" or something like that, after "CC and WSN MUs", since you're mentioning I-15. Also, the Huffmeyer et al. reference is for the SAs, as well as for CC-S. It might also be worth adding something to the end of the paragraph about isolation in the Santa Monicas, like: "In the Santa Monica Mountains and Santa Susana Mountains of CC-S, there is evidence of restricted movement and gene flow from the 5, 101, and 405 Freeways."

RESPONSE: Text altered to "Similar connectivity challenges occur due to Interstate 5 between the CC and WSN MUs. Recently published information on reproductive and morphological abnormalities in mountain lions indicate inbreeding in the CC-S, SA, and EPR (Huffmeyer et al. 2022). "

Line 872 (Vickers): Add "to" after "projected"

RESPONSE: Done

Line 880 (Riley): Yes, and along with the potential for increased intraspecific aggression, we have also documented many cases of very close inbreeding between fathers and daughters, which although it may occur occasionally in other populations, seems much more common in our small, isolated one. It was documented in Riley et al. 2014, but also in our report to CDFW covering the mountain lion study from 2013-2016.

RESPONSE: This section has been reworked. The information about inbreeding is mentioned in section 4.10.4 Genetic Impacts on the Populations Within the Petitioned ESU.

Line 910 (Vickers): Add "of" after "proportion"

RESPONSE: Done

Line 912 (Riley): How many home ranges was this based on? Is there a reference for this? Is it also the Meinke reference? This reference is incomplete in the Lit Cited (as are a number of other references; they all need to be double-checked), it is unclear what it is - a thesis? A report?, Nor is there any information about how readers can acquire it.

RESPONSE: Meinke reference issue fixed. Text altered to "A study of nine mountain lion home ranges in the redwood forest of northwest California found mountain lions used forest areas with a greater proportion of fragmentation and edge more frequently than areas of more contiguous forest; however, lions generally avoided areas of active timber harvest operations (Meinke 2004)."

Line 927 (Riley): We should make sure that you all have all of our vehicle mortality records. We worked with Esther and others to provide them, but based on the map in Figure 6, it looks like some are missing. Also, we had a really bad year for lion mortality in general, and from vehicles in particular, from early 2022 through early 2023. 15 lions died, 9 collared ones, and most of those were from vehicles. It says here that it is just through 2021, so maybe you aren't including those, but we can certainly provide them if it is useful.

RESPONSE: Map updated.

Line 939-940 (Vickers): The SA MU does not "include the greater Los Angeles metropolitan area" - it is considered to be a portion of that area, as are the CCS and SGSB MU's. In contrast it is probably correct to state that the greater San Diego Metropolitan area is included within the EPR MU, since in contrast to the SA MU (Santa Ana Mountains only) the EPR MU encompasses multiple mountain ranges both surrounding and far from the San Diego metropolitan area.

RESPONSE: The Department is no longer using the Management Unit framework. Text changed to "From 1981 to 2013, reported vehicle strikes accounted for 53% (50/94) of known mountain lion deaths in the SA genetic group (which includes parts of the greater Los Angeles metropolitan area) and 30% (46/154) in the EPR genetic group (which includes the greater San Diego metropolitan area) (Vickers et al. 2015)."

Line 940 (Riley): This gets again to the question of what the boundaries of the MUs are. I definitely wouldn't think that the SA MU includes the Los Angeles Area broadly, and certainly not the north and west parts of LA which are in the Santa Monica Mountains and adjacent to the Santa Susana Mountains. Vehicles have also become the major source of morality in the Santa Monica Mountains and surroundings. This could be mentioned maybe at the end of the paragraph. If a Santa Monica Mountains MU is considered, then maybe something like: "Vehicles have also become the largest source of mortality in the Santa Monicas to Los Padres MU (Benson et al. 2020, NPS Report 2024)." In our next report which we will be providing soon, we will document the large amount of mortality, especially from vehicles, that we have seen since early 2022.

RESPONSE: The Department is no longer using the Management Unit framework. Text changed to "From 1981 to 2013, reported vehicle strikes accounted for 53% (50/94) of known mountain lion deaths in the SA genetic group (which includes parts of the greater Los Angeles metropolitan area) and 30% (46/154) in the EPR genetic group (which includes the greater San Diego metropolitan area) (Vickers et al. 2015)."

Line 942 (Vickers): Replace "tertiary" with "secondary"

RESPONSE: Done

Line 945-955 (Riley): So, a few things about this paragraph. Overall, it feels pretty confusing, because there are many different numbers given from different areas, with different, but often overlapping years. So it is pretty hard to tell what's going on. Also, Shilling and Vickers 2023 is cited, but this is not in the references, so not sure if this should be Shilling et al. 2023, or if there is a reference missing.

RESPONSE: This paragraph has been reworked and reference has been updated.

Line 963 (Vickers): This phenomenon also occurred in the SA MU in February of 2021 when an adult female was killed by a car on a surface street in south Orange County, and her two approximately six month old offspring were subsequently captured. One of the offspring was also struck and sustained

bony injuries that required surgery. The uninjured individual was GPS collared and released by CDFW after a period of months in isolation at a rehabilitation facility. The individual that had surgery ultimately was kept in captivity rather than being released due to acclimation to humans.

RESPONSE: Noted

Line 963 (Riley): It might be valuable to also mention a story from the Santa Susana Mountains that we documented, at the end of this paragraph. In the Rocky Peak area of the 118 Freeway, between Simi Valley and the San Fernando Valley, adult female P39 was hit and killed in early December 2016. We had marked a litter of her kittens the previous summer, P50, P51, and P52, so they were about 5 months old. A couple of weeks after P39 died, P52 was killed in the same stretch of 118, and then a few weeks after that, P51 was killed in the same area. There is a good crossing in the area, specifically a hiker and equestrian tunnel at Corriganville Park, but they did not use it. We are currently doing a study with Caltrans to better understand connectivity in this area, and we are hoping to improve the fencing in this stretch, to keep animals off the freeway and funnel them towards crossings. This story was documented in our report to CDFW covering 2016-2018, which could be cited for reference.

RESPONSE: Noted, but this is a bit more detail than is useful for this document.

Line 967 (Vickers): Sentence beginning "Dr. Winston Vickers" could be changed to "Dr. Winston Vickers has observed that the data from numerous GPS collared mountain lions in the SA MU has indicated that they have encountered three regional freeways that surround the SA MU (I-5, I-15, SR 91) on multiple occasions, and ranged up and down along them before turning back. This has occurred with mountain lions going east and approaching Interstate 15, north approaching SR 91, and west approaching Interstate 5. Only three GPS-collared mountain lions have crossed I-15, the critical barrier between the SA MU and the EPR MU genetic groups during the 19 years that the UC Davis researchers have studied mountain lions in the SA MU . All three crossed west to east (from the SA MU into the EPR MU), and all three were dispersal age animals (two males and one female). Of the three, one was killed on a depredation permit in the EPR MU within 3 weeks, the other two returned to the SA MU after a short period and did not cross the freeway again before their collars dropped off as scheduled. Two uncollared mountain lions have been recorded crossing I-15 on cameras monitoring crossing structures at Temecula Creek and culverts south of that location. Those individuals crossed I-15 west to east, but no mountain lions have been recorded crossing east to west despite numerous photos of mountain lions being captured alongside the east side of the freeway. Gustafson et al. (2019) detailed genetic evidence of three mountain lions whose genetic origins were in the EPR MU. Evidence of offspring production was only detected for one of the three (UC Davis M86). That animal appeared to have produced eleven offspring and enhanced the genetic diversity of the population (Gustafson et al. 2019). Though one GPS collared mountain lion has crossed SR 91 from the main body of the Santa Ana Range into the Chino Hills and back several times, the Chino Hills are completely surrounded by development and do not provide a pathway to the SGSB MU to the north. A few GPS collared mountain lions have crossed under I-5 toward the ocean from the body of the Santa Ana Range, but have only been able to access small areas of coastal scrub between the freeway and the ocean, with no ability to connect from there to any other populations. (W. Vickers unpublished data)"

RESPONSE: Have added some of the text, now reads "For example, GPS data from collared mountain lions in the Santa Ana Mountains have revealed that on multiple occasions lions approached one of the three regional freeways that surround the mountains (I-5, I-15, SR-91), only to range back and forth along them before turning back (W. Vickers unpublished data). Only three GPS-collared mountain lions have crossed I-15, the critical barrier between the SA and the EPR genetic populations, during the 19 years that UC Davis researchers have studied mountain lions in the Santa Anas. All three crossed west to east (from SA into the EPR), and all three were dispersal age animals (two males and one female).

However, crossing a major barrier like a road does not guarantee the individual will stay or breed in the new area. Of the three who crossed I-15, one was killed on a depredation permit in the EPR within 3 weeks, while the other two returned to the SA after a short period and did not cross the freeway again before their collars dropped off as scheduled (W. Vickers unpublished data). Two uncollared mountain lions have been recorded crossing I-15 on cameras monitoring crossing structures at Temecula Creek and culverts south of that location. Those individuals also crossed I-15 west to east, but no mountain lions have been recorded crossing east to west despite numerous photos of mountain lions being captured along the east side of the freeway (W. Vickers unpublished data). Though one GPS-collared mountain lion has crossed SR-91 from the main body of the Santa Ana Mountains into the Chino Hills and back several times, the Chino Hills are completely surrounded by development and do not provide a pathway to the San Gabriel Mountains to the north. "

Line 970 (Riley): We have definitely seen this same thing repeatedly with young lions in the Santa Monicas, where they are "bouncing off" the freeway and the development along it, in what looks like "frustrated dispersal." You could cite Riley et al. 2014 for that, or some of our reports to CDFW, or S. P. D. Riley personal communication.

RESPONSE: Reworked this section and deleted this sentence.

Line 978-985 (Riley): A few things for this paragraph: the South Coast Missing Linkages Project was for the Southern California region, not for the state, though there was also a Missing Linkages Report from 2000 for the whole state. It would be good to cite the report on line 980, which would be South Coast Wildlands 2008 (let me know if you need help finding it). Also, in reference to Ventura County, I think it would be worth saying a bit more here: "Specifically, Ventura County has passed an ordinance that mandates the consideration of impacts to wildlife movement for projects within the linkage areas." And on line 985, when you say "the corridor", I don't think it's clear what you mean exactly. Maybe you could cite Figure 7, and put a circle or something around the area that you mean?

RESPONSE: Altered text to read "In 2008, the South Coast Missing Linkages Project identified areas in the coastal areas of southern California where linkages are needed (Fig. 7)." reference to South Coast Wildlands 2008 reference added.

Line 990 (Riley): What does "make the crossing more natural and acceptable to wildlife" mean? This isn't clear. It is definitely important to preserve natural habitat on both sides of crossing sites whenever possible, as that it makes it more likely to be used. It is also valuable to make the crossing itself feel as natural as possible, by vegetating it, if possible. Not sure if one, or both of these meanings are intended.

RESPONSE: Altered text to " However, funding to implement wildlife crossing projects, including land acquisition to preserve natural habitat on both sides to make the crossing more acceptable to wildlife, has been limited to date. "

Line 991 (Vickers): Suggest adding "with appropriate fencing, and lack of fencing near existing crossing structures" after "crossings"

RESPONSE: Done

Line 993 (Ernest): The CDFW proposal makes an unsupported assumption that the future Wallis-Annenberg Wildlife Crossing will largely mitigate road kills and lack of gene flow caused by heavy traffic on busy multi-lane highways. There is no guarantee that mountain lions will use it and avoid all other local highway crossings; there is no guarantee that it will greatly lower mountain lion road mortalities; there is no guarantee that this crossing alone with solve gene flow problems. The single Wildlife Crossing is a necessary start, but it is in no way sufficient to stop degradation of Santa Monica population viability.

RESPONSE: Altered text to "Together, these crossings should help facilitate the movement of mountain lions between the Santa Cruz Mountains in CC-N and the Gabilan Mountains in CC-C"

Line 993 (Riley): I would add after "vehicle strikes" here something like: "and especially to the barrier effects on movement and gene flow." As mentioned in other comments later, for major, busy freeways, animals are less likely to attempt to cross them, and so while they can certainly result in some mortality if animals do try, their major effects are more as barriers than sources of mortality. Often smaller highways and major secondary roads are more important for mortality - that is what we have found in terms of number of moralities in our area (see also another comment, which includes numbers).

Line 995 (Riley): After "2022" here, you could add an update if you want: "The structure over the freeway is due to be finished at the end of 2024 and the full crossing, including the approaches and the crossing over adjacent Agoura Road, at the end of 2025."

RESPONSE: Text changed to "The crossing, including the approaches and the crossing over adjacent Agoura Road, is expected to be completed in late 2026"

Line 996 (Riley): It would be more accurate to say "…facilitate genetic exchange throughout the CC-S MU and between CC-S and CC-C, and ideally between CC-S and SN."

RESPONSE: Text changed to "The overpass will help facilitate mountain lion movement between the Santa Monica Mountains and the Simi Hills and could ultimately contribute to genetic exchange throughout the CC-S genetic population, between CC-S and CC-C, and ideally between CC-S and WSN"

Line 997 (Riley): I think this sentence about minimizing vehicle mortality needs to be modified. Reducing vehicle mortality is really not the main goal of this crossing, though it certainly can be for some crossings, and may be for the Highway 17 crossing, for example. Though lions, and other wildlife, are occasionally hit on 101 and other large freeways, it is smaller highways and secondary roads that are more often the sources of vehicle mortality, as animals are reluctant to even try to cross these major freeways. It will certainly be the case that in the vicinity of the crossing, we hope to minimize, and ideally even eliminate, animals coming on to the freeway and being killed. But animals, including mountain lions, will continue to be killed by vehicles in the Santa Monicas and Simi Hills, especially on smaller roads, which is where more of them occur already. This will not mean that the crossing is in some way a failure - the main goal of this crossing is to provide connectivity between the Santa Monicas and the Simi Hills, and thereby to other areas, for mountain lions and for all other species, as you state well in the previous sentence. We do hope that there is some reduction in mortality for subadult mountain lions, from vehicles and potentially from other sources such as intraspecific strife, once they are better able to disperse out of the Santa Monica Mountains, and therefore aren't trying to disperse in other areas, including sometimes across 101 or other roads.

RESPONSE: Altered text to "It may also minimize some local vehicle-related mortality on Highway 101"

Line 1001 (Vickers): Suggest adding "In addition, initial design and environmental studies are being completed for a new crossing structure across I-15 south of Temecula, and improvements to the Temecula Creek passageway that is currently in existence in that critical corridor area but is currently heavily impacted by humans. Other connectivity studies are being initiated along I-10 in the area that is critical to mountain lion movement between the EPR MU and SGSB MU in order to guide potential improvements to connectivity across that freeway. (Vickers personal communication"

RESPONSE: Done

Line 1045 (Riley): Where does this definition come from? I think it would be good to give a citation if possible. Also, when you say "negative impacts to one or more species," are humans considered to be

one of the "species"? Clearly negative effects on humans are a critical part of this conflict, so I think that needs to be clear.

RESPONSE: Have changed text to CDFW's definition. Text now reads "Human-wildlife conflicts “occurs when humans and wild animals interact in an unwanted or unsafe way” (CDFW 2024). "

Line 1051 (Riley): What does it mean for a mountain lion to be "taken non-lethally"? I think that needs to be made clear, as that will not be intuitive for many readers.

RESPONSE: Added this text " Nonlethal methods involve modifying the natural behavior of the animal, for example through hazing with hounds or an air horn."

Line 1060 (Vickers): Suggest adding "Benson et al. (2023) determined that lethal take secondary to depredation permits was the number one cause of death for GPS collared mountain lions in California, and that human-associated mortality was additive versus compensatory".

RESPONSE: This sentence "From 1972 to 2020, at least 3,694 mountain lions were removed in depredation incidents (Dellinger et al. 2021b), and it was the leading cause of attributable mortality of collared mountain lions (Benson et al. 2023)" was added three paragraphs later.

Line 1064 (Riley): Does this mean that more than one animal could be taken on a single depredation permit in the past? That wasn't clear, I don't think.

RESPONSE: Modified text to read "The most noteworthy change in management action reflected in this approach was specifying that instead of multiple, only one mountain lion could be taken under a single depredation permit"

Line 1079 (Riley): Is there a period of time that must elapse between the first or second depredation events and the implementation of non-lethal measured, before a lethal permit can be issued because of another depredation event? If so, it would be good to mention what that is, and if not, I think that would be important to mention as well.

RESPONSE: This section has been deleted.

Line 1082 (Riley): How many of these 3,637 were determined to be related to public safety? I assume it is some subset of the 1,327 that were classified as "potential human conflict"? How is "potential human conflict" defined? It think it is important to be clear here, especially about public safety incidents. I'm also wondering what "general nuisance" means.

RESPONSE: The data are self-reported by the public and not vetted. Therefore reporting the incidence numbers would be potentially misleading. Information about reporting categories was added to a footnote. Added more detail about human conflict in section 4.4.3 about public safety including text “Specifically, a threat to public safety is when a mountain lion “exhibits one or more aggressive behaviors directed toward a person that is not reasonably believed to be due to the presence of responders.” (Fish & G. Code, § 4801.5, subd. (b).) From 1986 to April 2024 there were 25 reported mountain lion attacks on humans in California, 4 of them fatal (CDFW 2024c). The Department has records of 10 mountain lions being euthanized following attacks on humans in California between 2000 and 2024 (reliable records prior to 2000 are unavailable).”

Line 1092 (Riley): What percentage of permits resulted in lethal removals in the state overall? If it was 8.6% within the proposed ESU area, is this very different from what was happening generally?

RESPONSE: The section has been rewritten and the relevant sentence has been removed. See response above for new text.

Line 1094 (Riley): How many lions have been lethally removed for public safety reasons?

RESPONSE: Added the text "Since 2000, 10 mountain lions have been euthanized following attacks on humans in California."

Line 1098 (Riley): This seems pretty speculative, that depredations have increased for these reasons. It certainly seems reasonable, but is it based on anything? If so, it would be worth saying, or giving a citation.

RESPONSE: This part of the sentence has been deleted.

Line 1108 (Riley): I think you need to be a bit careful with a couple of things here. I think you want to use he past tense here, since the 2019 report is 5 years old and the data would have been older than that. What is this based on, to say that "approximately 33% of them were dispersers", from Steve's paper (Torres et al.)? Really the only way to know if they were dispersing is to have followed them from when they were born, or at least when they were with their mothers, which I'm sure is essentially never happening in these cases. They could potentially be said to be "of dispersal age" or something like that.

RESPONSE: Have reworked, text now says "For example, from 1981 to 2013 in the Santa Ana Mountains and the Eastern Peninsular Range, 3.4 times as many males were taken for depredation than females (Vickers et al. 2015). Because males are more likely to disperse than females, depredation removal may thus further inhibit adequate gene flow between mountain lion populations in southern California by removing the animals most likely to move between genetic populations (Vickers et al. 2017)."

Line 1113 (Riley): OK, this is fair enough that many of the "primary gene dispersers" are lost if many of the depredation cases are dispersing males. However, as I also mentioned elsewhere, young females disperse too. This is something that we have documented, and the thought is that generally 1/2 of young females disperse, along with all of the young males. As I said, we generally cite Logan and Sweanor 2010 (from the Cougar book) for that. So young females can be gene dispersers. We have one female that dispersed from the Santa Monica Mountains all the way up to Los Padres National Forest (P33).

RESPONSE: Have reworked, now says “Because males are more likely to disperse than females, depredation removal may thus further inhibit adequate gene flow between mountain lion populations in southern California by removing the animals most likely to move between genetic populations (Vickers et al. 2017)."

Line 1115-1123 (Riley): A few things about this paragraph. At the beginning, what does "most" were sheep and goats mean? I would just give the numbers. Also, I think the language in this paragraph should really be past tense. Even though it was pretty recent, Dellinger et al. 2021a is still covering data through 2019, so we know what happened with that data, but we can't assume it is still the case. Also, in terms of subadults taking over and creating conflicts, I think it's worth also citing the Weilgus work from Washington for this idea. He became a controversial guy, but it doesn't mean he didn't produce valuable work with important conclusions and implications. Finally, though it may often indeed be subadults involved with depredations, we have definitely documented adult males taking livestock when available as well, including sometimes repeatedly, when domestic animals continued to be unprotected (e.g., P45).

RESPONSE: Based on this and other feedback, section has been altered to read "Interestingly, researchers have noted that at the county level, mountain lion depredation rates increased by 9% for every lion removed through a depredation permit the prior year (Dellinger et al. 2021a). This general pattern of increased depredations in an area the year after mountain lion removal was also seen in Washington state, though removals were done via sport hunting and therefore less targeted to individual mountain lions that may have been involved in depredations (Peebles et al. 2013). Dellinger et

al. (2021a) suggested this pattern could be a result of subadults moving to territories vacated when resident adults were removed. Research shows subadults can be more likely to use areas closer to people (Kertson et al. 2013), but evidence that subadults mountain lions have less well-developed hunting skills and are more likely to target easily killed domestic animals is not conclusive (Linnell et al. 1999; Peebles et al. 2013). "

Line 1148-1152 (Riley): I think the first part of this paragraph is a bit misleading. While it is true that the management mortality rate was roughly equal to all natural mortality causes, that seems to be a bit selective of the results. Management killing was the number one cause of mortality, and all human-caused mortality was twice that of natural mortality, which was affecting population-level survival. Though population modeling is needed to fully understand the impacts of different kinds of mortality, human-caused mortality generally, of which management killing was the most important element, was additive. Though the North Coast and Sierra Nevada populations are likely generally doing well, I think it's important to acknowledge the human-caused mortality could reduce the ability of these large populations to continue to serve as sources for the smaller fragmented populations. Especially if management killing is preferentially killing dispersing males, as you mention earlier in the section. Also, there is an "of" missing in the first sentence.

RESPONSE: We deal with management killing in this paragraph, but we expanded our discussion of Benson et al. (2023)'s results in section 3.1.1. on sources of mortality to include a mention of how human caused mortality in general is additive. Management killings in the North Coast and Sierra Nevada may reduce gene flow to the petitioned area but management killing has decreased in recent years (see newly added Figure 14), and therefore the impact of management killings on dispersal may be greatly reduced. Without specific data it is hard to say either way. Editing suggestion was completed.

Line 1163-1165 (Beier): These lines have pale gray highlighting.

RESPONSE: Fixed

Line 1168 (Riley): The "until recently" should be dropped here. There is still no population of bears in the Santa Monicas. We did have one bear, BB12, that was in the Santa Monicas for a while, but he then crossed 101, visited the Santa Susanas (where he likely came from), was headed back south, and sadly was hit by a car.

RESPONSE: Done

Line 1169 (Riley): It think it's important to put the word "can" between "wolves" and "affect" here. These studies come from one particular area, wolves and mountain lions certainly coexisted for a long, long time throughout North America and continue to do so in many places, and in the abundance model in Elbroch et al. 2020, wolf abundance was important, but human hunting also mattered, which does not occur in CA. Also, the mountain lion harvest numbers for the intermountain west states where wolves have reestablished have actually remained steady or increased since wolves have arrived. This would not be possible if wolves were having a consistent and significant negative effect on mountain lion populations. Also, the Elbroch et al. 2015 paper is about bears, as opposed to wolves, so it wouldn't be cited here.

RESPONSE: Done, and replaced Elbroch et al 2015 with the other Elbroch et al 2015 paper about wolves.

Line 1176 (Riley): Yes, I think coyotes scavenging lion kills is unlikely to have much impact on what the lions are getting from them, depending on when they start feeding from them. And in fact, trying to feed from lion kills is dangerous for the coyotes. We have documented a number of cases where coyotes were also killed by lions at deer kill sites, and in eastern Oregon (Rupprecht et al. 2021) they documented quite a bit of coyote mortality from cougars, similar to what they mention in this WY study.

If a coyote is killed while attempting to scavenge from a lion kill, that could actually add to the resources for the lion in that case! Although in Rupprecht et al. they did document quite a lot of scavenging by the coyotes, but it was unclear how much it was affecting resources for the cougars.

RESPONSE: Noted.

Line 1180 (Riley): As I mentioned elsewhere, this should be modified a bit, since more recently, vehicles and toxicants have caught up to intraspecific aggression in terms of importance as mortality sources in our area, and even more recently vehicles have overtaken both. You could just say "was" instead of "has been" here, , and then at the end of the sentence, add: ", although more recently, vehicles and toxicants have reached similar levels as mortality causes (Benson et al. 2020)."

RESPONSE: Done

Line 1187 (Riley): It would be good to cite Benson et al. 2020 here too, since the years given here are 2002-2018, but the Riley et al. 2014 reference didn't cover that whole time period.

RESPONSE: Done

Line 1233 (Riley): Again, I think it would be better to use the past tense here, as in "Second-generation ARs were more commonly detected…"

RESPONSE: Done

Line 1236 (Riley): Why is the percentage with three or more compounds given here, as opposed to four, or five, or six? I think the most relevant measure to give Is just the percentage of animals that were exposed to more than one compound, because that means they were exposed more than once. And that number is even more impressive, at 86% (213/247). I'm not sure how much more meaning there is from showing two vs. three compounds, but there is a lot of meaning gained from 0 or 1 to 2, I think.

RESPONSE: The data has been updated through the year 2022 and text adjusted to present proportion for mountain lions with 2 or more ARs detected. Text now reads " The Department's Wildlife Health Lab detected AR exposure in 94.2% (343/364) of tested mountain lion livers submitted between 2016 and 2022 (Fig.15; Rudd et al. 2020b; Rudd and Rogers 2021; Rudd et al. 2021; Rudd et al. 2022; CDFW unpublished data). Second-generation ARs were more commonly detected than first-generation ARs, despite a 2014 California regulatory change restricting second-generation AR use to certified pesticide applicators (Rudd et al. 2018; Rudd and Rogers 2021). Eighty-five percent of the mountain lion livers (306/364) tested had two or more different ARs present at the time of death, with 52.2% (190/364) of individuals testing positive for three or four different ARs, which indicates multiple exposure events are common (Fig. 16; Rudd et al. 2020b; Rudd and Rogers 2021; Rudd et al. 2021; Rudd et al. 2022; CDFW unpublished data) " Figure 16 also updated

Line 1237 (Riley): There was some work evaluating rodenticide exposure in mountain lions across the state that covered earlier years, specifically from 2003 to 2015, which I think would be worth mentioning at the end of this paragraph, or rather right before the last sentence. This was also work led by Bob Poppenga at the toxicology lab at CAHFS, the senior (last) author on the Rudd et al. 2018 publication, and also involving CDFW folks, specifically Stella McMillin. If you included it, it could say something like this:

"This 96% exposure level was actually higher than the 82% (103/125) exposure found in an earlier sample of mountain lion livers from across the state from 2003 to 2015 (Poppenga et al. unpublished data). Sixty-seven percent (84/125) of livers tested i this earlier sample had multiple different ARs present."

RESPONSE: The 2003-2015 data set was received from the reviewer, re-examined to calculate AR exposure metrics, and compared to the 2016-2022 dataset. The text was revised accordingly to: The 94.2% (343/364) total exposure prevalence recorded between 2016 and 2022 is higher ($X2 = 14.8$, $p < 0.001$) than the 82.4% (103/125) exposure prevalence found in mountain lion livers analyzed from across the state between 2003 and 2015 (Poppenga et al. unpublished data). In samples from 2003–2015, 67.2% (84/125) of livers indicated exposure to multiple AR compounds, which was lower than the exposure prevalence rate in livers tested between 2016 and 2022 ($X2 = 15.4$, $p < 0.001$).

Line 1237 (Riley): I think the end of the paragraph should be modified to say something like "To date, there was not a consistent observable pathological condition associated solely with AR exposure in the livers of necropsied mountain lions (Rudd et al. 2018). However, multiple mountain lions have been determined by state pathologists to have died from coagulopathy associated with AR exposure." As discussed on the next page, we have had multiple mountain lions in our area that have been determined to have died from AR exposure as a result of coagulopathy, upon necropsy by the pathologists at the state-wide pathology lab at CAHFS.

RESPONSE: This sentence was deleted.

Line 1248 (Riley): Though it may mention it, this Kopanke et al. paper is really about something else, other than reduced coagulopathic effects in felids. I think a more appropriate reference here would be the Gupta 2012 reference, if it mentions it, or something like that. I know of two earlier references that mention the reduced susceptibility in cats, the Roder 2001 "Veterinary Toxicology" book, and the Morgan et al. 2003 "Handbook of Small Animal Practice" (both cited in Riley et al. 2007, if that is helpful).

RESPONSE: This sentence was deleted.

Line 1257 (Riley): A couple of things about this first sentence. Most importantly, it was not us, the National Park Service, that concluded that these 7 deaths were associated with toxicosis and coagulopathy from AR exposure. It all but one case (P04, in 2004, who we were not able to safely extract from the field, so we did a field necropsy), these mountain lions were transported to the California Animal Health and Food Safety Lab's San Bernardino branch, and the necropsy, including the decision about cause of death, was from the pathologist at CAHFS, not by the National Park Service. Even in the case of P04, we consulted about the necropsy with CAHFS and submitted samples. We are happy to provide CAHFS reports for all seven of these cases, if that is helpful.

RESPONSE: The sentence has been revised to… In the Santa Monica Mountains National Recreation Area (CC-S), the deaths of seven mountain lions since 2004 were associated with AR exposure and toxicosis (Riley et al. 2007, NPS 2021)…

Line 1259 (Riley): It would be worth adding an update here, I think, after the first sentence, since we have more recent data in the Benson et al. 2020 Biological Conservation paper showing that AR toxicosis was a leading cause of death in our population up through 2019. Something like: "Through 2019, AR toxicosis was a leading cause of death for mountain lions in the population, along with vehicles and intraspecific strife (Benson et al. 2020)."

RESPONSE: Text added "In the Santa Monica Mountains National Recreation Area (CC-S), the deaths of seven mountain lions since 2004 have been associated with AR exposure and toxicosis (Riley et al. 2007; NPS 2021). Between 2002 and 2019, out of 26 known deaths of adults and subadults in that population, 5 were from AR toxicosis (Benson et al. 2020)"

Line 1262 (Riley): For this sentence, along with Riley et al. 2007, it would be good to cite the more recent work on this question, Serieys et al. 2015 and Serieys et al. 2018, both of which are already in the Lit

Cited.

RESPONSE: Reference changed to Serieyes et al. 2015

Line 1264 (Riley): We documented another case of this, actually with four full-term fetuses. It would be worth adding this case to this paragraph and to Table 4 on the next page. Specifically, adult female P54 was hit and killed by a vehicle in June, 2022, and both she and all 4 of her full-term fetuses had been exposed to multiple AR compounds.

RESPONSE: We thank the reviewer for contributing this additional case. We have added that case, attributed to NPS, and also added more recent CDFW data to this section. Revised text: Fetal AR exposure occurs in mountain lions, as exposure was detected in four of eight (50%) instances where both pregnant female mountain lions and fetal or placental tissues were tested (Table 4; CDFW unpublished data; National Park Service (NPS) unpublished data). Many toxic substances, including ARs, can adversely affect fetal development and survival at doses that may not produce toxic effects in the mother (Gupta 2012). Fetuses are also typically more susceptible to AR toxicity because the placenta is the only source of vitamin K for the fetus (Gupta 2012). AR-related coagulopathy and toxicity was not observed in any of the examined fetuses with AR exposure (Rudd et al. 2020, CDFW and NPS unpublished data).

Line 1271 (Riley): As mentioned in the last note, it would be worth adding P54 from our study to this table. She was exposed to 5 different compounds, and all 4 of her fetuses were exposed to multiple compounds. We can provide the specific compounds and the residue levels for inclusion in the table.

RESPONSE: same as above comment

Line 1278 (Riley): I think it would really be important to mention in this paragraph, or better yet, in a new, separate paragraph, that many cases of exposure of mountain lions to another rodenticide, bromethalin, have been documented in recent years. So far, we have tested 21 animals for bromethalin exposure an 12 have been positive. Bromethalin use has increased significantly in recent years as a result of the ban on ARs, and so has the detection of exposure in non-target wildlife by the CAHFS toxicology lab, according to Bob Poppenga at CAHFS and CDFW folks at the Wildlife Investigations Lab. We don't know what the secondary effects could be, and this emphasizes the point of the last sentence of the paragraph here, about more research being needed on other toxicants. Also, minor point, there is no "Rudd et al. 2019" in the Lit Cited. I'm presuming Rudd et al. 2018 was intended maybe?

RESPONSE: A section on bromethalin exposure in mountain lions has been added to the document.

Line 1296 (Riley): This is certainly true that a major disease outbreak could be "catastrophic," especially for a small population. However, there has never been a major disease outbreak documented in this species, that I have ever seen. So while it is of course important to be aware of the potential for disease, mountain lions specifically, and perhaps so-called solitary felids more generally may be less susceptible to epizootics that could affect many animals. This may be because they are not very social and live at such low densities.

RESPONSE: Wording changed to "However, small, isolated mountain lion populations are at greater risk of experiencing population-level impacts from disease, which could reduce their ability to persist into the future, especially when combined with other threats (Foley et al. 2013). "

Line 1305 (Riley): Since both of these studies were of seroprevalence, they are measuring the prevalence of exposure, not of infection, as stated on line 1392 in a couple of pages.

RESPONSE: Have altered text to read "Researchers have found antibody test-based infection prevalence in mountain lions to be low, "

Line 1320 (Riley): I think just saying "other carnivores" here would be preferable. "Mesocarnivore" is a confusing term that is used in all kinds of different ways by different people and in different circumstances. As just one example that is relevant here, in the original coining of the term mesopredator, in Soule et al. 1988, coyotes were not a "mesopredator" but were in fact the larger predator (for the canyons of San Diego). They seem to randomly sometimes be included as "mesocarnivores" and other times not. If you want to define what you mean by the term it can be OK (or less objectionable, I would argue), but I think it really doesn't add anything here. You already say in the next sentence that these species can be prey of mountain lions.

RESPONSE: This section has been shortened and this paragraph deleted.

Line 1340-1341 (Riley): A couple of things here. I think it would be good to give a citation for this statement about FPV causing high mortality in domestic cats. It is interesting to note, in reference to my previous comment, that domestic cats and African lions, the two most social felids, are also the two where viral infections have caused significant mortality. Also, again, the Foley et al. paper was looking at seroprevalence, so it was detecting exposure to pathogens, as it says right in the title, as opposed to detecting the pathogen itself. This may seem like a minor technical difference, but I think it is an important one.

RESPONSE: Have deleted the sentence about domestic cat population. Sentence including the Foley citation has been changed to "Antibodies to FPV were detected in 36% of wild mountain lions from California sampled from 1991–2008 (Foley et al. 2013). "

Line 1364 (Riley): While this may have been mentioned in Janet's paper (Foley et al.), it seems like there is probably a better direct reference about bird flu evolving to be able to be transmitted between mammals.

RESPONSE: Have changed reference to "Volume 30, Number 3—March 2024 Emerging Infectious Diseases: Recent Changes in Patterns of Mammal Infection with Highly Pathogenic Avian Influenza A(H5N1) Pablo I. Plaza, Víctor Gamarra-Toledo, Juan Rodríguez Euguí, and Sergio A. Lambertucci https://wwwnc.cdc.gov/eid/article/30/3/23-1098_article

Line 1366 (Riley): It is important because of the zoonotic potential, but I would say more relevant in the context of this document is that avian flu causing regular infections, illness, and death in wildlife, specifically mountain lions, could be an issue for mountain lion populations, especially small ones, as you discussed early in the section. A disease that is coming from prey, and not from other lions, could potentially be more of an issue than one that requires contact between conspecifics. Lions are typically mostly ungulate eaters, mostly deer in CA, but they can obviously eat many different things, including birds, as happened in these cases.

RESPONSE: This section has been updated to include six cases and emphasize importance of continued monitoring.

Line 1375 (Riley): I see from the reference that this was in CA. Might be worth mentioning that in the text here, and even saying where (I assume from the eastern Sierras, since Tom is the lead author?).

RESPONSE: This paragraph has been deleted.

Line 1401 (Riley): It might also be worth mentioning that we have documented lepto exposure and infection in mountain lions in our small population in the LA area (Helman et al. 2023, Scientific Reports 13:14368). Not sure if the Straub et al. paper included any animals from our area or not.

RESPONSE: This paragraph has been deleted.

Line 1417 (Riley): I think it would be worth mentioning in this paragraph that we have documented notoedric mange in six mountain lions during the course of our study, including P22. These were females P33 and P53 and P65, subadult males P89 and P90 (kittens of P65), and adult male P22. In all cases the presence of notoedric mange was confirmed through CAHFS, the state lab, working with parasite folks at the Vet school at Davis. Importantly, we also recently documented the death of a mountain lion from notoedric mange, adult female P65, in March 2022, the first case of mortality from notoedric mange in a mountain lion that we know of.

RESPONSE: Text added "In the Santa Monica Mountains, there have been six known cases of notoedric mange, including one adult female who died of the disease in March of 2022 (S. Riley pers comm. March 2024) & "However, notoedric mange had a negative impact on the population of bobcats in CC-S in 2002-2004 (Riley et al 2007), and in 2019-2021 there has been regular mortality from mange (S. Riley pers. comm March 2024)."

Line 1416 (Riley): This is generally true, although we documented an epizootic of the disease in bobcats, which are also a solitary felid, and it had a major impact on our population of bobcats, as discussed in Riley et al. 2007. And although mange in bobcats later declined by 2008-2010, it increased again after that, and in recent years, 2019-2021, we have again seen regular mortality in bobcats from mange. Also, as I mentioned in the last comment, we have had our first mortality in a mountain lion from mange, with P65, and she shared it with her two older kittens, P89 an P90 (we don't know who had it first or who transmitted it to whom).

RESPONSE: Text added "In the Santa Monica Mountains, there have been six known cases of notoedric mange, including one adult female who died of the disease in March of 2022 (S. Riley pers comm. March 2024) & "However, notoedric mange had a negative impact on the population of bobcats in CC-S in 2002-2004 (Riley et al 2007), and in 2019-2021 there has been regular mortality from mange (S. Riley pers. comm March 2024)."

Line 1428-1432 (Riley): I think you really need a different reference here, something about fire and Mediterranean systems more generally. I'm sure Megan's paper mentions that, but it's not the appropriate reference here, I don't think. I just checked Jennings et al., and there are some good references in there that would make sense. Also, there are multiple Williams et al. references in the Lit Cited, but none of them are 2023. Finally, I think you want to have a reference at the end of the paragraph here, about deer response to fire, which shouldn't be too hard to find.

RESPONSE: Text altered to "Fire is a natural disturbance in many California ecosystems. " Lewis et al 2022 added as deer reference. Fixed Williams reference.

Line 1439 (Riley): Again, Megan's paper is valuable and a nice contribution about lions and fire. But it was not a paper about the frequency of fires, so I think you really need a reference that directly is addressing that here. This is also true on line 1461, and for sure on line 1464 about fire return frequencies. You have a number of references for Jon Keeley in the Lit Cited which could probably work well, including the 2005 one and maybe some of the more recent ones (Keeley and Syphard ones), and I know there are some others as well.

RESPONSE: This paragraph has been reworked and sentences deleted.

Line 1487 (Ernest): The CDFW Proposal does not sufficiently account for rapid and severe progression of impacts of climate change (wildfires, drought, floods on fire- and drought-damage landscapes, more extreme weather patterns, etc.), and massive housing and industrial developments in the works and near future that will reduce or eliminate quality and quantity of mountain lion habitat including key movement corridors. The CDFW report cites literature that is now antiquated with regard to wildfire and

climate change in California, and thus doing so makes statements such as (page 50, starting line 1487): “, …burned areas likely continue to be used by mountain lions as redwoods are adapted to wildfire and trees commonly survive most wildfires and trees that succumb remain standing for decades. Additionally, redwood sprouts and seedlings are prolific following fires, numbering in the tens of thousands per hectare, and canopies develop rapidly (Lazzeri-Aerts and Russell 2014).”

RESPONSE: Due to reviewer comments, the Department has reworked the status review and the majority of the petitioned area is included in the area recommended for Listing. Which means that if approved by the Fish and Game Commission, the mountain lions in the area would get the full legal protections under CESA. Added some text in the section on redwoods and softened the language. It now reads "IIn the redwood forests of the Santa Cruz Mountains, mountain lions likely continue to use burned areas following most wildfires as redwoods are adapted to wildfire with trees frequently surviving low and moderate intensity wildfires and decay-resistant dead trees remaining standing for decades. In 2020, an unusually severe fire burned old growth redwoods in Big Basin Redwoods State Park north of Santa Cruz. Six months later, many trees were able to resprout, suggesting redwoods could have some resiliency to changing fire regimes (Peltier et al. 2023). Additionally, redwood sprouts and seedlings can be prolific following fires, numbering in the tens of thousands per hectare, and canopies can develop rapidly (Lazzeri-Aerts and Russell 2014). Consequently, dense cover favored by mountain lions for hunting and travel can develop within a few years following severe wildfire in these forests."

Line 1502 (Riley): I think it would be worth adding a bit here about the other collared lion that was lost during the Woolsey Fire, and to cite the sentence. You could add something like this to the end of the sentence: "…reasonably be attributed to wildfire-related injuries, and another collared lion disappeared as the fire passed through and is presumed to have died in the fire itself (Blakely et al. 2022)." You could also cite our report to CDFW that described these events (the report for 2018-2019), if you wanted.

RESPONSE: Text changed to "Vickers et al. (2015) documented the death of a collared mountain lion in the SA and one in the EPR due to burns from human-caused wildfires and, following the 2018 Woolsey Fire in the Santa Monica Mountains and Simi Hills, one collared lion was found in poor condition with burned feet and eventually died. Another collared lion disappeared and was presumed to have died in the same fire (Blakey et al. 2022)"

Line 1533 (Riley): Please also see the comment for page 20, about the importance of chaparral. As you say, this was speculation by Burdett et al., as opposed to something that they actually addressed in their study, i.e. they didn't have different classes of chaparral based on density or age (time since fire). We found in our recent paper on 15 years worth of data on habitat use and selection (Riley et al. 2021) that chaparral was the most heavily used and consistently selected vegetation type by mountain lions of all age and sex classes. And although we also didn't explicitly evaluate chaparral density, we had a range of different ages for chaparral across the life of the study. So I really don't think there's much evidence of mountain lions avoiding chaparral. Even in Burdett et al., chaparral was used about as much as it was available, and given that it was the most common vegetation type, that was a lot!

RESPONSE: Deleted relevant sentence

Line 1537-1539 (Riley): I don't think these are actually contradictory results at all, because the burned area after the Woolsey Fire was really essentially barren for much, if not all of that 15 months post-fire that we evaluated in Blakey et al. 2022. I think the better comparison is the one with Megan's paper (Jennings et al.) the you make at the beginning of the paragraph, but as you say there, they found that it was "the first few years" post-fire when lions were preferring it, and the kills were more likely in areas less than 6 years post-burn. Whereas again, our results from Blakey et al. were within just the first 15 months, and that fire, which was huge and intense, really moon scaped the whole area, so recovery has

taken some time. Jennings et al. also mentions that lions were avoiding grasslands and sparser areas, and we also found that they avoided grasslands and altered open areas (landscaped areas such as cemeteries and golf courses) in our 2021 JWM paper. More work needs to be done on how vegetation structure specifically affects mountain lion habitat use and selection, something that we're working on with Rachel Blakey. But I don't think there's currently much evidence of chaparral being avoided, and there is good evidence of its importance, as well as of avoidance of areas with low cover.

RESPONSE: Rewrote. It now reads "A study in the Santa Monica Mountains and Simi Hills after the 2018 Woolsey fire showed that, in general, mountain lions avoided burned areas up to 15 months post fire (Blakey et al. 2022).

Line 1542 (Riley): As Jon Keeley and others have regularly argued, though it is really valuable in forested systems such as in the Sierra Nevada, prescribed fire is really not an appropriate tool at this point in scrubland systems (CSS and chaparral), where fire frequencies are already much higher than they should be, and where there is regular type conversion to other vegetation types, often invasive grasslands, as you mention in the next section. So I think it's important to make the distinction here between different ecosystem types. There is forest in some areas of the petitioned area, such as along the Central Coast, and in some farther east areas like the Eastern Peninsular Ranges, but much of it, especially in the South Coast Area, is really dominated by shrublands.

RESPONSE: Text now reads "Several strategies are employed in forested ecosystems including prescribed burns and mechanical fuels reduction"

Line 1549, 1637,1648 (Riley): Just a couple of minor things in this section: Bedsworth et al. is not in the Lit cited (line 1549). On line 1637, it's fine to have Jennings et al., but it might be worth having a couple of other references here about avoidance of grasslands, like maybe Burdett et al. 2010 and Riley et al. 2021, if you want to cover some time breadth and geography (at least in the south). And Fuller et al. 2016 is also not in the Lit Cited (line 1648).

RESPONSE: Fixed reference issues.

Line 1646 (Ernest): Similar problematic statements (as on page 50) and imply that climate change is unlikely to affect “large-bodied mammals” including mountain lions and deer. This statement is likely false in regard to “temperature” but perhaps more importantly are the diverse effects of climate change (not just “temperature”) on disease pathogens, plant communities, and so much more. The cited references for this are also proven outdated by recent climate change effects to California, and to the many newer citations in these regards. Recent wildfires show this thinking is no longer valid. Bowers et al 2024 outline climate change in its diverse ramifications for habitats in Central and Southern California – including drought, increasingly catastrophic wildfires, increasingly catastrophic atmospheric rivers (https://www.science.org/doi/10.1126/sciadv.adi7905). An example of massive housing developments are those slated for the Tejon Range/Tehachapi region (Jan 10, 2024 “…It marks the next stage of a constant progression that will see Tejon Ranch eventually become home to more than 35,000 homes…” on website as viewed January 21, 2024, https://tejonranch.com/news-events/)

RESPONSE: Added text about Tejon ranch development in section on urbanization "For example, there are 35,000 new homes planned adjacent to current development at Tejon Ranch in the Tehachapi Mountains near the southern end of the Central Valley (Tejon Ranch Company 2024). Their buildout would decrease the available undeveloped land in a relatively narrow corridor where mountain lions move between the western Sierra Nevada and the central coast and southern California (Penrod and Smith 2022; Tejon Ranch Company 2024)." Added text to section on infectious disease "Recent detections of emerging diseases in California mountain lions coupled with potential for future changes in the distribution of pathogens and disease vectors due to habitat modification and climate change

supports the value of continued mortality monitoring and disease surveillance in this species (Thurman et al 2024). " We did not find any literature that specifically predicts threats of climate change to mountain lions, only papers that say things might change.

Line 1651 (Riley): I think you did a nice job with a relatively difficult subject in this section, and I agree that it doesn't seem likely that there will be too much of an effect of climate change on mountain lion distribution. We will see I guess. If there were more significant effects on mule deer, then of course that could in turn affect lions.

NO RESPONSE NEEDED

Line 1659 (Riley): I think it's important to add the lack of migration, or specifically immigration, to the factors that contribute to low genetic diversity and potential inbreeding depression, along with drift and inbreeding.

RESPONSE: Done

Line 1683-1688 (Riley): Yes, the Woolsey Fire in the Santa Monicas and Simi Hills in 2018 is a very real example of this. The Woolsey Fire burned 42% of the natural area in the Santa Monica Mountains and 66% of the natural area in the Simi Hills, and overall burned about 1/2 of the natural area within the two areas overall. It was really a devastating event, some effects of which are still being seen 5 years later. A couple of edits for this section - the fire was 39,234 HA, which is 96,949 acres. Also, although we were tracking 13 lions at the time, there were 11 mountain lions that we were tracking that were in danger of being affected by the fire - for example, P22, in Griffith Park, was far away from it. This is accurate to say that two lions died in or as a direct result of the fire, as I referenced for the previous section, but it was really 2 of 11, as opposed to 2 of 13. Also, definitely the best reference to use for this information is Blakey et al. 2022, which is already in the Lit Cited.

RESPONSE: Suggested changes were made

Line 1701 (Riley): I think the Ernest et al. 2014 and Riley et al. 2014 papers really need to be cited here, in a statement about the low genetic diversity of these two populations. The Gustafson et al. papers, discuss it too, certainly, but they are later, and are focused obviously on the whole state. These are the papers that established this issue for the Santa Anas and the Santa Monicas. And Holly's earlier paper in 2003, while important certainly, was not able to evaluate this, certainly not for the Santa Monicas.

RESPONSE: References added

Line 1702-1704 (Riley): We have DIRECTLY documented close inbreeding events multiple times in the Santa Monicas. In Kyle's paper, we can infer it from indirect evidence, but it is important to indicate, and it is much stronger, to say that we know it has been occurring. Specifically, we find kittens from a particular female, and then we use genetics to determine the father. We note cases in Riley et al. 2014, so that can be cited, but we have also documented multiple other cases of it since then. Specifically, we have documented multiple cases of adult male P12 mating with close relatives, including his daughters, grand-daughters, and great-granddaughters. These more recent cases could be cited as Riley et al. personal communication, if you want, but you could also cite reports that we have submitted to the Dept as part of our permit requirements. Specifically, the report covering 2016-2018 mentions a few cases. And in ongoing genetic work with UC Davis, we are documenting even more cases of this kind of close inbreeding.

RESPONSE: Added following text to section 4.10.4 "There are multiple known cases on close inbreeding, for example a male that had kittens with daughters, granddaughters, and great granddaughters (NPS 2018, S Riley pers comm 2014). "

Line 1706 (Riley): Minor thing, but I think it would be worth adding the word "long" here before "runs of homozygosity," as it is long runs that indicate more recent inbreeding.

RESPONSE: Made suggested change

Line 1716 (Riley): OK, but it is important to realize that we only evaluated two populations in Saremi et al., the Santa Cruz Mountains of CC-N, and the Santa Monica Mountains of CC-S, which are also two of the most distant of the smaller, low genetic diversity populations. Importantly, the Santa Ana Mountains and the San Gabriel-San Bernardino Mountains were not evaluated, so it's possible that these various southern California groups will be more similar in their pattern of inbreeding. The current work at UC Santa Cruz and as part of the California Conservation Genomics Project will shed more light on this.

RESPONSE: Noted

Line 1734 (Riley): Although the state-wide work and the Gustafson et al. samples are not from the same time, there are 5-10 years in between, at least, depending upon which Gustafson et al. samples you're talking about and when the scat surveys were done in a particular area. It's probably worth acknowledging that. This is a fair point, and definitely worth making, about census size being much larger than effective population size. I think it is important to acknowledge that estimating Ne from genetic data is a very indirect way of determining it, and there are some populations, such as ours in the Santa Monicas, and also the Santa Ana Mountains and maybe the Santa Cruz Mountains as well, were we have much more direct data on reproduction patterns that would provide a better estimate of Ne. Also, I know there has been a lot of interest and attention to state-wide estimate of the population, but I really don't know how much meaning that has, ecologically. I think it would be worth making comparisons between the census estimates and Ne's for different specific populations, especially in this document where the focus is on these coastal populations.

RESPONSE: This section and the discussion of effective population size has been reworked. The effective population size of individual genetic populations is no longer particularly relevant to the recommendation

Line 1731-1738 (Vickers): The draft analysis by Department and other statewide researchers that the 3,242 statewide population estimate in line 1732 was taken from also has a second population range that is higher based on one of the three models that were developed - that value range should also be noted with explanation. It should also be noted that both values are not yet peer reviewed. Also see my comments elsewhere regarding the use of Ne for population estimation and assumptions based on Florida panther research.

RESPONSE: We have reworked this section and the updated statewide estimate is no longer included here, but is instead is in section 3.2

Line 1733 (Vickers): The value of 483 in line 1733 is from Gustafson et al. 2019 and as noted includes some animals outside of California. The Ne being cited is much higher than the Ne total for the state (210) in Gustafson et al. 2022. See my earlier notes regarding detailing the full range of population estimates available and their sources, strengths, and weaknesses.

RESPONSE: This sentence and the number referenced has been deleted. Table 6 includes the two estimates of Ne for the genetic populations within the petitioned area

Line 1742 (Riley): So here, and throughout the document, there is a lot of going back and forth between citing the 2019 paper and citing the 2022 paper. I think it is not good practice generally, and could give the impression that the different papers are being cited selectively to make a particular point. In this case you were citing the 2019 paper repeatedly, and then now we have the 2022 one cited, but I don't

think it's clear why. I think it's important to be clear why you are citing one over the other. You could also more regularly cite both together, depending on the point being made, which could potentially alleviate this issue.

RESPONSE: Have clarified throughout

Line 1742 (Riley): So when you mention "WSN" here, do you mean the Management Unit, or the genetic cluster? I think it is important to be clear what you mean generally, especially with the abbreviations. The only abbreviation for WSN in the appendix, that I could find, was for the management unit.

RESPONSE: Updated the document to include the phrase "genetic population" when referring to the genetic clusters and use just the abbreviation alone or explicitly name the geographic area when talking about the physical landscape. Have added the full name Western Sierra Nevada to the first time it is mentioned in the text.

Line 1743 (Vickers): Need more recent citations after the sentence regarding "controversial" use of and Ne level of 50 as a threshold for increased risk of extinction.

RESPONSE: Have rewritten the section on effective population size and include Frankham et al. 2014.

Line 1750-1751 (Riley): We specifically addressed this in two detailed analyses of population viability for the Santa Monicas and the Santa Anas, in Benson et al. 2016 and Benson et al. 2019. I definitely think it's important to mention these results here, in a mention of viability, and to cite these papers (which are already in the Lit Cited). Line 1745 mentions how "extinction risk is the result of the complicated interaction of both genetic and demographic factors," which is an important point, and that is what we were specifically able to evaluate in those population viability analyses.

RESPONSE: CC-S which includes the Santa Monica Mountains is now within the area recommended to be listed, and have added the citations.

Line 1752-1763 (Vickers): Heterozygosity is discussed at the state level and in comparison to other western states, but a table or discussion should address the lower levels in the SC and CC populations in Gustafson et al. 2022 versus the SN unit. The similarly low level in the NC unit when compared to the SN unit should be discussed as a cause for concern as well. The heterozygosity levels in the NC individual unit in Gustafson et al. 2022 is notably lower, and similar to the 6 petitioned MU's, when compared to the KC, ESN, and WSN units, a fact that should also be noted in this report.

RESPONSE: Noted. However the NC is outside of the petitioned area and does not appear to be a significant source of migrants into the petitioned area.

Line 1752-1763 (Riley): Somewhere in this paragraph, I think it's important to distinguish between expected and observed heterozygosity, say which one you are focusing on, and why.

RESPONSE: text changed to "An important metric of genetic variation is expected heterozygosity (HE) . "

Line 1756 (Riley): What is this "average"? I think it is important to say what it is here, so the reader can evaluate how it's lower than in other states.

RESPONSE: The sentence contains a range of averages for other states, and allows the reader to evaluate that California's range is generally lower than other states.

Line 1762 (Riley): I think it's important to say something about why the CA landscape is unique. I certainly think this is true, and that It's relevant for lion population genetics, but I'm pretty sure every state would say that, i.e. that they have a unique landscape.

RESPONSE: Text changed to "The lower overall heterozygosity, as well as the large variance in

heterozygosity among local genetics populations, observed in California is most likely driven by barriers to dispersal such as mountain ranges and contemporary patterns of urban and transportation development"

Line 1766 (Riley): OK, it's really two genetic investigations, Holly's in the 2003 paper, and Kyle's in the 2019 and 2022 papers, depending a bit on how you define "investigation." The 2022 paper was using different markers, obviously, but it uses essentially the same samples, though a subset of them. I guess two is still "multiple," but it seems a bit misleading. Also, again in this paragraph, you start by citing the 2022 paper, but then switch over to the 2019 one. As I said, it would be better to be clear about why you're using one vs. the other, I think.

RESPONSE: Fixed

Line 1775 (Riley): I think it's definitely worth saying what the 2Ne-4Ne generations means in terms of number of generations, and in terms of number of years, maybe for a couple of populations, or you could give an average and range maybe.

RESPONSE: This paragraph has been deleted.

Line 1776 (Riley): Though I'm sure we mention it in there, I don't think Saremi et al. is really the appropriate reference for mountain lion generation time. Looking back at the paper actually, I don't see that we gave a citation for lion generation time, which is an oversight. Something from the 2010 Puma book would probably be good.

RESPONSE: This paragraph has been deleted.

Line 1782 (Riley): Which findings are you referring to here, by "these findings"? It's not really clear, I don't think. But overall for this paragraph, yes, I think it's hard to say too much about bottlenecks that may have occurred a long time ago, for many of these populations, and the bottleneck analysis using genetic data is again an indirect one, as opposed to knowing for sure that a population got very small at some point. It might be worth saying something about how recently the bottleneck may have been for some of the smaller populations, say for the Santa Anas especially, and CC-S.

RESPONSE: This paragraph has been deleted.

Line 1792 (Riley): I think it would be worth saying a bit more about what "unique alleles" were found in the SC genetic group. The 2022 paper is cited here, and it seems a bit odd to use the term "unique alleles" about SNP data. I guess that means that there were some loci that were polymorphic in the SC cluster that were not anywhere else? How many loci like that were found? And they were not found anywhere else? This makes me wonder about the 2019 paper, and to what extent there were private alleles found in any of the populations in that study. Either way, I think it would be worth mentioning.

RESPONSE: Text changed to "However, in the SC genetic group contained some private alleles not found in other genetic groups, which should be conserved to help preserve statewide genetic variation (Gustafson et al. 2022). "

Line 1795-1799 (Vickers): The statement in this sentence that acknowledges risks to a small population that are posed by inadequate genetic connectivity, then is followed by the statement that "a small population size ALONE (my capitalization) is not necessarily predictive of reduced population viability" is an odd statement to include, since the Department itself emphasizes again and again in this document the other significant risks to the petitioned populations - genetics, mortality rates, inadequate habitat levels, etc. This sentence seems to minimize risk for the smaller petitioned populations, even though the report lays out in clear detail the multitude of risks of decline that these petitioned populations face.

RESPONSE: Have altered text to read "While genetic risks may significantly increase a small population's risk of extinction, implementation of a well-planned conservation strategy can substantially mitigate risks associated with small populations."

Line 1798 (Riley): So this seems like a major and important statement, but it is currently just a one sentence throwaway line, it feels like. I think a lot more needs to be said here! What would this look like? Is this the plan? What would be represented? How would resilience be measured? What would be considered adequate redundancy? It is not enough to cite these references, I don't think.

RESPONSE: Noted, but getting into the details of a future plan is beyond the scope of this document.

Line 1801-1880 (Vickers): At this location in the report, the six individual MU's begin being discussed as consolidated into two populations based on Gustafson et al. 2022, but neither before this nor after, do there appear to be assessments of the entire group of the six smaller ESU's combined into one ESU or MU as was proposed in the CESA petition. The reasons for this exclusion did not appear to be explained in the report in my reading, and could be interpreted as somewhat arbitrary - it would be appropriate to explain further.

RESPONSE: Section 6.1 is the discussion of why the individual and combined populations do not qualify as an ESU. Due to this and other feedback from external reviewers, the entire petitioned area is evaluated as a DPS.

Line 1803 (Vickers): As noted earlier in the document, I suggest that Table 2 from Gustafson et al. 2019 and Table 1 from Gustafson et al. 2022 need to be included in this document on pages 21 and 22 to inform the reader about the best supported genetic parameters that are known about these populations. Those tables should be referenced here.

RESPONSE: Table 2 in Gustafson et al. 2019 is now included as Table 2

Line 1805 (Riley): Since there are only 4 broad groups, it's worth saying which ones are low, Central Coast and South Coast, and which ones are high, Sierra Nevada and North Coast. Especially because Figure 4 is 40 pages back! Incidentally, it's worth giving a page number here for Figure 4, for that same reason.

RESPONSE: Text modified to read "Of the broad-scale groups, SC and CC have relatively low genetic variation while SN and NC have retained sufficient variation to be capable of serving as sources of genetic rescue under various management scenarios (e.g., improved connectivity, assisted gene flow). "

Line 1808 (Riley): Sure, but maintaining and enhancing connectivity between these broad groups is easier said than done! Especially between NC and CC, through the Bay Area, and between SN and CC, through the Tehachapis and across 5. This is one reason why it might be important to extend protection to the northern part of CC-S, in Los Padres National Forest, as well. As I mention elsewhere as well, connecting all of the coastal populations to the rest of the state is really important, from a genetic point of view, and this Tehachapi connection is the main way that could occur, certainly to all of the Central Coast.

RESPONSE: Noted, and the Tehachapi connection is now included in the area recommended for listing.

Line 1820 (Vickers): See my notes elsewhere in the report regarding use of Ne for statements about population size.

RESPONSE: The inclusion of the estimated effective population size is linked to a statement about low genetic variation, and is part of the criteria for imperilment in the DPS framework which is why we keep it in this section.

Line 1821 (Riley): Yes, if the whole CC-S has a Ne of about 3, this area is clearly at significant risk. This is borne out by the PVA analysis in Benson et al. 2016, and also by the fact that we have documented multiple animals in the region of the Santa Monicas to the Santa Susanas with evidence of potential inbreeding depression, including distal tail kinks and high levels of teratospermia (Huffmeyer et al. 2022).

RESPONSE: Noted. We talk about CC-S and cite the results of Huffmeyer et al. 2022 further down in this section.

Line 1823 (Ernest): The citing of literature reporting “close inbreeding” in the Santa Monica Mountains (CC-S), Santa Cruz Mountains (CC-N), as well as Santa Ana Mountains – is really important. This is a late harbinger of populations that are too small and lacking gene flow from other populations – this is a call to more protection for these populations

RESPONSE: CC-S and CC-N are now in the area recommended for listing

Line 1823 (Riley): As mentioned before, we have actual direct documentation of close inbreeding in the Santa Monica Mountains, repeatedly, as opposed to the "evidence" of it, in Kyle's paper, and the "suggestion" of it, in the genome paper (Saremi et al., line 1826). We report it in Riley et al. 2014, and we have documented it repeatedly since then as well. Again, the way we have done it is by sampling kittens, when we know a female has given birth (we have now documented 27 litters of kittens at the den), and then determining who the father of the litter is by using genotyped samples from males in our study. We are also able to use GPS telemetry data to document mating events between males and females, although it's always important to verify the father using genetics, since females may consort with more than one male, and we are never following every animal in the population. Both here and previously, it should be noted that we have repeated known examples of this close inbreeding. We can compute the total number, and let you know what that is, if that would be useful. As I mentioned, for the ones since the 2014 paper you could cite Riley et al. unpublished data, but you could also potentially cite our reports to CDFW, specifically the one for 2016-2018 where we mention 2 specific cases. We are also currently doing work with graduate student Cass Rodriguez in Ben Sacks' lab at UC Davis to further document other and more recent examples.

RESPONSE: We have added more detail to this paragraph about evidence of inbreeding based on this and other reviewer comments.

Line 1828-1846 (Beier): This clearly states that the Central Coast South MU is a mess. How does it not qualify as a DPS?

RESPONSE: CC-S is now in the area recommended for listing

Line 1829 (Riley): The Huffmeyer et al. 2022 paper needs to be cited here, as it is really the only one that has documented signs of inbreeding depression similar to what was seen in Florida. In Ernest et al. 2014 they mention a tail abnormality, but it is not at all distal (see photo in the paper), and therefore not similar to the Florida panther cases and could more likely be a break.

RESPONSE: Reference added

Line 1830 (Riley): So this statement about the very low genetic variation, at a similar level to the Santa Anas, and lower than anywhere else other than in Florida Panthers, is about the Santa Monica Mountains specifically, and not the CC-S MU more broadly. This should be made clear in the text. In fact, if the CC-S MU includes Los Padres National Forest, than the variation would likely be quite a bit higher. And that would be even more true if the Sierra Pelona Mountains, E of Highway 5, were also included in CC-S (though as I said, I don't think it makes sense to do so). Again, it needs to be very clear what the

boundaries of the different MUs are.

RESPONSE: We have reworked this section and clarify when the Santa Monica Mountains and not CC-S as a whole is relevant.

Line 1833 (Riley): Here, and in some other places, references are not in chronological order. I assume that is the intent in general, for them to be chronological? If so, it should be checked throughout, and made consistent. I definitely think chronological order make the most sense, as opposed to say alphabetical order (which these seem to be in).

RESPONSE: Done

Line 1834 (Riley): The Ernest et al. 2014 and Vickers et al. 2015 papers are not about CC-S, they are about the Santa Ana Mountains, so it wouldn't make sense to cite them here.

RESPONSE: Fixed

Line 1836 (Vickers): After "the" add "significant potential for"

RESPONSE: Have changed text to "Models predict a 16–28% probability of the extirpation of the Santa Monica Mountains population within 50 years if immigration levels remain the same or are reduced, in part due the impacts of inbreeding depression (Benson et al. 2016; Benson et al. 2019)

Line 1836 (Riley): Again, this modeling in Benson et al. 2016 (and 2019) is about the Santa Monica Mountains specifically, not CC-S more broadly.

RESPONSE: Have changed text to "Models predict a 16–28% probability of the extirpation of the Santa Monica Mountains population within 50 years if immigration levels remain the same or are reduced, in part due the impacts of inbreeding depression (Benson et al. 2016; Benson et al. 2019)

Line 1838-1842 (Vickers): It should be noted that the CC-C MU has inadequate levels of protected acreage relative to the amount spelled out in Dellinger et al. 2020 that is needed for long term stability of that source population for the CC-N and CC-S MU's. Development also threatens to bisect the CC-C MU

RESPONSE: Noted

Line 1839 (Vickers): After "inbreeding" add "though the percentages of the habitat that is conserved raises concerns about long term genetic stability and fragmentation. (Dellinger et al. 2020)"

RESPONSE: Done

Line 1842 (Riley): Again, this should say CC-S here, as opposed to the Santa Monica Mountains, since the Santa Monicas are only a part of CC-S, and in fact are the very farthest south, and distant from CC-C, part of it.

RESPONSE: Text has been changed to "Bi-directional migration rate models indicate the CC-C serves as a significant source of migrants for CC-N and CC-S "

Line 1845 (Riley): Yes, this is a good and important point, about maintaining connectivity to and within the CC-C MU. I would add, as you've stated on the previous page, that in particular, connectivity between CC-C and the Sierra Nevada, through the Tehachapis, is especially important.

RESPONSE: Noted

Line 1857 (Vickers): After "Riley et al 2014" add "Gustafson et al. 2019 and Ernest et al. 2014"

RESPONSE: Done

Line 1859 (Riley): Again, the one case of a kinked tail in the Santa Anas is very different, morphologically, from what they were seeing in Florida.

RESPONSE: Noted

Line 1861 (Riley): I think more detail would be valuable here about the results of the analyses in Benson et al. 2016 and 2019, especially since the Santa Anas are currently part of the group proposed for listing. This sentence isn't really true - for the Santa Anas there was a 16-21% of extinction in the models just based on demographic stochasticity. The high likelihood of extinction within 50 years would be if inbreeding depression sets in and affects survival and reproduction the way that it did in Florida.

RESPONSE: This paragraph has been reworked and the relevant text now reads " For example a thirteen-year study (2001–2013) that collared 74 mountain lions in the Santa Anas and EPR observed only one mountain lion move from the SA to the EPR, and that individual was killed for depredating sheep before it could breed and introduce genetic material to the group (Vickers et al. 2015). The impact of this isolation and inbreeding has led to a "16–21% probability of local extinction in the SAM due purely to demographic processes over 50 yr with current low levels or no immigration" (Benson et al. 2019)."

Line 1870 (Vickers): Add "and" after "Nevada"

RESPONSE: Done

Line 1877-1880 (Vickers): There is no reason to believe that maintenance of the status quo for any of these MU's will result in improvement or reconnection absent additional protections that can lead to concrete measures to enhance their survival and genetic connectivity. This paragraph and subsequent recommendations for the most part do not spell out what legal or policy drivers there are, in the absence of added legal protections associated with Threatened status, that will with some confidence lead to the desired improvements to genetic status and long term survival potential.

RESPONSE: The updated recommendation is for the majority of the petitioned area to be listed as Threatened with the resultant legal protections

Line 1878 (Riley): I would argue that there are two populations that are not currently "interconnected," the Santa Anas, and the Santa Monicas, or a Santa Monicas Management Unit, if that were to be considered. It is true that the Wallis Annenberg wildlife crossing will help connect the Santa Monicas to other areas, but it is not completed yet, and while we are confident that it will be effective for mountain lions and other species, I think it is not a good idea to presume that it has effectively connected the Santa Monicas to other areas before documenting it. And, as mentioned elsewhere, there are two other roads between the Santa Monicas and the larger source population of Los Padres National Forest and the Central Coast Central cluster. Finally, as you have also alluded to elsewhere in the document, I think that the San Gabriels/San Bernardinos area is potentially not that well connected to other areas. Though this MU would obviously be afforded protection by listing the South Coast Group as a DPS.

RESPONSE: Changed interconnected to 'somewhat connected'

Line 1900 (Riley): I think it is pretty hard to see what is going on in this map. For example it is hard to pick out the federal NPS, Forest Service, and BLM lands. Our park, Santa Monica Mountains NRA, is basically impossible to see. I think some brighter or more contrasting colors might be helpful. I understand that part of the issue is showing such a large area; perhaps there could be this one, and one showing just the southern California region, where it is potentially a bit more complex? Also, I'm wondering why the CDFW areas are labeled specifically? I understand they are Dept Lands, but I'm not sure they are particularly important in this context. But maybe I'm missing something? Finally a general comment, all of the maps need a north arrow and a scale bar, I think.

RESPONSE: Reworked this map.

Line 1906 (Riley): I think it's notable the Prop 117 and the California Wildlife Protection Act specifically called out the Santa Monica Mountains, the Simi Hills, and the Santa Susana Mountains, the region that we are proposing for potential consideration as a management unit, as areas of concern for mountain lions more than 30 years ago. We certainly believe that that concern continues to be warranted, and that there is plenty of evidence to support that.

RESPONSE: Noted

Line 1993 (Riley): A minor note: this sentence mentions 3 HCPs and 4 NCCPs, and that 3 of the 4 NCCPs include mountain lions. However, the next 4 paragraphs describe 4 plans, all of which seem to be both HCP/NCCPs, and all of which seem to include mountain lions. So potentially a bit of a discrepancy there.

RESPONSE: As is clarified further down "The Orange County Transportation Authority NCCP/HCP (OCTA Plan) lists the mountain lion as a covered species for purposes of the federal HCP, but not for purposes of the NCCP permit"

Line 2074 (Riley): Maybe a minor thing, but shouldn't the title here be "National Forest and BLM lands"? That would better match the ones in this section. And there are resource management plans for national parklands and for military bases too, so not sure why those would be called out here, but not in the other sections.

RESPONSE: Done

Line 2114 (Riley): I think the title here should just be "National Parklands" or "National Parks" or something like that. In the National Park Service, all units, regardless of specific title, are referred to as "parks." And most importantly, from the point of view of conservation, both generally and for mountain lions specifically, it really doesn't matter what the specific name of the park is, i.e., national park or national recreation area or national monument or national preserve (and there are others, like national scenic river, national parkway, etc.). The mandate is the same for all units: to preserve the lands of the national park system, and the resources within them, including the wildlife, for the enjoyment of future generations.

RESPONSE: Done

Line 2129-2132 (Riley): A couple of minor things here - on line 2129, this should say "Other NPS lands," since all of these places are managed by the National Park Service, not by some other federal agency. Also, there wouldn't be a "the" before "Golden Gate National Recreation Area," or before "Santa Monica Mountains National Recreation Area," just as there isn't in front of everything else on this list. Also, Muir Woods is not within the proposed zone, since it is north of San Francisco in Marin County.

RESPONSE: Done

Line 2134 (Riley): I wonder if it would be worth having a section of Land Conservancy lands in this State section, such as those of the Santa Monica Mountains Conservancy, in southern California. They are definitely an important player in a potential Santa Monica Mountain MU, in the CC-S MU, and in southern California generally. And perhaps there are other similar state land conservancies that are worth mentioning?

RESPONSE: Noted, however that is a level of detail that is beyond the scope of this document.

Line 2205 (Riley): A couple of notes here: Runyon Canyon is a city park, but Franklin Canyon is owned by MRCA and by the National Park Service. Encino Reservoir is west of the 405 Freeway and Stone Canyon Reservoir is east of it, although in our proposed Santa Monicas to Los Padres MU, it would all be

included. We think this would be valuable, to include the eastern Santa Monicas, as well as Griffith Park, in the MU, and those areas are all certainly important to the City of Los Angeles.

RESPONSE: Noted

Line 2290 (Riley): Happy Camp is already part of an important linkage, although because it is in the Santa Susanas, as you say, it is really part of the linkage between the Santa Monica Mountains and Los Padres National Forest. Also, as I mentioned in row 45, it would be valuable to include something about the Santa Monica Mountains Conservancy. They have many really important areas, both for conservation overall, and for connectivity specifically. Of relevance here is that they actually own most of the important public lands in the Santa Susanas, specifically areas to the east, along Highway 5, in East and Rice Canyons and that area. I think it would also be worth mentioning, in this section, two other local Ventura County Open Space agencies that are important in a potential Santa Monicas to Los Padres MU, including in the Santa Monicas, Santa Susanas, and especially in the Simi Hills. These are Rancho Simi Recreation and Parks District (RSRPD) and Conejo Open Space Conservation Agency (COSCA). Let me know if it would be helpful to have more information about these two agencies.

RESPONSE: Noted. However that level of detail is bit too fine scale for this document

Line 2251 (Riley): I think this statement about our 2019 paper is a bit strong, i.e., that "Gustafson et al. found more lions emigrated from" the Sierras to Nevada than vice versa. It comes down to what genetic data means exactly, and what the population genetic methods can tell you. I think it's fine to say that "Gustafson et al. (2019) found evidence of more movement from the Sierras to Nevada than vice versa." Depending on the strength of the population differentiation, and how clearly an individual assigns to a different area than it was found in, it can certainly be good evidence that it was a migrant. But that is not the same as knowing that it moved, through radio-tracking (GPS or VHF), or by capturing it in both places.

RESPONSE: Text changed to suggestion.

Line 2290 (Riley): I don't think there is much evidence that jaguars have much of an impact on mountain lions. I am not a jaguar expert certainly, but they have broadly coexisted for many thousands of years across Central and South America, and continue to do so where jaguars are still present. I think citations are needed here at least.

RESPONSE: This section has been shortened and the relevant sentence deleted.

Line 2291 (Riley): I think it would be valuable to show on a map where connectivity may be present currently between CA and Mexico, if possible.

RESPONSE: Added Figure 21 which has a representation of the border and known crossings by mountain lions.

Line 2295 (Riley): I think it's important to be a bit more specific here, about what you're saying is implied by the SNP data, and in particular about local populations having "considerable shared ancestry" and being "more genetically similar than previously thought." Which local populations in particular are sharing this ancestry across barriers? And what is meany by "than previously thought"? Than thought after our 2019 microsat paper? This needs to be clear, I think.

RESPONSE: Text altered to read "The same study used SNPs to characterize variation across more of the genome, which suggests many of these local genetic populations separated by barriers have considerable shared ancestry (Figs. 7, 8) and are more genetically similar than was suggested by the result of Gustafson et al. (2019)

Line 2337 (Riley): We would propose a couple of other considerations about the significance of a population segment that we think are relevant, given this statement that "This consideration my include, but is not limited to, the following." One is the ecological importance of the species, or in this case of the population segment of the species. Mountain lions are a large carnivore, and more specifically, they are a large carnivore that is purely carnivorous, as opposed to omnivorous, and that specializes on large prey, specifically ungulates such as mule deer. Although wolves are making their way back into more of California, for large parts of the state mountain lions are the only species that fills this role, and that is likely to be the case for some time to come and perhaps permanently, if there are places that wolves are not able to recolonize and establish. My understanding is that there is evidence that wolves did not historically occupy all of California, especially the drier, southern parts, dominated by shrublands. Although coyotes, and sometimes even bobcats, will also kill deer, especially fawns, mountain lions are the dominant predator of ungulates in the state, and they will prey on other species as well, including other carnivores such as coyotes, raccoons, foxes, bobcats, and domestic cats. Given the normal densities of mountain lions relative to their various prey species, mountain lions may rarely have significant direct trophic impacts on their main prey populations. However, they can affect some populations through predation, such as rare bighorn sheep populations. And, they can certainly be affecting all of these different species from a behavioral perspective. More and more research, including in California, is investigating and finding ways that mountain lions and other predators may be affecting the behavior of various prey species. Most importantly from a conservation and ecological perspective, mountain lions are the only species that fills their role. While we may not understand all of the ways this role affects other species and the ecosystem more broadly, losing this species from any system is a major loss, we believe, and as we often say, not an experiment that we want to conduct. We believe that every species is important and worthy of conservation, and indeed, this is our mandate in the National Park System. However, it is also true that mountain lions, as the only apex predator regularly preying on ungulates and other large species, are particularly important to conserve from an ecological perspective. Another significant factor that we would propose for consideration is the importance of the population segment to the people of the area and to the state more broadly. In the case of the mountain lions of the Santa Monica Mountains and surrounding areas, people have learned about and followed the population very closely, and we believe care deeply about the continued presence of the species in the Santa Monica Mountains and in the Los Angeles Area more broadly. This was the case specifically with P22, as evidenced by the outpouring of concern and sadness upon his death in late 2022, including a full capacity celebration of life at the Greek Theater. While P22 was the most obvious symbol of lions in LA, and the animal that lived farthest into the city itself, people care about and follow the population more broadly. We believe that it would be a significant loss to the people of southern California and of the state overall if this population segment were lost, and so we would propose the importance of the population to the people of the area as another measure of significance. This is obviously different from the others, in terms of not being related to biological factors, but we think that biology is not the only factor that can be important in conservation. Finally, we think it is worth considering measuring significance by the importance of the management unit in terms of connecting other mountain lion populations. Criterion b, about a gap in the range, might cover this, but it's not clear to me how that criterion is being applied, and it doesn't seem like it is fully covering the importance of these connections. For example, the connection between CC-S, specifically the northern part along 5 in Los Padres National Forest near Gorman, and the Tehachapis, is critical for genetic connectivity for mountain lions across the state. And the connection between the Santa Susana Mountains and the San Gabriels is similarly critical for connecting the Central Coast populations to the South Coast Group. Though this connection is not very strong currently, there is current work going on to better understand and improve it, and that fact that it is not strong does not diminish its importance, I would argue.

RESPONSE: We no longer evaluate the genetic populations individually using the DPS framework. Instead, the whole petitioned area was evaluated and found qualified as a DPS using the existing criteria. Therefore expanding the criteria used in the assessment would not change the recommendation.

Line 2378 (Ernest): The CDFW proposal incorrectly downplays the ecological uniqueness of the Central Coast habitats, and implies that there is little there of ecological importance to mountain lion biology that is not found elsewhere. This is a false assumption as vast lists of endemic plant systems and island native plant systems demonstrate (see Calflora and California Native Plant Exchange online resources). Central Coast habitats are rich in unique ecosystem and biome features. Mountain lion prey evolved with and depend on those unique ecosystems and mountain lions evolved with and depend on the prey. For example, the Santa Lucia ecoregion … has "qualities include the southernmost native stands of the coast redwood, as well as the presence of several notable endemic species." (Reed Noss description as viewed 1/20/2024 https://www.oneearth.org/ecoregions/santa-lucia-montane-chaparral-and-woodlands/). There is a strong genetic signal that the coastal populations south of San Francisco Bay and Delta are distinct from other mountain lion populations in rest of California – see Fig 3 of Gustafson 2022.

RESPONSE: We no longer evaluate the genetic populations individually using the DPS framework. Instead we evaluated the whole petitioned area (including CC-C) and found it qualified as a DPS.

Line 2381 (Ernest): The CDFW proposal incorrectly implies that mountain lions in the Coast ranges lack unique adaptive evolutionary traits. There are no studies that address this issue with any accuracy. The published science cited by the CDFW report is not sufficient to rule out the local adaptations of California mountain lions to their habitats. 1) mitochondrial data and the citations are insufficient to infer anything about local adaptation. This citation and inference should be deleted.

RESPONSE: This section has been reworded and now states "1. There is only one recognized subspecies of mountain lion in North America (P. c. cougar) based on mitochondrial DNA data (Culver et al. 2000; Caragiulo et al. 2014; Kitchener et al. 2017), suggesting a reduced potential for adaptive localized genetic variation among North American mountain lion populations." The department's remaining conclusions about local adaptation are taken directly from published literature (i.e., Gustafson et al. 2019 and 2022).

Line 2435 – 2446 (Wilmers): The criteria for determining "Significance" date back to 1996 and require some updating. Ecological science has made important progress in understanding the significance of species since that time, and this needs to be reflected in the listed criteria. This is especially true for keystone species and apex predators. A keystone species, for instance, wasn't definitively defined until late 1996 (too late for inclusion into the USFWS list of significance criteria) as "one whose effect on ecosystems is large and disproportionately large relative to its abundance" (Power et al. 1996), and in the 1990s ecologists were still debating whether the impacts on ecosystems by top predators were confined to aquatic ecosystems (Strong 1992). But science has made great strides since then. There is now abundant evidence that apex terrestrial carnivores are keystone species through their direct and indirect effect on other species in an ecosystem (Estes et al. 2011). Removing apex terrestrial carnivores can have dramatic impacts on herbivores (Terborgh et al. 2001), trees (Ripple and Beschta 2008), stream erosion (Ripple and Beschta 2006), disease (Levi et al. 2012), carbon cycling (Wilmers and Schmitz 2016, Schmitz et al. 2018) and many other ecosystem processes (Ripple et al. 2014). Surely these impacts are of concern to California residents and should be considered when determining "Significance". The USFWS seems to have anticipated that evaluations of significance would change with new knowledge when they wrote (and the Department repeated – line 2445) "This consideration may include, but is not limited to, the following:" I therefore suggest a new category e) be added to the significance list (lines 2438 – 2446) which acknowledges the many advances in ecological science since the writing of these criteria. I

propose that it read “Evidence that loss of the discrete population segment will lead to significant ecological impact”.

RESPONSE: Noted.

Line 2435-2440 (Beier): Significance can derive from "Persistence of the discrete population segment in an ecological setting unusual or unique for the taxon." I would argue that the urban sea thoroughly intertwined with several units (SA, SM/CCS) is a "most unusual ecological setting for the taxon" and thus qualifies as Significant. Anybody who sees the photo of P22 and the Hollywood sign appreciates this fact. Humans are part of ecosystems. And the humans in these ecosystems increasingly value mountain lions.

RESPONSE: Based on this and other feedback we evaluated the whole petitioned area as a DPS and the units mentioned are included in our updated recommended area for listing.

Line 2450 (Riley): We would like to propose another Management Unit that has not been evaluated to date, that we think is worthy of consideration for listing. Specifically, we would propose the "Santa Monica Mountains to Los Padres" Management Unit (or some similar name). Geographically, we would suggest that the northern line of the proposed Southern Coast Unit (p. 102, Fig. 19) be extended essentially along the Santa Clara River from where Highway 14 crosses over it in western Santa Clarita, along the Santa Clara River to the west to where it meets the ocean between Ventura and Oxnard. This means that the MU would then include the Santa Monica Mountains, the Simi Hills, and the Santa Susana Mountains. We would propose that the MU also include a buffer 10 km north of the Santa Clara River, as far west as Saticoy at the east end of Ventura, so that connectivity between the Santa Susana Mountains and Los Padres NF, the critical last step in the overall Santa Monicas to Sierra Madre Linkage, is preserved. In terms of the criteria for listing an MU, the Santa Monica Mountains themselves would be the main focus, but the Simi Hills and the Santa Susana Mountains are critical for the long-term persistence of mountain lions in the Santa Monica Mountains, since connectivity between the Santa Monicas and Los Padres, the site of the nearest large source population, is necessary because of the small size and isolation of the whole population. In terms of the criteria, the Santa Monica Mountains are discrete, because of the physical barrier of the large and very heavily trafficked 101 Freeway, which separates them from the Simi Hills, and thereby all other natural areas, to the north. There are also two other important roads in the MU, the 118 Freeway between the Simi Hills and the Santa Susanas and Highway 126 between the Santa Susanas and Los Padres NF. The discreteness of the Santa Monica Mountain population is also demonstrated by genetic data, first in Riley et al. 2014, and by dispersal data, see also comments for page 20, about population structure. In terms of significance, we would argue that the Santa Monicas to Los Padres MU is significant in 4 ways. The first is a) "an ecological setting that is unusual or unique for the taxon." This MU is the only place in the state, and in fact in the whole range of the species, where mountain lions persist in a megacity, i.e., a metropolitan area of 10 million or more people. And in fact it is one of two places on the planet where a large felid exists in a megacity, the other being Mumbai, India, where there are leopards. There are other urban areas where mountain lions exist on the fringes, such as Seattle, WA; Denver, CO; and Salt Lake City, UT. But none of these cities are nearly as large, sprawling, and crisscrossed by major freeways as Los Angeles. Mountain lions in the potential Santa Monicas to Los Padres MU, which includes the eastern Santa Monica Mountains (E. of the 405 Freeway) and Griffith Park, represent a "setting that is unique and unusual" for the taxon. There is also increasing evidence that animals in urban habitats are specialized to those habitats, and that they are more likely to stay and reproduce within these urban habitats, adding to their unique qualities. Along with criteria a), we would propose that a Santa Monicas to Los Padres MU is also significant in 3 other ways. One, it is the only species filling the apex carnivore role in the ecosystem; two, the population is extremely significant to the people of Los Angeles and the

surrounding region; and 3) the MU represents a critical connection between the CC-C MU and the San Gabriel-San Bernardino MU, another relatively small and isolated MU. This connection would be primarily across Highway 5 south of Santa Clarita, and if connectivity could be increased, it could potentially be through the eastern Santa Monica Mountains, Griffith Park, and the Verdugo Mountains to the San Gabriels.

RESPONSE: The area mentioned is now recommended to be listed.

Line 2450 (Vickers): See earlier notes regarding the lack of examination in the report of the full set of MU's combined as proposed in the CESA listing to designated the entire ESU as Threatened.

RESPONSE: Section 6.1 is an evaluation of whether the petitioned populations meet the criteria to be considered an ESU either individually or collectively. Lines 2378-2380 state "Taken as a whole, the genetic evidence does not support applying the ESU concept to the overall petitioned area or any of the Management Units individually, as a subspecies or ESU for the following reasons:"

Line 2453 (Vickers): See note above under lines 1801-1880

RESPONSE: Section 6.1 is the discussion of why the individual and combined populations do not qualify as an ESU. Due to this and other feedback from external reviewers we evaluated the entire petitioned areas as a DPS.

Line 2453 – 2465 (Wilmers): The petitioners ask the department to consider listing six identified genetic populations of mountain lions along the central and southern coasts as a single ESU or alternatively whether any of the six populations individually or in combination comprise an ESU. I can understand the department treating these as DPSs instead of ESUs – this makes sense for the reasons they describe– but the department still needs to consider all six populations as a single DPS. This was clearly the intent of the petitioners and the departments lack of consideration of the merits for listing all six populations together as a single DPS seems like a major oversight.

Line 2470 (Ernest): The decision matrix Table 7 should be reworked given these multiple issues noted above.

RESPONSE: Done.

Line 2473 (Vickers): It seems reasonable to me to conclude that all 6 petitioned ESU/MU groups are markedly separated from each other based on the clear contemporary genetic separation in both Gustafson papers and the <10% gene transfer between them noted in lines 696-713 that was used to justify assessing the petitioned populations as individual MU's. The matrix presented here is puzzling in that each individual population is listed, and the two population groups, but not the entire petitioned ESU as a single entity. This is especially puzzling given that the report's first listed task was to evaluate the primary proposal in the CESA petition of establishing the six populations together as an ESU (or following the Department's scheme in this report, an MU) and to determine if it warranted being listed as threatened. Though using the larger population groupings from Gustafson et al. 2022 is one option, there are many others as the report notes, thus it is puzzling that an MU combining all 6 smaller MU's was not evaluated. Additionally, other MU groupings might also be considerations. The SMM/CC-S MU would generally be considered to be more associated with southern California than the central coast geographically and ecologically, and could very reasonably be included in the South Coast group MU as easily as the Central Coast group. MU's could be grouped by other measures as well, such as levels of risk of decline based on any number of factors and analyses that have been conducted. In the end, given the levels of risk of both similar and different types that each individual MU faces (habitat loss, and vulnerability to stochastic factors such as disease outbreaks, fire, and excess anthropogenic mortality, and the interdependence of each on several of the others for long term stability), it is my opinion that

each population being examined is in fact both "discrete" and "significant", and that singly the CC-N, CC-S, SGSB, and SA MU's qualify as DSP's, and that by virtue of their criticality as gap populations to the other four, that the CC-C and EPR MU's should be similarly designated and protected with the Threatened Designation.

RESPONSE: Based on this and other feedback we evaluated the whole petitioned area as a DPS and found it significant, thus the units mentioned are included in the updated recommended area for listing.

Line 2474 Table 7, and 2587-2591 (Beier): CC-S: In Table 7, think you could make the case that this unit earns a "Yes" for "markedly separated". Your rationale on 2587-2591 is reasonable, but I think a "yes" response is similarly reasonable.

RESPONSE: Due to the extensive feedback from reviewers and the reworking of the recommendation, Table 7 was no longer necessary and has been removed.

Line 2474 (Riley): We would propose to evaluate another Management Unit in this table, specifically the Santa Monicas to Los Padres MU, including the Santa Monica Mountains, Simi Hills, Santa Susana Mountains, and 10 km north of the Santa Clara River. We would argue that this MU would rank "Yes" under "Markedly separate", for the Santa Monica Mountains specifically; "Yes" under "Unique Ecological Setting" for its "unique and unusual" location in one of the largest and most intensively fragmented urban areas in the world; and "Yes" under two other important elements of "Significance": "Only apex carnivore species in the system" and "Significant value for the local human population." In turn, this would mean that it would be a "Yes" as constituting a DPS, and because it is also clearly threatened, it would be a "Yes" for "Imperiled," and therefore a "Yes" for warranting listing as a threatened or endangered DPS.

RESPONSE: Based on this and other feedback we evaluated the whole petitioned area as a DPS and found it significant, thus the units mentioned are included in our updated recommended area for listing.

Line 2474 (Riley): A couple of other comments on this table: if the "Only apex carnivore species in the system" category were added for significance, then all of the Management Units would be significant. This may seem like an overly broad criterion, but I think it is indeed a valid one, as I mentioned previously, and that the disappearance of this species in any of these area would truly be a significant ecological loss. There are places in the state where that might not be the case because of wolf presence, but that is not currently the case here, and may not be for a long time, if ever, as I mentioned. So that would then mean, according to the table, that any management unit that is determined to be imperiled, would also warrant listing, which would include CC-N, CC-S, the Santa Anas, and SG-SB, along with the currently proposed ones (the EPR and the South Coast Group), or basically everything except for CC-C and the Central Coast Group. One other thought about the potential importance of the Central Coast Central Management unit: it is true that the Central Coast Central cluster is relatively large and seems in decent shape genetically and demographically, currently. However, with an effective population size of about 60 individuals, based on Table 3, and a population estimate of around 150 (same Table), it is not as secure as say the North Coast or Sierra Nevada populations. Given that the Central Coast Central population is currently the main source for both the CC-N and CC-S populations, both of which are imperiled, an argument could be made that it is really important to protect this Central Coast population as well, over the long-term to prevent further erosion or loss of the smaller ones to the north and south. So taking the longer view of protecting the whole coastal area overall might indicate the importance of protecting Central Coast Central as well. Something to consider at least. Finally, though the CC-S overall may not be, the Santa Monica Mountains are definitely markedly separate, we believe represent a unique ecological setting, and are certainly imperiled.

RESPONSE: Based on this and other feedback we evaluated the whole petitioned area as a DPS and

found it significant, thus the units mentioned are included in the updated recommended area for listing.

Line 2475 – 2522 (Wilmers): To determine whether or not each of the management units is markedly separate or discrete, the department relies on genetic data from Gustafson et al. (2019) and (2022) to make pie charts foreach animal showing the animal's genetic ancestry (Figs 15 and 16). They then use these pie charts to ask whether there is evidence of recent migration from other management units or populations. If there is evidence of recent migration into the management unit, the department then claims the management unit is not discrete. This is not a sufficient test. Just because there is some in migration does not mean that the population is not discrete (e.g. as measured by Structure tests).This would be like saying that coyotes and gray wolves are not separate species because they occasionally hybridize. A better test would be to ask whether the amount of in-migration is sufficient to counteract the effects of inbreeding on genetic diversity. This approach has been applied to the Santa Monica mountains population by Benson et al. (2016), but has not been applied to the other management units. Absent this test, the department should ask whether a) the management unit shows genetic structure which would indicate that habitat fragmentation is affecting the genetic composition of mountain lions, b) this structure has been increasing over time indicating that human induced landscape fragmentation is inducing said structure, and c) the activities that created this structure continue or are increasing over time (e.g. road building, vehicle travel, home building etc.).

RESPONSE: Due to reviewer comments, we no longer evaluate whether the individual genetic populations meet the criteria for a DPS, and this section has been deleted.

Line 2485-2490 (Vickers): The sentences "The SNP data from Gustafson et al. 2022 represent more of the genome and reveal ancestry further back in time. The 2022 study informs questions about the amount of genetic material historically shared between MUs and retained genetic variation within individuals and extant MUs. However, the effects of relatively recent (i.e. within the last few centuries) land use changes that restrict connectivity between MUs is not revealed by such data." are not accurate in my understanding. Microsatellites that are selected for population genetics mutate much more quickly than SNPs, and have more sensitive abilities to determine kinship leading to population structure, but the time scales of change that are revealed by the two methods is substantially influenced by other factors. The Gustafson et al. 2022 analysis used numerous contemporary samples and can be utilized to inform more recent genetic connectivity.

RESPONSE: Due to these and other comments we have overhauled the discussion of Gustafson's 2 studies and time frames. The text addressed in this comment has been deleted.

Line 2490 (Riley): It is definitely my understanding that SNP data like the kind in Gustafson et al. 2022 certainly can be informative about relatively recent land use changes. I have confirmed this with collaborators that we work with on population genetics projects. And this was my understanding from Kyle, while working on this paper, and it is what we were thinking in that paper. Indeed, both the first and last sentences of the abstract mention the effects of urbanization and fragmentation on lion population genetics, which, in this paper, is obviously measured with SNPs. Moreover, there are multiple places in this current document that mention the importance of the SNP data for determining population structure across the state, including from anthropogenic, and therefore more recent, factors. So I'm not sure where this statement at the end of the paragraph is coming from. While microsats evolve relatively quickly, and therefore can be good indicators of more recent evolution of some kind, and individual SNPs may not be evolving quickly, there is great power in the use of 1,000s of SNPs as are commonly used in these studies, including this one. And looking at changes across that many loci can indeed reveal relatively recent changes such as changes in connectivity from land use. The SNP data is richer than the microsat data and can provide information about things that the microsats cannot, including deeper relationships and potentially selection, but that doesn't mean they can't also provide

information about relatively recent changes. Indeed, these relatively recent changes would generally be largely or entirely a result of genetic drift, as opposed to mutation, and the large numbers of markers that you get from the SNP data give you an even better picture of genetic drift than the smaller number of microsats.

RESPONSE: Due to these and other comments we have overhauled the discussion of Gustafson's 2 studies and time frames. The text addressed in this comment has been deleted.

Line 2492 (Riley): Where did these maps come from? They clearly are using the data from our two papers, Gustafson et al 2019 and 2022, but they do not appear in either paper, at least in the main body. I think it's important to say explicitly that the data come from the papers, as is indicated by the figure captions, but that they were produced by others, and ideally who. Also, I think it's very hard to make out what is going on in the pie charts representing different individuals. I know there are already a lot of figures, but I think if there are important places to highlight with the pie charts, I think it would be important to zoom in closer.

RESPONSE: These maps were produced by the Department using the data from Gustafson et al. 2019 and 2022. We have tried to present them at a scale that is relevant for our purposes but also doesn't require too many individual maps.

Line 2516 (Ernest): This statement is not always true: “However, it (genetics) does not provide information about the extent of current connectivity”. The statement is false when genetic tools are used to determine kinship relations - then it can provide information on current connectivity - such as with genetic pedigrees as in in Ernest et al 2014, Riley et al 2014, Gustafson et al 2017.

RESPONSE: Due to these and other comments we have overhauled the discussion of Gustafson's 2 studies and time frames. The text addressed in this comment has been deleted.

Line 2526 (Vickers): Re Discreteness/Designation as Markedly Separate: To quote the wording in the report vis a vis the SA population when answering the question with "Yes"- "This population is classified as a fine-scale genetic group by Gustafson et al. (2019)". This designation as a separate population is the case for every one of the 6 petitioned populations, so to say that any of them are not discrete or separate throws into question the basic premise of basing these evaluations on the genetic grouping. That makes no sense to say that is the basis for some to be "discrete" and not others.

RESPONSE: Based on this and other feedback we evaluated the whole partitioned area as a DPS and found it met the criteria. Therefore whether each individual genetic population meets the criteria is less relevant than it was in the version that went to external review.

Line 2526 – 2536 (Wilmers): I agree with the categorization that this is a markedly separate population. However, the structure of this population is a bit more nuanced than presented in the department’s status review and in the two Gustafson et al papers (which suffered from a low sample size of animals east of hwy 101).Rather than lump individuals from east (i.e. the Diablo range) and west (i.e. the Santa Cruz Mountains) of the 101 together, recent genetic evidence suggests that these would be better described by two management units – let’s call them Central Coast North-East and Central Coast North-West. (Describe genetics). In an analysis led by my collaborators, Nicolas Alexandre, Megan Supple and Beth Shapiro, we sequenced whole genomes of 506 mountain lions from across California with a range of ~3-20x coverage and a mean ~12x coverage. The data used for estimation of "admixture proportions between populations" and the "estimated number of populations" in the attached figure comes from a set of ~5 million markers (SNPs) filtered for various quality metrics, which were then pruned to reduce computational burden and nonindependence of linked markers (N=~130K). Using a similar approach to Gustafson 2022, the analysis has identified a K value of 12 populations as best fitting the data. This is still

an ongoing analysis and has some issues that still need to be resolved. For instance, there are many instances of highly related individuals in certain populations that need to be pruned out before resolution of even more subtle population structure is visible. However, we can already observe strong signals of structure in the following analysis that are a good starting point. For example, CC-N has a clear split to the east and west side of the 101. As well, we have collared 147 adult and juvenile mountain lions with GPS and/or VHF collars over the past 15 years in the Santa Cruz Mountains, and we have never had an animal leave the mountain range though connectivity to the east across the Coyote Valley to the Diablo range and to the south to the Gabilan range surely existed prior to the construction of Highway 101 and associated development.

RESPONSE: Noted. Based on this and other feedback we evaluated the whole petitioned area as a DPS and found it met the criteria, thus substructure of the genetic populations is less relevant to the recommendation that it was previously.

Line 2537 (Vickers): For the reasons noted above, I feel that the parameters listed in 2537-2547 are inadequate to capture whether this population is in fact "Significant". Thus I believe that the answer here should be "Yes'

RESPONSE: Based on this and other feedback we evaluated the whole partitioned area as a DPS and found it met the criteria. Therefore whether each individual genetic population meets the criteria is less relevant than it was in the version that went to external review.

Line 2538 – 2548 (Wilmers): As described above in comment 1, the ecological impact of losing mountain lions needs to be assessed as their loss would almost surely result in significant ecological impacts in the Santa Cruz mountains and throughout the other MUs. As an apex predator, mountain lions (and the only apex predator in the MUs being considered) have a large and disproportionally large impact on ecosystems. When mountain lions (and jaguars) were lost from island fragments formed by the damming of a major river in Lagu Guri, Venezuela, herbivore populations ranging from rodents to monkeys increased 10 to 100 fold (Terborgh et al. 2001). In Yosemite valley, where mountain lions are largely excluded by heavy human presence, deer are now limiting the recruitment of young oak trees (Ripple and Beschta 2008). Similarly, in Zion National Park high human visitation excluded mountain lions from certain areas allowing for higher deer densities which reduced recruitment of cottonwood trees, increasing bank erosion and reducing hydrophytic plant, wildflower, amphibian, lizard and butterfly abundance (Ripple and Beschta 2006). Our own work has shown that that the loss of wolves from the north east of the US and consequent invasion of coyotes has had a profound impact on rates of Lyme disease (Levi et al. 2012). Given a similar ecological relationship between mountain lions and coyotes (Wang et al. 2015) as between wolves and coyotes (Levi and Wilmers 2012), it would not be surprising if the presence of mountain lions in coastal California contributes to the much lower incidences of Lyme disease here than occurs in the Northeast. Finally, pumas in our study area eat a lot of domestic cats (Smith et al. 2016) which reduces the prevalence of domestic cats where pumas occur (Wang et al. 2015). Given the substantial toll that domestic cats have on biodiversity (Loss et al. 2013, Lepczyk et al. 2023),losing mountain lions from these habitats will almost surely greatly magnify the impacts of domestic cats on biodiversity through mesopredator release (Crooks and Soule 1999)

RESPONSE: Noted. Based on extensive feedback from reviewers we evaluated the whole petitioned area as a DPS and recommend it for listing.

Line 2539 – 2540 (Wilmers): The department appears to have interpreted the first significance criteria (i.e. “Persistence of the discrete population segment in an ecological setting unusual or unique for the taxon.”) to me mean that if the dominant plant species (e.g. redwoods) are found elsewhere in California, then the ecological setting is not unusual or unique as if the only thing determining ecological

uniqueness is the dominant plant species. This is overly simplistic. There are many things that comprise an ecological setting (including but limited to the dominant plant species) such as other plant and animal species, soil types, aquifers, slope, elevation, aspect, water bodies, the spatial scale of watersheds, human developed areas and much more. Determining the difference or uniqueness of two or more different ecological communities is something that is commonly done in ecology using ordination, dissimilarity or other techniques. I am not familiar with all the data the department has at its disposal, but at a minimum I would assume that they at least have species lists of the most common plants and animals in each study area. Based on the data they do have available, they should conduct an ecological uniqueness test that includes multiple (e.g. the 100 most common species) species and other ecological variables rather than one or two dominant plant species.

RESPONSE: Noted. Based on this and other feedback we evaluated the whole petitioned area as a DPS and found it met the criteria. Therefore whether each individual genetic population is significant is less relevant than it was in the version that went to external review.

Line 2540 (Vickers): See notes above re CC-N population.

RESPONSE: Based on this and other feedback we evaluated the whole partitioned area as a DPS and found it met the criteria. Therefore whether each individual genetic population meets the criteria is less relevant than it was in the version that went to external review.

Line 2541 – 2544 (Wilmers): I disagree that the loss of mountain lions in the Central Coast North population would not constitute a gap in range. First, the Central Coast North-West MU (see comment 4 above) is tenuously connected (though threatened by highway 101 and associated development) to the south across highway 101 to the Gabilan range and to the east across the Coyote Valley to the Diablo range. Losing the Central Coast North-West MU would thus create a gap for mountain lions trying to get from the Gabilan range to the Diablo range through the Santa Cruz Mountains. The Central Coast North-West and Central Coast North-East MUs are also connected to MUs north of the bay via the Golden Gate and Carquinez strait respectively. Dellinger et al. (2020) Fig 3 shows that mountain lion habitat from the Central Coast North-East MU abuts mountain lion habitat in the North Bay with only the Carquinez strait separating them. Conventional wisdom has held for along time that mountain lions don't swim, but this is wrong. Stratton et al. (2022) recently documented a GPS collared dispersing male swimming 1.1 km in the Puget Sound, Washington and was able to infer mountain lion swim distances of up to 2 km based on the pattern of occupancy of islands at different distances from the mainland. The Carquinez strait separating the north and south Bay Areas is only 0.8 km wide at Dillon point where a mountain lion could reasonably cross. Even the Golden Gate is less than 2km across and mountain lions do appear in the Presidio or nearby every few years. A water crossing at either site is surely a rare occurrence given the low bidirectional migration estimate between sites north and south of the Bay (0.003 from Table S2 Gustafson et al. 2019), but these rates of crossing have almost surely been reduced by human development along both shorelines and by ship traffic within the waterways.

RESPONSE: Noted. Based on this and other feedback we evaluated the whole petitioned area as a DPS and found it met the criteria. Therefore whether each individual genetic population qualifies as a gap in range is less relevant than it was in the version that went to external review.

Line 2546 (Riley): This seems like a judgement call, and I'm not sure that I agree with this conclusion, that there are not "markedly different genetic characteristics" based on the SNP data. The fact that Fig. 16, with SNP data, shows some evidence of potential shared ancestry farther back, doesn't mean that there aren't important genetic differences here, in the Santa Cruz Mountains. In fact, when I look at Fig. 16, and compare the Santa Cruz Mountains and CC-N to CC-C, they look quite different! How much difference is enough, to be "markedly different"? How is this being measured? It's not clear to me.

RESPONSE: Based on this and other feedback we evaluated the whole partitioned area as a DPS and found it met the criteria. Therefore whether each individual genetic population meets the criteria is less relevant than it was in the version that went to external review.

Line 2550 (Vickers): In the document, the word "threatened" is utilized to describe some of the six petitioned populations before the final recommendation that may decline to suggest Threatened status. Using the word "threatened" in multiple and conflicting ways is likely to be confusing to the reader. An example follows from the CC-N MU evaluation section: Imperiled? Threatened or Endangered: Yes. This is a small, isolated population with an effective population size of 16.6 and an estimated 33–66 adult animals. Conclusion: Evidence does not support a designation as a threatened or endangered DPS.

RESPONSE: Based on this and other feedback we evaluated the whole partitioned area as a DPS and found it met the criteria. Therefore whether each individual genetic population meets the criteria is less relevant than it was in the version that went to external review.

Line 2550 – 2551 (Wilmers): I agree that this population is threatened or endangered. In addition to the low effective and estimated population sizes, we have recently documented two adult mountain lions with kinked tails – a trait associated with inbreeding – in the Santa Cruz Mountains population.

RESPONSE: Noted.

Line 2552 (Wilmers): I disagree with this. Given my analysis above that the loss of mountain lions from this DPS would constitute both a 'gap in range' (Comment 7) and have a significant ecological impact (Comment 5), scientific evidence favors designation as a threatened or endangered DPS.

RESPONSE: Noted. Based on this and other feedback we evaluated the whole partitioned area as a DPS and found it met the criteria. Therefore whether each individual genetic population meets the criteria is less relevant than it was in the version that went to external review.

Line 2558 and 2586 (Vickers): The CC-C MU is bordered on the north by a discrete isolated population (CC-N MU), and on the south by the CC-S MU, itself containing one of the two most imperiled population segments (SMM) in the state, as well as at its margin the Tehachapi population which recent research suggests has significant restriction of connectivity due to major freeways (Vickers and Najera unpublished). Thus, it is my opinion that the CC-C MU is in fact discrete and likely becoming more so since its connection to the SN population is dependent on the Tehachapi Range, which is itself under threat from plans for high speed rail, SR 58 widening, and steadily increasing traffic on I-5, SR 58, and SR 14, as well as two large planned developments. These infrastructure elements all serve to further reduce connectivity for both the CC-C MU and CC-S MU to the east and south, and will be likely to exert more effects in the future. Given the dynamic negative challenges to connectivity occurring on the ground in that area (despite the Wallis Annenberg bridge over the 101 freeway that will benefit only the small SMM population), in my opinion the answer relating to the questions of discreteness/marked separation for both the CC-C and CC-S MUs should be "Yes".

RESPONSE: Noted. Based on reviewer feedback we evaluated the whole petitioned area as a DPS. Therefore whether each individual genetic population qualifies as discrete is less relevant than it was in the version that went to external review.

Line 2560 (Riley): So the implication here is that there is enough gene flow between CC-N and CC-C that CC-C is not markedly separate, yet CC-N is, based on line 2526? That doesn't make sense, I don't think. Or is it that CC-C is not markedly separate just because of the connections in the South between CC-C and CC-S?

RESPONSE: Noted. Based on this and other feedback we evaluated the whole partitioned area as a DPS

and found it met the criteria. Therefore whether each individual genetic population meets the criteria is less relevant than it was in the version that went to external review.

Line 2562 (Riley): This mention of CC-C ancestry in CC-S except for the Santa Monica Mountains provides further support for evaluating and potentially listing a separate Santa Monica Mountains MU, as we are suggesting.

RESPONSE: The Santa Monica Mountains are now in the area recommended for listing.

Line 2573 – 2576 (Wilmers): The department appears to use an effective population size (Ne) of less than 50 individuals in determining whether a DPS is potentially imperiled. This derives from the so called 50-500 rule proposed by Soule (1980) and Franklin (1980) nearly 45 years ago in which they recommended that a population of ≥ 50 individuals was necessary to avoid inbreeding depression in the short term and that a population of ≥ 500 individuals was necessary to maintain evolutionary potential in the long term. These thresholds were based on the opinions of animal breeders and limited data on laboratory animals. Since then however, numerous studies have shown that inbreeding depression can occur in populations with Ne's ≥ 50, and as such recent authors have suggested that a more appropriate limit of Ne ≥ 100 be set to avoid inbreeding in the near term (Frankham et al.2014). Similarly, several lines of theoretical and empirical evidence now suggest that an Ne ≥ 1000 is necessary to maintain evolutionary potential in perpetuity (Frankham et al. 2014). If an Ne ≥ 50is insufficient to prevent inbreeding, then surely it is too small to prevent imperilment. If the goal is simply to preserve mountain lion populations in the near term, then an Ne ≥ 100 should be the minimum to avoid imperilment, but if the goal is to maintain mountain lion populations in the long-term, then the department should aim for an Ne ≥ 1000. To achieve this later target would require maintaining and restoring connectivity among mountain lion populations throughout California and to neighboring states. Even if we are to accept an Ne ≥ 50 as the acceptable threshold, the department doesn't consider that the Ne estimate of 56.6 for the Central Coast Central MU taken from Table 2 of Gustafson et al (2019) has 95% confidence intervals (CIs) that included values < 50 (CIs 47.4 – 69). Furthermore, Gustafson et al (2022) estimates an Ne for the Central Coast Central of only 26.9. Taken together these point to the fact that the Central Coast Central population may well have an effective population size less than 50 and should be regarded as imperiled.

RESPONSE: Due to this and other comments, we use Frankham et al. (2014) suggested Ne=100 to prevent inbreeding depression over short timescales (~5 generations) as the criteria for imperilment.

Line 2577 (Vickers): Dellinger et al. 2020 found that key genetic elements (expected heterozygosity, allelic richness, and effective population size) that are recognized as significant to mountain lion population long term survival were all higher in habitat that was protected versus unprotected. It was surmised in that paper that this was the result of unprotected habitat being more prone to fragmentation and other anthropogenic factors that disrupt connectivity. Since the CC-C MU has the least percentage of habitat that is protected of the six MU's, its north-south intra-MU connectivity is vulnerable to development, and it is a critical gap between the CC-N MU and the CC-S MU, that it too should have the increased protection of threatened status.

RESPONSE: CC-C is now in the area recommended for listing.

Line 2585 – 2612 (Wilmers): How can the Central Coast South population be imperiled, but not discrete? This makes little sense. Either it is a discrete population that is imperiled (due to extremely low effective population size and inbreeding) or it is not discrete and not imperiled (because it has plenty of gene flow from other populations as the department suggests). It is hard to imagine how this population is showing such stark signs of inbreeding if it is not really discrete. The genetic (e.g. structure plot inset in Gustafson et al (2019) and other (e.g. high rates of malformed sperm and kinked tails) evidence suggest

the population is both discrete and imperiled.

RESPONSE: Noted. Based on reviewer feedback we evaluated the whole petitioned area as a DPS. Therefore whether each individual genetic population qualifies as discrete is less relevant than it was in the version that went to external review. This section has been deleted.

Line 2587 (Riley): Again, there is explicit acknowledgement of the Santa Monica Mountains being separated from the rest of CC-S, and therefore from CC-C, by "heavy urbanization," which includes freeways. This continues to indicate the importance of considering a Santa Monica Mountains MU.

RESPONSE: The Santa Monica Mountains are now in the area recommended for listing.

Line 2590 (Riley): I think this assessment of how much connection there is between CC-S and CC-C is premature. There really wasn't very good sampling of southern CC-C and northern CC-S for our statewide papers, because those samples just weren't available. More recently, through various efforts by the Dept, there are significantly more samples available, is my understanding. And as I said before, it is important to specify somewhere what the boundaries of the CC-S MU are. I don't think it makes sense to have the Sierra Pelona, across Highway 5, as part of CC-S. I don't think anyone in the area would consider the Sierra Pelona mountains, east of 5 and above Highway 14, as part of the "central coast." And I don't think it makes sense based on what we have seen of lion population genetics, both in our 2014 paper, and in these two statewide papers.

RESPONSE: Noted. Based on reviewer feedback we evaluated the whole petitioned area as a DPS, which makes the discussion of the connectivity between the individual genetic populations less relevant, and this section has been deleted.

Line 2594 (Riley): As stated in a couple of previous comments, we believe that the Santa Monica Mountains specifically do indeed represent a unique ecological setting as the most intensely urbanized place in the state, and indeed in the country and hemisphere, where there are mountain lions or any large felid.

RESPONSE: The Santa Monica Mountains are now in the area recommended for listing.

Line 2596-2603 (Vickers): The way that the term "gap" is used in the report for assessing these populations is inappropriate in my view. Populations seem to only qualify if they are as links in a straight or curving chain of discrete links, but in fact each population south of the CC-N MU and east of the SA MU is a link that would create an insurmountable connectivity gap if that population were to be extirpated or if connectivity within or between the MU's were seriously disrupted by accumulated infrastructure. Interestingly, the most critical linking population area or "gap" (as noted by the Department in the report) is the Tehachapi Range, and though it is included in the proposed ESU, it exists at that margin of the CC-S and CC-C MU's but the report does not classify it as to what MU it belongs to. This is partially due to the low numbers of genetic samples that were available from there for the Gustafson analyses. More samples are now available from research by UC Davis there in the last year and those may help define their most appropriate grouping. However, since the status of that Range has a bearing on the designation for the CC-S and CC-C MU's, it may be necessary to include it in both in my opinion. If included in the CC-S MU it makes that MU clearly a "gap" area. The lack of definition of where that population falls makes proper classification of the CC-S MU difficult. Recent UC Davis research suggests that the population across the Tehachapis is to some degree restricted in free movement between the SN and the CC-C and CC-S MU's (Vickers and Najera unpublished). The report seems to be treating the Tehachapi Range population as part of the CC-C MU connection to the SN when in fact the western end of the Tehachapis falls on the border between the CC-C and CC-S MU's, and thus may be functionally a part of both, and critical to both. In these sentences however, the CC-S MU is

depicted as just the SMM population despite earlier in the document and in the genetics analyses the CC-S MU includes mountain lions substantially north of US 101 and perhaps to the Tehachapis. So assuming that the Tehachapi Range is at least functionally a marginal part of the CC-S, the CC-S could also be classified as a "gap" population. It is a given that disappearance of that Tehachapi population, or loss of what diminished connectivity there is across that Range, would in fact leave the biggest gap of all in connectivity for the genetic health of all six MU's. In my opinion this answer for the CC-S should instead be "Yes" for all of these reasons.

RESPONSE: Noted. Based on reviewer feedback we evaluated the whole petitioned area as a DPS, which makes the discussion of the gaps between the individual genetic populations less relevant, and this section has been deleted.

Line 2597 (Riley): I disagree that losing CC-S does not represent a significant gap in the range, although as I said, I'm not really clear on how this "gap in range" criterion is being applied. Most importantly though, I definitely think that CC-S is critical for connectivity to other MUs. Again, this may depend a bit on where CC-S is considered to be, but assuming that the northern part of CC-S is the Los Padres National Forest area around Gorman and Frasier Park, which based on Fig. 1, it would be, than it would be the connection between the entire Central Coast area and the Sierras, and therefore the rest of the state (other than the South Coast). CC-S also includes the connection between the coast and SG-SB, and therefore to the whole South Coast area (SAs, EPR). So really you could argue that CC-S is the most important MU for connectivity in the entire state, certainly in the petitioned area. It is true, as stated on line 2600, that the connection to SGSB is currently very limited, but in my opinion that does not mean that we should give up on it, nor does it diminish the importance of the connection. On the contrary, I would argue that it is especially important that healthy populations of lions exist on both sides, so that if we're able to improve connectivity, the improvement will still be useful for this species. And there are currently efforts underway to improve connectivity across 5, and ideally 14 too, for wildlife generally and for mountain lions specifically. Finally, while it is true that the Wallis Annenberg Wildlife Crossing is under construction and will significantly improve connectivity between the Santa Monica Mountains and areas north (last sentence here), I don't think that means we should assume its success at significantly assisting the mountain lion population before it is even finished, let alone before we have been able to monitor its use and ultimately how the lion population responds. And as we've stated elsewhere, though 101 is the biggest and most significant barrier for the Santa Monica Mountains, there are two other roads between the Santa Monicas and Los Padres, the 118 Freeway and Highway 126, across which connectivity is also important.

RESPONSE: Noted. Based on reviewer feedback we evaluated the whole petitioned area as a DPS, which makes the discussion of the gaps between the individual genetic populations less relevant, and this section has been deleted.

Line 2601 (Beier): "Connectivity across highway 101 linking the Santa Monica Mountains to the Simi Hills will be significantly improved following the completion of the Wallis Annenberg wildlife overpass, which will promote gene flow within the southern portion of this MU." I do hope this is true, but we don't really know this yet.

RESPONSE: That sentence has been deleted.

Line 2612 (Riley): As we've mentioned, we have direct evidence of extensive close inbreeding in the Santa Monica Mountains population, within CC-S. This is mentioned for the SAs (line 2683), so it should also be mentioned here. We mentioned two cases of it in Riley et al. 2014, and we also reported on three other cases in our Report to the Dept, specifically covering the years 2016-2018. So this could be cited instead of a personal communication.

RESPONSE: This section has been deleted, and details of inbreeding in the Santa Monica Mountains has been added to section 4.10.4

Line 2612 (Riley): Mountain lions in CC-S are indeed imperiled, and there are a number of other sources of data other than the statewide papers. We investigated the viability of the population in a very detailed and comprehensive way for the Santa Monica Mountains, using the best available empirical data on demography and genetics, in Benson et al. 2016 and 2019. I think it is important to mention and cite these results here. Specifically we found that over the next 50 years there was a 20% chance of extinction just based on demography along, because of the isolation and small size of the population in the Santa Monicas. And when genetics were taken into account, if inbreeding depression reached a similar level as seen in Florida, there was essentially a 100% (99.7) chance of extinction over 50 years, with a median time to extinction of 15 years. Also, as mentioned in previous comments, we have directly documented close inbreeding, i.e. mating between close relatives, multiple times in the Santa Monicas (Riley et al. 2014, NPS reports).

RESPONSE: CC-S is now in the area recommended for listing.

Line 2613 (Riley): As mentioned in other comments, we believe that the mountain lion population in the Santa Monica Mountains is both discrete and significant. It is discrete, based on physical separation and genetic evidence, and it is significant as the most urban population of the species in the state and beyond; as the only apex predator in the system; and because of its significance to the people of the Los Angeles Area.

RESPONSE: The Santa Monica Mountains are now in the area recommended for listing.

Line 2613 (Wilmers): I disagree that the Central Coast Group is not discrete. It is hard to understand how the department came to this determination. The discriminant analysis of principal components plot (Fig. 3, page21) shows clear genetic structure differentiating the Central Coast from other populations in the state. There is no natural reason for this genetic structure to occur – were it not for the activities of humans, there is no reason that a wide-ranging species capable of dispersing 100s of miles would show such population structure. The cause is human development in the form of highways, row crop agriculture and urban areas fragmenting habitat and making it more difficult for mountain lions to disperse from one area to another. That there might be occasional migrants into the population from outside the Central Coast MU does not negate its discreteness as evidenced by the strong genetic structure, low effective population sizes and multiple lines of evidence of inbreeding (described above and in the status review). Finally, the department suggests that the Los Padres National Forest provides connectivity to public land east of the MU without mentioning that this is bifurcated by highway 5 – one of the busiest interstates in the United States and getting busier every day. Substantial sprawl is expected to continue along the I5 with a new community of 12k homes being planned for the Tejon ranch in the Tehachapi at the part of I5 purportedly providing connectivity to the Central Coast Group.

RESPONSE: Noted. Based on reviewer feedback we evaluated the whole petitioned area as a DPS, which makes the discussion of discreteness of the individual genetic populations less relevant, and this section has been deleted.

Line 2619-2623 (Beier): Here you assert that the Central Coast Group is not markedly separate. Figure 3 suggests that it is quite separate. One could argue "Yes" just as strongly. Remember, there is a time lag between land use changes and genetic response. I would strongly argue that the trajectory is leading toward a "yes". If there were superb crossing structures on US-101, SR-14, and I-5, one could say the trajectory might be getting better.

RESPONSE: Due to reviewer comments, we no longer evaluate whether the individual genetic

populations meet the criteria for a DPS, and this section has been deleted.

Line 2622 (Riley): I'm not convinced that there is "evidence of gene flow and migration" in the Santa Barbara through Ventura area." What is this evidence exactly? One problem may be, as I mentioned before, that it's very hard to see the pie charts in Figure 17 and 18. So it may be worth zooming in on particular areas, to make certain points, more so than is currently the case. I think another problem, again as I said before, is the lack of extensive sampling in this area, of the northern CC-S and southern CC-C. And finally, as I've also said, there needs to be a clear description of the boundaries of the management units, which is not the case currently, that I've seen. Where does CC-C end and CC-S begin? Is the Sierra Pelona in CC-S? I think it should be part of the Western Sierra Nevada, which is what it looks more like is happening in Figure 1, back in the beginning of the document. But overall, in order to be able to evaluate these management units and how discrete they are, we need to know where they begin and end.

RESPONSE: Due to reviewer comments, we no longer evaluate whether the individual genetic populations meet the criteria for a DPS, and this section has been deleted.

Line 2628 (Riley): In terms of connection between the Central Coast and the San Gabriels, we have done work specifically in this area and on this question, and there is no evidence that this is the case, and in fact there is substantial evidence that it is not the case. We have tracked many animals over the years in the Santa Susana Mountains, and never had one cross the 5 Freeway to establish itself in the San Gabriels or Sierra Pelona. And we have had many animals come right up to the freeway, which is clearly a home range boundary. This is evident in a figure in Riley et al. 2014, but we have also seen it regularly in other animals since then, including some animals that we're tracking currently (P105 and P106). We also did a study with Caltrans and LA Metro specifically along Highway 5 in the stretch between the 14 interchange and Santa Clarita, where we monitored 9 different crossing points and natural areas in the vicinity on both sides. We never detected mountain lions at any of the crossing points, or nearby on the East side, although we did detect them in the vicinity on the west side, at multiple sites. Finally, in our regional genetic analysis, we also saw strong evidence of genetic differentiation across Highway 5 (Riley et al. 2014, and subsequent unpublished analyses).

RESPONSE: Due to reviewer comments, we no longer evaluate whether the individual genetic populations meet the criteria for a DPS, and this section has been deleted.

Line 2630 (Riley): As I said, I don't agree that the Central Coast is not markedly separated from other populations. It is physically separated, by the Central Valley and Highway 5, and that separation is borne out by genetic data, as far as I can tell.

RESPONSE: Due to reviewer comments, we no longer evaluate whether the individual genetic populations meet the criteria for a DPS, and this section has been deleted.

Line 2634 (Riley): Again, we believe that the Santa Monica Mountains, in the Central Coast Group, does indeed represent a unique and unusual ecological setting for the species.

RESPONSE: The Santa Monica Mountains are now in the area recommended for listing.

Line 2641 (Riley): It's hard for me to understand how, if the Central Coast Group has "markedly different genetic characteristics," it is not also markedly separated. This gets back to the point about whether SNP data are also relevant for recent changes, which they definitely can be, even if they also provide information about deeper ancestry (more so than microsats, say).

RESPONSE: Due to reviewer comments, we no longer evaluate whether the individual genetic populations meet the criteria for a DPS, and this section has been deleted.

Line 2647 (Riley): I agree that the Central Coast overall, specifically because of the presence of the CC-C group, is not imperiled, in the way that the others in the petitioned area are. I think it's worth saying here that that CC-C MU is one of just 4 (along with ESN, WSN, and NC) MUs with an Ne of more than 50 (as opposed to saying "few"). Also, however, as I mentioned in reference to the Table, although it is not as imperiled as the others, Central Coast Central is indeed critical for the long-term survival of the CC-N and CC-S populations, and therefore for the whole Central Coast. If it's important to conserve the species in the petitioned area, it may be worth considering whether it is worth protecting the Central Coast Central unit, because of its critical role as a source for the other areas.

RESPONSE: Due to reviewer comments, we no longer evaluate whether the individual genetic populations meet the criteria for a DPS, and this section has been deleted.

Line 2647 – 2651 (Wilmers): I disagree this population is not imperiled. The effective population size of the Central Coast Group as estimated by Gustafson et al. (2019) is 76, which is less than the Ne ≥ 100 threshold currently recommended by conservation biologists (Comment 10). Additionally, the combined effective population sizes from all three populations calculated by Gustafson et al. (2022) is only 50, a margin of only one effective animal over the older Ne ≥ 50 rule. By either metric the population should be considered imperiled

RESPONSE: Due to reviewer comments, we no longer evaluate whether the individual genetic populations meet the criteria for a DPS, and this section has been deleted.

Line 2652 – 2653 (Wilmers): Given my analysis for discreteness (comment 12) and imperilment (comment 13) above, the Central Coast group now meets the standards to be designated as a threatened or endangered DPS.

RESPONSE: Due to reviewer comments, we no longer evaluate whether the individual genetic populations meet the criteria for a DPS, and this section has been deleted.

Line 2661 (Riley): Yes, based on Fig. 17, there do seem to be quite a few migrants into the SAs from the southeast. How many are there specifically? It is hard to see, but worth mentioning, I think.

RESPONSE: Due to reviewer comments, we no longer evaluate whether the individual genetic populations meet the criteria for a DPS, which makes the gene flow between the individual genetic populations less relevant to the recommendation. This section has been deleted, but the maps and some of the text has been moved to section 2.4

Line 2662 (Riley): Do you means to say that 74 lions in the EPR, or 74 in the EPR and the SAs together? Otherwise, how many were tracked in the SAs? This needs to be clear, I think.

RESPONSE: This section has been deleted, and has been clarified where mentioned in the rest of the document.

Line 2666 (Riley): What is the evidence for the increased traffic and development, and what is meant by "recent years"? Maybe Winston can help with this. Also, the Huffmeyer et al. reference has 2022 as the year, in the Lit Cited. Technically it was accepted and in press in late 2021 I believe, but printed in 2022, so either could in theory be used, but it would be good to be consistent with the Lit Cited.

RESPONSE: This section has been deleted, and the reference has been fixed in the rest of the document.

Line 2668-2672 (Beier): You correctly state: "The conflicting evidence between Vickers et al.'s (2015) telemetry study and Gustafson's et al.'s (2019) genetic work may, in part, be explained by worsening fragmentation from recent land use changes as many of the tissue samples analyzed by Gustafson et al. (2019) were obtained prior to the onset of Vickers et al.'s (2015) study." I agree 100%. But recent (and

ongoing) land use changes and time lags in genetic response also affect other groups for which we lack telemetry data, so although Gustafson genetic map is superb, time lags mean it may not reflect the condition today, and certainly not tomorrow.

RESPONSE: Noted.

Line 2671 (Riley): This is confusing - many of the samples in our 2019 Gustafson paper were from before 2000, is that right? That seems surprising, but either way, it needs to be clear. Were they maybe from Paul Beier's work back in the 90's? But also, I think the excellent long-term telemetry data that Winston and others collected is clear evidence of the Santa Anas being discrete, along with the fact that there is a major, busy freeway, I-15, separating the Santa Anas from the EPR. The population genetic data is of course valuable, but the population assignments are an indirect, and not always perfect, measure of immigrants. The telemetry work is directly measuring this movement.

RESPONSE: Due to reviewer comments, we no longer evaluate whether the individual genetic populations meet the criteria for a DPS, and this section has been deleted.

Line 2672 (Vickers): May add: "Telemetry and camera studies have documented two additional mountain lions crossing I-15 west to east from the SA to the EPR, though both stayed for only short periods of weeks to a few months and then returned to the SA before their collars dropped off as planned. No collared mountain lions have been recorded crossing I-15 from east to west, though Gustafson et al. 2018 documented in an extensive pedigree construction for the SA and EPR populations three mountain lions sampled in the SA whose genetics suggested their origin was the EPR. Two of those were deceased when sampled in the SA and no offspring of theirs were detected. One of the three however (M86) appeared to have reproduced extensively and sired eleven offspring that were detected in the SA group at the time. In that same Gustafson et al. 2018 pedigree reconstruction, 3 animals were detected in the EPR whose genetics suggested that their origin was the SA. More recently, over a 3-year camera monitoring period along I-15, no mountain lions have been detected moving from the EPR to the SA, though two individuals were photographed moving from the SA into the EPR under I-15. Efforts are underway with Caltrans and others to increase connectivity through existing passageways like Temecula Creek and to build additional infrastructure for safe passage over or under the highway south of that point. (Vickers unpublished data)"

RESPONSE: Due to reviewer comments, we no longer evaluate whether the individual genetic populations meet the criteria for a DPS, and this section has been deleted.

Line 2677 (Vickers): See earlier comments re CC-N population - lines 2435-2441

RESPONSE: Due to reviewer comments, we no longer evaluate whether the individual genetic populations meet the criteria for a DPS, and this section has been deleted.

Line 2688 (Riley): This is true just for demographic stochasticity, but the model's predictions are much more dire when they include inbreeding depression causing declines in survival and reproduction. And as mentioned at the top of the page, there is evidence of this in the region based on poor sperm quality. I think another sentence or clause is needed here to at least mention this potential even more severe danger to the population.

RESPONSE: Due to reviewer comments, we no longer evaluate whether the individual genetic populations meet the criteria for a DPS, and this section has been deleted.

Line 2702 (Vickers): Add: "However, movement across the southern border is becoming more and more restrictive for wildlife including mountain lions due to border security infrastructure expansion and increased border patrol activity over time."

RESPONSE: This section has been deleted.

Line 2729 (Vickers): See earlier comments re appropriateness of use of Ne for population estimation and additional information that is needed here.

RESPONSE: We have reworked the discussion of effective population size and no longer use it to estimate population size. In addition the effective population size of individual genetic populations is no longer particularly relevant to the recommendation,

Line 2736 (Vickers): See earlier comments re discreteness and marked separation of the six populations. In my opinion this answer should be "Yes"

RESPONSE: Due to reviewer comments, we no longer evaluate whether the individual genetic populations meet the criteria for a DPS, and this section has been deleted.

Line 2736 (Riley): I would argue that the SG-SB is indeed discrete. Both our regional genetic analysis (Riley et al. 2014) and the statewide papers (both Gustafsons) indicate that Highway 5 is a major barrier and that this group is separated from the Central Coast. As I mentioned above, this is also borne out by our mountain lion tracking data in the area. I think figures 3 and 17 actually show that this group is indeed discrete from a genetic point of view, Figure 3a quite compellingly so.

RESPONSE: Due to reviewer comments, we no longer evaluate whether the individual genetic populations meet the criteria for a DPS, and this section has been deleted.

Line 2742 (Riley): As mentioned, we have extensive tracking and camera data, and some genetic data (Riley et al. 2014) about the strength of Highway 5 as a barrier to movement and gene flow for mountain lions.

RESPONSE: Due to reviewer comments, we no longer evaluate whether the individual genetic populations meet the criteria for a DPS, and this section has been deleted.

Line 2759 (Riley): As mentioned, I don't agree that SG-SB is not discrete. Although it's also true that there were relatively few samples available from this area for the statewide papers. I know more recent samples have been acquired by CDFW work in the area, especially at the southern end of the population, so perhaps those could help shed some light on this area.

RESPONSE: Due to reviewer comments, we no longer evaluate whether the individual genetic populations meet the criteria for a DPS, and this section has been deleted.

Line 2759 (Vickers): In my opinion this population should be listed as a threatened DPS.

RESPONSE: Due to reviewer comments, we no longer evaluate whether the individual genetic populations meet the criteria for a DPS, and this section has been deleted.

Line 2795 (Vickers): See earlier comments re appropriateness of use of Ne for population estimation and additional information that is needed here.

RESPONSE: We have reworked the discussion of effective population size and no longer use it to estimate population size. In addition, we evaluate the petitioned area as a whole and the effective population size of individual genetic populations is no longer particularly relevant to our analysis.

Line 2804 (Wilmers): As stated above in comment 2, the department needs to consider whether all six MUs taken together meet the criteria for listing as a single DPS. This would be a good place in the report to do so. For the sake of my review, let’s call this single DPS the “Coastal Group”, and evaluate them for Discreteness, Significance and Imperilment. Regarding Discreteness, the Coastal Group is markedly separate from other populations in the state using the same genetic arguments I have used above for the

other MUs (comment 12) and the department has used for the Southern Coast Group. The Coastal group is also discrete because it has an international border. Regarding significance, the coastal group is significant according to Unique Ecological Setting, Gap in Range and Ecological impact criteria as described by the department and above. Regarding imperilment, the coastal group is imperiled for numerous reasons; 1) It has a combined effective population size of 70.6 (Gustafson et al. 2022) which is less than the Ne = 100 threshold described above, 2) the MU is experiencing signs of inbreeding in the North, Central and Southern parts of its range (as described above and in the status review) and 3) urban, road and/or agricultural development have and continue to fragment populations throughout all of the Coastal group MU.

RESPONSE: Due to reviewer comments, we evaluated the whole petitioned area as a DPS and found it met the criteria.

Line 2807-2817 (Vickers): The proposed ESU area constitutes a "significant" portion of the range in my opinion. Significant should be better defined as a term in this context - i.e. significant as a percentage of all the habitat in the state, or in other ways? As a proportion of the habitat I believe that a common reading of the term would classify the ESU area as significant.

RESPONSE: Noted

Line 2844 (Riley): Yes, we agree with this statement, of course, and think that it provides continued support for considering a Santa Monica Mountains MU.

RESPONSE: The Santa Monica Mountains are now included in the area recommended for listing.

Line 2846 (Riley): I think it's worth naming these groups, the two broad-scale ones, central coast and south coast, and the 6 fine-scale ones, CC-N, CC-C, CC-S, SG-SB, SA, and EPR, so that it's very clear what you're referring to here, and so that readers that aren't intimately familiar with everything won't have to wonder.

RESPONSE: This portion of the sentence has been deleted and text now reads "Long-term maintenance of genetic variation within the genetic populations in the petitioned area is reliant on habitat conservation and connectivity"

Line 2850 (Riley): Yes, this is a very important point, and we agree that connecting the coastal areas to the Sierras, through the Tehachapis, is critical for mountain lion populations across the state, long-term. The Santa Monicas to Los Padres MU that we are suggesting be considered would provide potential connectivity between the Central Coast and the San Gabriels. An important point is that this connection between a potential Santa Monicas to Los Padres MU and the San Gabriels-San Bernardinos MU would connect these two fine-scale MUs, but it would also be essentially the only connection between the broad scale MUs of the Central Coast and the South Coast. So this adds significantly to the importance of this connection. In theory, connection across 5 between the Santa Susanas and the San Gabriels could then also provide connection from the San Gabriels north to the Sierra Pelona and then to the Tehachapis, though that is a bit more indirect. However, the best connection between the coast and the Sierras is directly to the Tehachapis, though the northern part of CC-S, in Los Padres up in the Gorman, Frazier Park, Grapevine area. This area would not be covered in our proposed Santa Monicas to Los Padres MU, so we think it is worth considering whether CC-S is also worthy of listing, because of its significance for connectivity state-wide. If this connection is maintained or enhanced, this would provide another potential place connecting the Central Coast to the South Coast, though again a bit more indirectly, through the Sierra Pelona and to the San Gabriels.

RESPONSE: The area mentioned is now recommended to be listed.

Line 2864 (Riley): I think it's important to make it clear what you're referring to in this last sentence, since the previous one addresses multiple things, including protecting habitat, and the term "crossing infrastructure" is a bit nebulous. You could just say "of crossing structures" at the end of the sentence before "for effectiveness," or something like that.

RESPONSE: Done

Line 2874 (Riley): I think it is definitely worth citing the Benson et al. 2023 statewide survival paper here, when talking about depredation mortality rates (line 2874) and about concern about how depredation mortality could affect the coastal populations (line 2878). As mentioned earlier, this recent publication includes a massive amount of data on survival and mortality causes over decades, over the entire state, and including essentially all of the major researchers on lions, including Dept folks, in the state, and it specifically addresses these survival rates and mortality cause rates in a rigorous way.

RESPONSE: These sections are summaries of the threats more fully explained in Section 4, and do not contain citations. We discuss Benson et al. 2023 in the section on over exploitation 4.3.

Line 2889 (Riley): Yes, and there is no evidence that where wolves and bears coexist with mountain lions, which is essentially all over the west wherever wolves have returned, that this predation matters for lion populations.

RESPONSE: Noted

Line 2895 (Riley): Mark's work on these interactions is certainly interesting, but yes, even when there are wolves across the state again, mountain lions certainly coexisted with wolves and bears for millennia and do so currently in every place that wolves have returned to the west. And as mentioned earlier, lion harvest rates have actually been increasing in states with wolves, so significant, widespread population impacts seem unlikely.

RESPONSE: Noted

Line 2898 (Riley): It would be worth updating this section a bit. We certainly agree that these intraspecific interactions are likely more important in isolated areas such as the Santa Monica Mountains, and it was indeed the case that intraspecific conflict was the leading cause of mortality in the early part of the study, as we reported in Riley et al. 2014, coming especially from adult male P001, who killed a son (P005), a daughter (P007), and a former mate (P002); and also from P001's son, P009, who killed P-B and P008. And we certainly agree, as you say here, that this source of mortality, though it occurs in other populations too, especially unhunted ones, is likely exacerbated by the lack of dispersal out of places like the Santa Monicas. It might also be worth mentioning that when major, habitat altering or destroying events like fire happen in an isolated area, this intraspecific conflict could be further exacerbated. After the Woolsey Fire wiped out about 1/2 of the natural area in the Santa Monicas, there was even more overlap between males (both adults and subadults) in the unburned, eastern half of the Santa Monicas, as we discussed in Blakey et al. 2022. However, as our study has continued, other mortality causes have caught up to and even surpassed intraspecific conflict as sources of mortality. It would be important to cite Benson et al. 2020 (Biol. Conserv. 241:108294) here, where we determined rates of survival and mortality causes for the first almost 20 years of the study, covering 53 deaths, and found that anticoagulant rodenticide poisoning and vehicle mortality were equivalent with intraspecific conflict overall. And in fact, in the few years since this work, vehicles are now the most common cause of mortality.

RESPONSE: This section is a summary of 4.4 on competition where we have included the major points of this comment. The summary sections do not include references or new information.

Line 2902 (Beier): Remove the second period.

RESPONSE: Done

Line 2920-2925 (Riley): By far the best way to evaluate the importance of different mortality causes is through the use of telemetry data, since that gives an unbiased view of survival rates and of the rates of mortality from different causes. Fortunately, as mentioned before, we have a very recent, comprehensive analysis of mountain survival rates and mortality rates for different causes, including vehicles, from across the state and from 100's of collared animals over many years (Benson et al. 2023). Vehicles are indeed an important cause of mortality in the state, and through this analysis we can directly measure its importance against other mortality causes. The telemetry studies have of course not occurred everywhere, or across all years, but they are in more than just the Santa Monica Mountains and Santa Ana Mountains, and overall they give an excellent assessment of the importance of different mortality sources, including vehicles. Counts of vehicle mortalities can give some idea of total numbers, but there are all kinds of well-understood biases associated with such counts, especially if they are not based on systematic surveys for vehicle mortalities, which the Shilling et al 2023 survey is not. These counts are certainly valuable, and they are useful as minimum counts of mortality. But it is important to be aware of the limitations.

RESPONSE: Noted. We have included mention of the results of Benson et al. 2023 in this summary section.

Line 2935 (Riley): Although it may be somewhat true for Highway 17, I don't agree with this statement for the 101 Freeway, and potentially for many future crossings, depending on the specifics of what kind of road they're on. So, we of course believe the wildlife crossing structures specifically, and wildlife connectivity generally, are extremely important for wildlife conservation now and in the future, for all kinds of species, including for mountain lions. However, different crossing structures have different main goals, and different roads have different primary impacts. Major freeways are generally more important in terms of their barrier effects, because few animals even try to cross them, whereas smaller roads such as smaller highways and secondary roads have fewer barrier effects, but they are often more important as potential mortality sources. The main goal of the Wallis Annenberg Wildlife Crossing is not to reduce vehicle mortality, because that is not a major issue for the 101 Freeway, one of the widest and busiest freeways in the world. The main goal is to connect the two natural areas of the Santa Monica Mountains and the Simi Hills, for all species of wildlife, including mountain lions. The crossing will indeed provide safe passage for animals, including mountain lions, but it will not prevent vehicle mortality from continuing in our area, and more of the vehicle mortalities in our region have been on smaller highways or secondary roads than on freeways - of the 41 vehicle mortalities that we know of 25 have been on smaller roads vs. 16 on freeways. So as I said, wildlife crossings are critically important, but depending on where they are and what kind of road they cross, they may not make that much difference in terms of vehicle mortality.

RESPONSE: Have changed 'significantly reduced' to 'may be substantially reduced' so it now reads "If wildlife crossing structures and fencing become widespread within the proposed DPS, mortality from vehicle strikes may be substantially reduced."

Line 2947 (Riley): For the Santa Monica Mountains and surrounding areas, so for a potential Santa Monicas to Los Padres MU, two things are true: 1) toxicants have caused significant mortality in our population; and 2) we have computed cause specific mortality rates associated with it across our overall study area, and it was of similar importance as intraspecific strife, and now just behind vehicles, as the most important causes of mortality. This is all most recently documented in Benson et al. 2020 (needs to be added to the Lit Cited).

RESPONSE: Have added this sentence "In the relatively small population in the Santa Monica Mountains National Recreation Area, AR toxicosis was the third leading cause of death after vehicles strikes and intraspecific strife."

Line 2959, 2963 (Riley): In the Santa Monica Mountains, we have documented both mortality as a result of fire (line 2959), and a major loss of usable habitat after the Woolsey (line 2363) in Blakey et al. 2022, so it would be worth citing that in both of these places, I think.

RESPONSE: These sections are summaries of the threats laid out in Section 4, and do not contain citations.

Line 2998 (Riley): Yes, and as mentioned before, we did detailed viability modeling, based on the best available empirical data and including both demographic and genetic factors, and determined that both the Santa Monica Mountains and Santa Ana Mountains populations are at imminent risk of extinction, especially if connectivity is not improved and inbreeding depression worsens.

RESPONSE: The paragraph has been rewritten to reflect changes in section 4.10 and that sentence has been deleted.

Line 3008 (Riley): This is likely true, that the North Coast, Central Coast overall, specifically Central Coast Central, and Sierras are likely in pretty good shape at this point, and for the foreseeable future. However, the petition is not about those areas, it is specifically about the Central Coast and South Coast, and for all of those areas, except for Central Coast-Central, I think there are significant concerns.

RESPONSE: Have changed 'high potential' to 'potential'

Line 3071-3095 (Vickers): Though the Department spells out the specific reasons that they believe the ESU designation is not appropriate, it is notable that by changing the names of the population segments from ESU's to MU's they can then be potentially listed if determined to be DPS's. Nevertheless, as noted above, in the report, in practical terms, it would seem to be a "distinction without a difference" since the proposed actions for the genetically defined population segments would be the same if listed as threatened under CESA.

RESPONSE: Noted

Line 3096 Figure 19 (Riley): As we have mentioned earlier, we recommend considering adding a new Management Unit to the South Coast Group, to include the Santa Monicas up to Los Padres. There is strong evidence that the Santa Monica Mountains are discrete, based on physical, behavioral/ecological (lack of dispersal), and genetic factors. And we believe that this MU is significant, based on four criteria: 1) it is a unique and unusual ecological setting for the species in and around Los Angeles, a megacity; 2) mountain lions represent the only apex carnivore in the system; 3) the MU maintains critical connectivity to the San Gabriels-San Bernardinos MU, and therefore between the entire rest of this threatened South Coast Group and the Central Coast; and 4) the population is of major cultural significance to the people of southern California and the state. We also think it's worth considering whether the Central Coast South MU overall would be important to list as threatened because of its link to the Tehachapi Mountains and thereby to the Sierra Nevada Mountains. Connecting the Coastal populations overall to the rest of the state, via the Sierras, is critical for the long-term genetic health of the species in the entire state, we believe.

RESPONSE: Due to this and other comments, the suggested area is now included in the area recommended for listing

Line 3104 (Ernest): The CDFW proposal includes a proposal for a Distinct Population Segment (DPS) in the South Coast Ranges. The jagged lines denoting the boundary of the geographic area of this DPS

primarily follow roads, curiously bisect the city of Los Angeles immediately adjacent to the Santa Monica Mountains, and are not following ecological/bioregion designations – this is very problematic. Why does the CDFW proposal cut this jagged and apparently arbitrary line in LA around and excluding the Santa Monica Mountains? Makes no sense.

RESPONSE: Due to extensive feedback from reviewers, the area recommend to be listed now includes the Santa Monica Mountains.

Line 3105 Figure 19 (Beier): You did a reasonable job of setting the eastern edge of the DPS. But in the west, why not include CC-S in the DPS? As I said above (comment on Table 7 and lines 2587ff), the evidence for this unit could be interpreted in either direction.

RESPONSE: CC-S is now in the area recommended for listing

Line 3117-3123 (Vickers): The Naidu 2015 PhD thesis is not appropriate to be cited or used to infer anything regarding California mountain lions – the work was not later peer-reviewed, and only used eight samples collected over 30 years ago from California populations. That analysis also used limited numbers of microsatellites (15) and SNP's (25) which is insufficient for inferences. The sweeping conclusions in the report regarding potential connectivity are not appropriate based on this evidence.

RESPONSE: The question of the genetic ancestry of the mountain lions in the Mojave Desert is tricky because there are no genetic studies that include samples from that area. Therefore, we use scientific studies that can help provide context even if they do not examine the question directly. Peer review is not a requirement for information to be used in a status review, and Naidu's sample sizes are small, but not unusually so for work of that time. The text now reads "Another study compared samples from the coastal areas of the SC group (including EPR) and southwest Arizona (Naidu 2015). There was minimal evidence of gene flow between the mountain lions in the coastal area of the SC group and those along the border or in Arizona. In fact, the individuals sampled in south coastal California were found to be more genetically similar to those sampled from the North Rim of the Grand Canyon than those directly across the desert in southwest Arizona (Naidu 2015). However, the study had a small sample size, and did not include samples from the inland desert regions of California. Therefore, the results provide little information regarding the genetic assignment of mountain lions in the desert regions of California. " This discussion has been moved the section 6.2.1

Line 2229 and 3119 and 3120 (Ernest): The CDFW proposal also makes assumptions about mountain lions that may range into the Mojave Desert that are not supported by the best scientific evidence. There are no cited valid and published studies to compare mountain lions sampled in the Mojave Desert and Arizona to the Petitioned Coastal California Populations. The Naidu unpublished PhD 2015 that is cited in the CDFW report lacks peer-review and is not valid for comparing Arizona (and the intervening Mojave Desert) to California Coastal populations. The Naidu PhD 2015 study (and inferences that followed in the CDFW proposal) make invalid conclusions based on the only 8 samples from California, across at least 3 separate populations (meaning at best 2-4 samples per population – insufficient for population genetic analyses), and sampled from a period decade(s) older than the Arizona samples. Naidu 2015 analysis also used insufficient set of microsatellite and SNP DNA markers to make valid inferences with regard to California mountain lions.

RESPONSE: The question of the genetic ancestry of the mountain lions in the Mojave Desert is tricky because there are no genetic studies that include samples from that area. Therefore, we use scientific studies that can help provide context even if they do not examine the question directly. Peer review is not a requirement for information to be used in a status review, and Naidu's sample sizes are small, but not unusually so for work of that time. The text now reads "Another study compared samples from the coastal areas of the SC group (including EPR) and southwest Arizona (Naidu 2015). There was minimal

evidence of gene flow between the mountain lions in the coastal area of the SC group and those along the border or in Arizona. In fact, the individuals sampled in south coastal California were found to be more genetically similar to those sampled from the North Rim of the Grand Canyon than those directly across the desert in southwest Arizona (Naidu 2015). However, the study had a small sample size, and did not include samples from the inland desert regions of California. Therefore, the results provide little information regarding the genetic assignment of mountain lions in the desert regions of California. " This discussion has been moved the section 6.2.1

Line 3156 (Riley): Yes, I totally agree about the importance of the Central Coast Central MU as a source of migrants for the small and imperiled CC-N and CC-S, as I've said in other comments. It might be worth considering whether this area is worthy of protection because of this critical role, even though it is less imperiled than the CC-N and CC-S MUs.

RESPONSE: CC-C is now in the area we recommend for listing.

Line 3167-3169 (Beier): "assisted gene flow" is a slippery slope that can be abused as an excuse not to restore long term connectivity. If you are going to suggest translocations, make a clear demand that the translocation program must monitor gene flow carefully and NOT use the translocations as an excuse to avoid the long-term mgt actions needed. "Deposit $XX million in a particular conservation fund. If you have not made highways permeable and protected key habitat, you lose the $XX million. You cannot use translocation as a cheap way to avoid doing the things that work in perpetuity."

RESPONSE: Noted. Text now includes " While self-sustaining connectivity through a network of corridors, highway wildlife crossings, and habitat patches with functional ecosystem processes would be ideal for long term sustainability, assisted gene flow between populations through targeted translocations should be considered as a short-term management action to augment the genetic variation of the most isolated small populations."

Line 3174-3208 (Vickers): Given that genetic isolation has already been shown to be a substantial extirpation risk for the SMM portion of the CC-S MU, and SA MU (Benson et al.2019), and the SGSB MU and the CC-N MU also have substantial genetics-based risks, it would seem counterintuitive to count on the same processes that have been operating historically to improve the current status without legal interventions to protect those MU's. The Department's recommendation in the report suggest protections be extended only to the SA and SGSB MUs without what would seem to be a commonsense reason why the SMM/CC-S MU and CC-N MU are not in similar enough positions to also warrant protections. A recommendation to make no changes in status or management for those populations and the CC-C MU that can be enforced or written into policy or statute would seem to be a recipe for the genetic status of the populations in the coastal group to continue to decline over time. Single new overcrossings over SR 17 and US 101, though notable, are unlikely to be enough to assure adequate connectivity for those populations. Development threatens to divide the CC-C MU into two segments, and US 101 in the northern Gabilans, I-15 between the SA and EPR MU's, I-10 between the EPR and SGSB MU's, SR 14, I-5, SR 58, and High Speed Rail, along with proposed developments, are all present and increasing threats to connectivity for these MU's that are under consideration. One only has to look at the SA MU and SMM portion of the CC-S MU to observe connectivity occurring now and then through existing infrastructure or simply across highways at grade, but it is not enough to halt continuing genetic decline and advancing extirpation threats.

RESPONSE: The areas mentioned are now included in the area recommended for listing, and if listed would receive the full legal protections of CESA.

Line 3180-3186 (Wilmers): While this list isn't comprehensive, it should surely include I-5 and SR 58 in the Tehachapis as top priorities for restoring and maintaining gene flow for the petitioned populations.

Highway 101 in the coyote valley and near Rocks Ranch should also be top priorities for restoring connectivity into and out of the Santa Cruz Mountains. Finally, crossings along highway152 at Pacheco pass are critical to maintaining connectivity within the CC-North West MU.

RESPONSE: Noted, and this suggestion has been incorporated into section 10.1 with the following text "The following crossing locations have been identified by mountain lion experts and should be among the top priorities for the implementation of crossing infrastructure: 1) Highway 58 near the town of Tehachapi 2) I-5 between the Grapevine and Gorman"

Line 3210 (Riley): I think the Department's recent efforts to better estimate mountain lion population density, and to develop methods to do so, has been really valuable. One other potential research and monitoring goal would be to further evaluate mountain lion populations, using the best available demographic data on survival, reproduction, and census numbers, and using population modeling techniques. Personally, I don't think the number and density of mountain lions across the entire state, particularly given its size and complexity, is of as much importance as determining population abundance and potentially trends in different management units. Maybe something to consider as another Research and Monitoring goal. We had a full-day discussion of this as part of the most recent California Mountain Lion Scientific Working Group meeting in the fall, organized by the Dept.

RESPONSE: Noted. The recommendations include "Determine mountain lion distribution, abundance, resource selection at multiple spatial scales, movements and dispersal patterns, foraging ecology, and landscape genetics in the Sonoran and Mojave deserts, including the lower Colorado River region. Work collaboratively with tribes, adjacent states, Baja California, Mexico, universities, other government entities (e.g., Caltrans, BLM, NPS, State Parks, USGS, Military), IUCN and IUCN Species Survival Commission Cat Specialist Group, and other NGOs." and "Develop rigorous population estimates for the individual genetic populations using available demographic data and/or population modeling techniques."

Line 3301 (Riley): At some point the Lit Cited section needs to be carefully gone over. There are some references that are missing, but are cited in the text; there are some with missing authors, or book editors; and some need more information about the reference, and about how the reader can acquire it. For example, for all of the CDFW reports, how would someone acquire those, so they can evaluate them? A website or more of an address or something should be available whenever possible.

RESPONSE: Noted

The version of the status review sent to external peer reviewers is included below, including line numbers for reference.

STATE OF CALIFORNIA

NATURAL RESOURCES AGENCY

DEPARTMENT OF FISH AND WILDLIFE

DRAFT REPORT TO THE FISH AND GAME COMMISSION

A STATUS REVIEW OF THE PETITIONED SOUTHERN CALIFORNIA/CENTRAL COAST EVOLUTIONARILY SIGNIFICANT UNITS (ESUs) OF MOUNTAIN LION (*Puma concolor*) IN CALIFORNIA



CHARLTON H. BONHAM, DIRECTOR

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

Draft***August 31, 2023***Draft

TABLE OF CONTENTS

TABLE OF CONTENTS i
LIST OF FIGURES v
LIST OF TABLES vii
LIST OF APPENDICES vii
ACKNOWLEDGMENTS ix
EXECUTIVE SUMMARY 9
1. REGULATORY SETTING 9
1.1 Petition Evaluation Process 9
1.2 Status Review Overview 11
1.3 Administrative Status 12
1.4 Summary of Petition 12
2. BIOLOGY AND ECOLOGY 14
2.1 Species Description and Life History 14
2.1.1 Sources of Mortality 17
2.2 Range and Distribution 18
2.3 Habitat That May Be Essential to the Continued Existence of the Species 20
2.4 Population Structure 20
2.4.1 Management Units 23
3. STATUS AND TRENDS IN CALIFORNIA 24
3.1 Trends in Distribution and Abundance 24
3.2 Population Size 26
4. FACTORS AFFECTING ABILITY TO SURVIVE AND REPRODUCE 27
4.1 Past and Threatened Modification and Destruction of Habitat 27
4.1.1 Urbanization 28
4.1.2 Agriculture and Forestry 30
4.2 Vehicle Strikes, Roads, and Rail Lines 30
4.3 Predator Control and Overexploitation 37
4.3.1 Historical Overexploitation 37
4.3.2 Livestock Depredation and Human Safety 37
4.4 Competition 40
4.5 Toxicants 41

4.5.1 Pesticide Exposure 41
4.5.2 Mercury 45
4.6 Infectious Diseases 45
4.6.1 Viral Diseases 46
4.6.2 Bacterial Diseases 48
4.6.3 Parasitic Diseases 48
4.7 Wildland Fire and Fire Management 49
4.8 Climate Change 53
4.9 Risks to Small, Isolated Populations 57
4.9.1 Demographic and Environmental Stochasticity 57
4.9.2 Inbreeding and Genetic Drift 58
4.9.3 Loss of Genetic Variation 59
4.9.4 Genetic Impacts on the Petitioned ESU and Related Management Units 61
5. EXISTING MANAGEMENT 63
5.1 Land Ownership within the Petitioned Central Coast/Southern California ESU 63
5.2 California Wildlife Protection Act 66
5.3 State, Federal, and Local Land Planning and Land Use Laws 66
5.3.1 California Environmental Quality Act (CEQA) 66
5.3.2 Z'Berg–Nejedley Forest Practice Act 67
5.3.3 Natural Community Conservation Plans and Habitat Conservation Plans 68
5.3.4 National Environmental Policy Act 69
5.3.5 Ventura County Habitat Connectivity and Wildlife Movement Ordinances 69
5.3.6 Los Angeles County Significant Ecological Areas Plan 69
5.3.7 City of Los Angeles Draft Wildlife Ordinance 70
5.4 Management on Federal Lands 70
5.4.1 National Forest and Bureau of Land Management Resource Management Plans 70
5.4.2 Military Bases 71
5.4.3 National Recreation Areas, National Monuments, and National Preserves 71
5.5 Management on State Lands 71
5.5.1 California Department of Fish and Wildlife 71
5.5.2 California State Parks 72
5.5.3 Management on County and City Lands 73
5.6 Management in Neighboring States and Nations 73
5.6.1 Arizona 74

5.6.2 Nevada 74
5.6.3 Mexico 74
6. ASSESSMENT OF LISTABLE MANAGEMENT UNITS 75
6.1 Assessment of Evolutionary Significant Units 76
6.2 Assessment of Distinct Population Segments 78
6.2.1 Details of Assessment 82
6.3 Assessment of Significant Portion of Range 94
7. SUMMARY OF LISTING FACTORS 95
7.1 Present or Threatened Modification or Destruction of Habitat 95
7.2 Overexploitation 96
7.3 Predation 96
7.4 Competition 96
7.5 Disease 97
7.6 Other Natural Occurrences or Human-related Activities 97
7.6.1 Vehicle-Related Mortality 97
7.6.2 Toxicants 98
7.6.3 Wildland Fire and Fire Management 98
7.6.4 Climate Change 98
7.6.5 Risks to Small, Isolated Populations 99
8. PROTECTION AFFORDED BY LISTING 99
9. LISTING RECOMMENDATION 100
10. MANAGEMENT AND RECOVERY ACTION RECOMMENDATIONS 103
10.1 Connectivity 104
10.2 Research and Monitoring 105
10.3 Regulations and Policy 106
10.4 Partnerships and Coordination 107
10.5 Public Education 107
11. ECONOMIC CONSIDERATIONS 107
LITERATURE CITED 108
APPENDIX A – Acronyms, Abbreviations and Definitions 124
APPENDIX C – Solicitations for Information 128
APPENDIX D – Public and Tribal Comments 128
APPENDIX E – External Peer Review Invitation Letters 130
APPENDIX F – External Peer Review Comments 131

APPENDIX G - California Department of Fish and Wildlife Human-Wildlife Conflict and Depredation Policies.....131

LIST OF FIGURES

Figure 1. Map of fine-scale genetically discernible mountain lion (*Puma concolor*) populations in California based on data collected from 1992–2016 and genetic population assignment from Gustafson et al. (2019) and major roadways. Black outlines the petitioned Southern California/Central Coast ESU boundary. Road data source: ESRI. This figure is from the Petition, Figure ES 1.

Figure 2. Range and distribution of mountain lions (*Puma concolor*) in California based upon a habitat selection model (Dellinger et al. 2020a). Darker red indicates a higher probability of mountain lion occupancy. Mountain lions may occur in areas outside of this distribution, though such animals may include breeding and/or dispersing individuals. Major mountain ranges in the petitioned ESU are labeled.

Figure 3. Functional connectedness of mountain lion (*Puma concolor*), based on (**a**) discriminant analysis of principal components and (**b**) bi-directional migration rate estimates (multiplied by 100 for visualization). Each dot represents an individual (**a**). Each color (**a,b**) represents a population. Black lines (**a**) indicate the most closely related population based on genetic dissimilarities. The inset barplot (**a**) shows which axes are being displayed (i.e., discriminate functions 1 and 2) and the relative proportion of variation explained by each of the 9 discriminant functions. Two-thirds of the individuals in each population are contained within the corresponding ellipsoid. For a biologically meaningful interpretation, only estimates of interpopulation migration rates with 95% confidence intervals that do not cross 0 are presented (**b**). Net genetic source-sink migration rates are presented next to population names with positive values indicating net genetic source and negative values indicating net genetic sink (e.g., WSN exported 9% of migrants and received 2% so its net rate is +7%). *NV* Nevada, *ESN* Eastern Sierra Nevada, *WSN* Western Sierra Nevada, *NC* North Coast, *CC-N* Northern section of the Central Coast, *CC-C* Central section of the Central Coast, *CC-S* Southern section of the Central Coast, *SGSB* San Gabriel San Bernardino, *SA* Santa Ana, *EP* Eastern Peninsular Range. Reproduced from Gustafson et al. (2019).

Figure 4. Principal component analysis (PCA) of 401 mountain lions (*Puma concolor*) at 16,285 SNPs reveals four broad-scale genetically discernable populations (NC = North Coast, CC = Central Coast, SC = Southern Coast, SN = Sierra Nevada). (A) The colorplot (R package *adegenet*) of the PCA represents colors corresponding to a combination of the first 3 eigenvectors. The inset plot shows the proportion of the variance explained by shaded PC eigenvectors 1–3 compared to other eigenvectors. The color values are plotted at sample locations to demonstrate geographic structure. Colorplots of (B) PC1 and PC2 and (C) PC1 and PC3 resolved the 4 broad-scale genetically discernable populations. Reproduced from Gustafson et al. (2022).

Figure 5. Map of extent of human development in southern California. Included on the map are genetic sample locations from Gustafson et al. 2019 (orange circles, samples collected 1992-2016) and confirmed locations of mountain lions from CDFW camera traps (red squares, images captured 2009-2022). Note: does not show agricultural development.

Figure 6. Mountain lion (*Puma concolor*) vehicle strike mortality incidents 2000–2021 from a collection of roadkill reports from Department records and Dr. Fraser Shilling at the University of California-Davis, Road Ecology Center.

Figure 7. Important wildlife corridors identified in the South Coast Missing Linkages Report (SC Wildlands 2008).

Figure 8. Rendering of Wallis Annenberg Liberty Canyon Wildlife Crossing. Source: Santa Monica Mountains Conservancy.

Figure 9. Anticoagulant rodenticide residues detected in 247 livers of mountain lions (*Puma concolor*) submitted to the Wildlife Health Laboratory for postmortem examination 2016–2018 (Rudd and Rogers 2021).

Figure 10. Number of different anticoagulant rodenticides detected in 247 individual mountain lion (*Puma concolor*) livers analyzed from January 1, 2016–March 31, 2018 (Rudd and Rodgers 2021).

Figure 11. Wildfire perimeters in California by fire year.

Figure 12. Left: Burned paw of female mountain lion (*Puma concolor*) F121 (L) with phalanges showing, found deceased following the Bond wildfire in Orange County, California. (Photo Credit: Nick Molsberry, CDFW). Right: F121 prior to the fire (Photo Credit: UC Davis Wildlife Health Center).

Figure 13. Percent of California land area in each Palmer Drought Index category, Jan 2000–April 2023. DO = Moderately Dry, D1 = Moderate Drought, D2 = Severe Drought, D3 = Extreme Drought, D4 = Exceptional Drought. (Source: NIDIS 2022)

Figure 14. Public and tribal lands with larger Department Wildlife Areas and Ecological Reserves labeled within the petitioned Southern California/Central Coast mountain lion ESU.

Figure 15. Assignment of individual mountain lions (*Puma concolor*) to genetic populations identified by Gustafson et al. 2019 using microsatellite DNA markers.

Figure 16. Assignment of individual mountain lions (*Puma concolor*) to genetic populations identified by Gustafson et al. 2022 using Single Nucleotide Polymorphisms.

Figure 17. Assignment of individual mountain lions (*Puma concolor*) from southern Management Units to genetic populations identified by Gustafson et al. 2019 using microsatellite DNA markers.

Figure 18. Assignment of individual mountain lions (*Puma concolor*) from southern Management Units to genetic populations identified by Gustafson et al. 2022 using Single Nucleotide Polymorphisms.

Figure 19. Proposed boundary of South Coast DPS recommended for threatened status. Points represent genetic sampling locations color coded by the Management Unit they lie within. Grey squares are confirmed locations of mountain lions from camera trap data (CDFW unpublished).

LIST OF TABLES

Table 1. Status Review peer reviewers.

Table 2. Survival estimates (with confidence intervals) by sex and age-class for mountain lions in California from 1974–2020 (data from Dellinger et al. (2021b)).

Table 3. Effective population size and estimated total adult population of Central Coast and Southern California mountain lion populations from Gustafson et al. (2019).

Table 4. Anticoagulant rodenticide detection in maternal and fetal mountain lion livers. BRD: brodifacoum, BRM: bromadiolone, CHL: chlorophacinone, COU: coumachlor, DIF: difethialone, DIPH: diphacinone, WAR: warfarin, DFN: difenacoum. An asterisk "*" indicates that the samples were pooled together for qualitative and quantitative analyses (i.e., samples too small to be evaluated individually).

Table 5. Baseline and projected changes in Annual Average Maximum Temperature (AAT_{MAX}), Annual Average Minimum Temperature (AAT_{MIN}), and Number of Extreme Heat Days (EHD) per Year for four representative sites in the North Coast (NC), Sierra Nevada (SN), Central Coast (CC), and Southern Coast (SC) mountain lion genetic cluster areas identified by Gustafson et al. (2022). Model data are derived from Cal-Adapt's Local Climate Change Snapshot tool, accessed November 2021. CC refers to the Central Coast large scale cluster that incorporates CC-N, CC-C, and CC-S. SC is the South Coast large scale cluster made up of SA, EPR, and SGSB. (For more detail, see Fig. 1.)

Table 6. Land ownership within the petitioned Southern California/Central Coast ESU and the percentage of total land and public land in the petitioned ESU.

Table 7. Decision matrix summarizing evaluations of whether Management Units may warrant listing under CESA based on federal DPS policy. Need at least one yes from each of the orange, green, and blue column(s) to be listable as a DPS.

LIST OF APPENDICES

UPDATE FOR FINAL DRAFT

Appendix A. Acronyms and Abbreviations

Appendix B. Metric Unit Conversions

Appendix C. Solicitations for Information

Appendix D. Public and Tribal Comments (note: need permission to publish Tribal comments)

Appendix E. External Peer Review Solicitation Letters

Appendix F. External Peer Review Comments

Appendix G. California Department of Fish and Wildlife Human-wildlife Conflict and Depredation Policies

Appendix H. California Wildlife Barriers 2020 Report

ACKNOWLEDGMENTS

This report was prepared by Department scientific and technical staff, with substantial contributions from Esther Burkett, Dr. Justin Dellinger, Dr. Michael Buchalski, Dr. Deana Clifford, Dr. Jaime Rudd, Kristi Cripe, Dr. Scott Osborn, Erin Chappell, Dr. Ange Baker, Dr. Anne Hilborn, Julie Horenstein, and Dan Applebee. Terris Kasteen, Dr. Jeff Villepique, Dave Hacker, Bob Stafford, David Mayer, Pete Figura, and Dr. Jason Lombardi provided valuable feedback on a draft version of the report. The Department is extremely grateful for the valuable comments provided on this report by the following peer reviewers: _____. The conclusions in this report are those of the Department and do not necessarily reflect those of the reviewers.

Cover photograph by Irvine Ranch Conservancy on Orange County Parks Land; used with permission.

EXECUTIVE SUMMARY

To be added following peer review.

1. REGULATORY SETTING

1.1 Petition Evaluation Process

On June 25, 2019, the California Fish and Game Commission (Commission) received a petition that proposed the listing of the mountain lion (*Puma concolor couguar*) as threatened or endangered in a portion of the state identified as the Southern California/Central Coast Evolutionarily Significant Unit (ESU). The petitioners also requested, in the event the Commission determined that the six populations comprising the identified ESU did not collectively comprise a single ESU or otherwise did not warrant listing, that the Commission consider whether any of the populations, singularly or in combination, comprise an ESU and meet the criteria for listing. Commission staff transmitted the petition to the Department of Fish and Wildlife (Department) pursuant to Fish and Game Code section 2073 on July 5, 2019, and published a formal notice of receipt of the petition on July 26, 2019 (Cal. Reg. Notice Register 2019, No. 30-Z, p. 1086). A petition to list or delist a species under the California Endangered Species Act (Fish & G. Code, § 2050 et seq.)(CESA) must include "information regarding the population trend, range, distribution, abundance, and life history of a species, the factors affecting the ability of the population to survive and reproduce, the degree and immediacy of the threat, the impact of existing management efforts, suggestions for future management, and the availability and sources of information. The petition shall also include information regarding the kind of habitat necessary for species survival, a detailed distribution map, and any other factors that the petitioner deems relevant" (Fish & G. Code, § 2072.3).

On January 31, 2020, the Department provided the Commission with its evaluation of the petition, "Evaluation of a Petition from the Center for Biological Diversity and the Mountain Lion Foundation to List the Southern California/Central Coast Evolutionarily Significant Unit (ESU) of Mountain Lions as Threatened under the California Endangered Species Act," to assist the Commission in making a determination as to whether the petitioned action may be warranted based on the sufficiency of scientific information (Fish & G. Code, §§ 2073.5 & 2074.2; Cal. Code Regs., tit. 14, § 670.1, subds. (d) & (e)). Focusing on the information available to the Department relating to each of the relevant categories, the Department recommended to the Commission that the petition be accepted.
At its scheduled teleconference public meeting on April 16, 2020, the Commission considered the petition, the Department's petition evaluation and recommendation, and comments received. The Commission found that sufficient information existed to indicate the petitioned action may be warranted and accepted the petition for consideration. Upon publication of the Commission's notice of its findings, the Southern California/Central Coast ESU of mountain lions became designated a candidate species on May 1, 2020 (Cal. Reg. Notice Register 2020, No. 18-Z, p.692).

Notification, Information Received, and Peer Review

Following the Commission's action to designate mountain lions within the petitioned ESU as a candidate species for threatened or endangered status, the Department notified affected and interested parties and solicited data and comments on the petitioned action pursuant to Fish and Game Code section 2074.4 (see also Cal. Code Regs., tit. 14, § 670.1, subd. (f)(2)). Comments on the petitioned action were invited via a general notification letter dated May 21, 2020 sent to subscribers to the Fish and Game Commission's CESA email list, via the California Regulatory Notice Register dated May 1, 2020 (Number 18-Z), and through a statewide tribal notification letter dated May 13, 2020 sent via U.S. mail and again via email on May 22, 2020. The same general notification letter was distributed via U.S. mail and via email (when an email address was available) to owners and managers of lands supporting mountain lions primarily within the geographic area of the petitioned ESU, including County Agricultural Commissioners, County Fish and Game Commissions, Caltrans district offices, California Department of Parks and Recreation units, California Department of Pesticide Regulation, military land managers, environmental organizations, the Bureau of Indian Affairs (BIA), California Cattlemen's Association, California Wool Growers Association, Mountain Lion Foundation, Center for Biological Diversity, Audubon California, Natural Resource Defense Council, Endangered Habitats League, Planning and Conservation League, scientists familiar with mountain lions, and other interested individuals and organizations. The Department received 21 comments in response to the general notification and 10 comments in response to the tribal notifications. Supplemental comments were received from the BIA, California Cattlemen's Association, the Center for Biological Diversity, State Parks, lion researchers and some land managers. Comments received are included in Appendix A.

Pursuant to Fish and Game Code section 2074.6, the review process included independent and competent peer review of the draft status review by persons in the scientific/academic community acknowledged to be experts on mountain lions and related topics and possessing the knowledge and

expertise to critique the scientific validity of the status review contents. Appendix F contains the specific input provided to the Department by the individual peer reviewers, the Department's written response to the input, and any amendments made to the status review (Fish & G. Code, § 2074.6; Cal. Code Regs., tit. 14, § 670.1, subd. (f)(2)). Independent experts that reviewed the Status Review are listed below.

Table 1. Status Review peer reviewers.

Name	**Affiliation**
Reviewer 1 name	
Reviewer 2 name	
Reviewer 3 name	

This Status Review was prepared by the Department's Wildlife Branch with input from regional biologists.

1.2 Status Review Overview

The Commission's action designating the mountain lion within the boundary of the petitioned Southern California/Central Coast ESU as a candidate species triggered the Department's process for conducting a status review to inform the Commission's decision on whether listing mountain lions within the petitioned ESU is warranted. At its scheduled public meeting on April 14, 2021, the Commission granted the Department a six-month extension to complete the status review and facilitate external peer review.

This status review report is not intended to be an exhaustive review of all published scientific literature relevant to the mountain lion in California; rather, it is intended to summarize key points from the best scientific information available relevant to the status of the species, primarily within the boundary of the petitioned ESU. This final report, based upon the best scientific information available to the Department, is informed by independent peer review of a draft report by scientists with expertise relevant to the mountain lion. This review is intended to provide the Commission with the most current information on the mountain lion and to serve as the basis for the Department's recommendation to the Commission on whether the petitioned action is warranted. The status review report also identifies habitat that may be essential to continued existence of the species and provides management recommendations for recovery of the species (Fish & G. Code, § 2074.6). The receipt of this report is to be placed on the agenda for the next available meeting of the Commission after delivery. At that time, the report will be made available to the public for a 30-day public comment period prior to the Commission taking any action on the petition.

1.3 Administrative Status

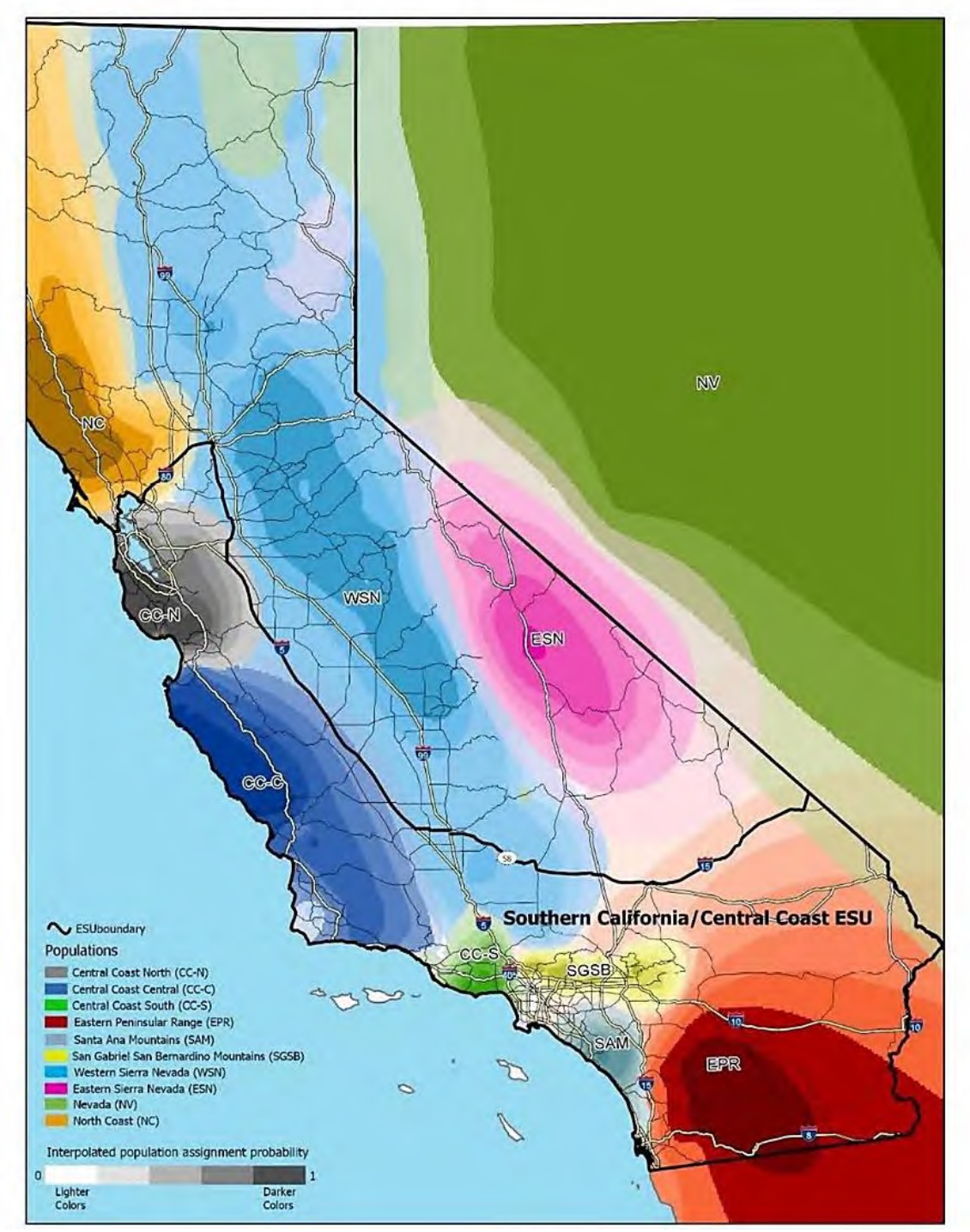
In California, mountain lions are designated as a specially protected mammal per Fish and Game Code section 4800. State law prohibits the take, possession, transport, import, or sale of a mountain lion or mountain lion products with limited exceptions. Take of mountain lions is allowed, under specified conditions, for scientific research purposes and to protect public health and safety, listed or fully protected bighorn sheep (*Ovis canadensis* spp.*)* populations, and livestock or other property.

There are currently two recognized subspecies of mountain lion throughout the Americas (Culver et al. 2000, Kitchener et al. 2017). Lions in North and Central America are classified as *Puma concolor couguar,* while most mountain lions in South America are classified as *Puma concolor concolor.* One formerly recognized subspecies of mountain lion was listed as a California Species of Special Concern until recently. The Department's Species of Special Concern (SSC) designation is similar to the federal Sensitive Species designation. It is administrative, rather than regulatory in nature and intended to focus attention on animals at conservation risk. The designation is used to stimulate needed research on poorly known species and to target the conservation and recovery of these animals before they meet the CESA criteria for listing as threatened or endangered (Thomson 2016). The Yuma puma subspecies of mountain lion (*Puma concolor browni*) was designated by the Department as a subspecies of special concern in 1986 (Williams 1986, Kucera 1998, CDFW 2022a). However, research by McIvor et al. (1995) and Culver et al. (2000) detected little morphological or genetic support for retention of the *P.c. brownii* subspecies. Consequently, the Department no longer considers mountain lions from the valley of the Colorado River and adjacent rocky uplands of the Sonoran Desert to be a distinct taxonomic unit.

1.4 Summary of Petition

The Petitioners propose listing mountain lion populations south of San Francisco Bay in the coastal, Transverse, and Peninsular Mountain ranges, the Sonoran Desert, and part of the Mojave Desert as a single Southern California/Central Coast Evolutionarily Significant Unit (ESU). Alternatively, the Petitioners propose the Commission determine whether one or more of the six populations in the following areas identified by Gustafson et al. (2019) comprise an ESU and meet the criteria for listing as threatened or endangered: 1) Central Coast North (CC-N), which includes the Santa Cruz Mountains and San Francisco Bay Area counties to the east; 2) Central Coast Central (CC-C), generally from southern Monterey Bay to Ventura County; 3) Central Coast South (CC-S), which includes the Santa Monica Mountains, Santa Susana Mountains, Sierra Pelona Mountains, and Simi Hills; 4) San Gabriel and San Bernardino Mountains (SGSB); 5) Santa Ana Mountains (SA); and 6) Eastern Peninsular Ranges (EPR), which includes eastern San Diego County to the Colorado River and the border with Arizona, and is bounded on the south by the border with Mexico. These populations are six of the 10 genetically discernable populations in California as delineated in Gustafson et al. (2019) (Fig. 1). Specifically, the petitioners suggest that the following combinations of populations be considered ESU(s): "Group all three Central Coast populations (CC-N, CC-C and CC-S) into one ESU, with the remaining three

370 populations placed into a second ESU (SA, EPR, and SGSB). Alternatively, the Central Coast populations
371 could be treated as one ESU, SA and EPR as a second ESU, and SGSB separately
372 listed as a third ESU."



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Figure 1. Map of fine-scale genetically discernible mountain lion populations and major roadways in California based on data collected from 1992 to 2016 (genetic information from Gustafson et al. 2019). Black line outlines the petitioned Southern California/Central Coast ESU boundary. This figure is from the Petition, Figure ES 1.

The Evolutionary Significant Unit concept was developed primarily for use in salmonids by the U.S Fish and Wildlife (USFWS) and National Marine Fisheries Service (NMFS) and has been used to list populations of anadromous salmon under the federal Endangered Species Act such as the Columbia River chum salmon ESU (64 Fed. Reg 14508–14517 (March 25, 1999)). The use of ESUs by the Department to evaluate the status of species pursuant to CESA is supported by recent listing determinations by the Commission (e.g., Southern Sierra Nevada Fisher ESU, Coho salmon, central California coast ESU) and by the determination of California's Third District Court of Appeal that the term "species or subspecies" as used in CESA (Fish & G. Code, §§ 2062 and 2067) can include ESUs (*Cal. Forestry Assn. v. Cal. Fish and G. Com.* (2007) 156 Cal.App.4th 1535).

To be considered an ESU under federal policy, a population must meet two criteria: 1) it must be substantially reproductively isolated from other conspecific (i.e., same species) population units; and 2) it must represent an important component of the evolutionary legacy of the species that contributes to the genetic diversity of the species as a whole (Waples 1991). The genetic isolation "does not have to be absolute, but it must be strong enough to permit evolutionarily important differences to accrue in different population units" (Waples 1991). The Department used these criteria in its evaluation of ESUs for the Pacific fisher and uses them in this status review.

For brevity the term "petitioned ESU" is used throughout this report. When "petitioned ESU" appears, it is intended to encompass the petitioner's proposal to list the petitioned area as a single ESU as well as the petitioner's alternative proposal to evaluate each of the six genetically discernible populations identified by Gustafson et al. (2019) singularly or in combination, within that area as ESUs.

2. BIOLOGY AND ECOLOGY

2.1 Species Description and Life History

Mountain lions belong to the mammalian order Carnivora and are members of the cat family Felidae, subfamily Felinae, and a part of the Puma lineage. Numerous common names include puma, cougar, panther, painter, and catamount (Young and Goldman 1946, Hunter 2015). Mountain lions were once widespread in the Americas, but European settlers extirpated them from most of the U.S. and Canada east of the continental divide by the beginning of the 20th century, with only a small population remaining in Florida and a population of unknown size in Texas; although populations in Mexico do not appear to have suffered similar extirpations (Hall and Kelson 1959, Pierce and Bleich 2003, The Cougar Fund 2023). However, since the late 20th century, breeding populations of mountain lions have returned to North and South Dakota and Nebraska, and those states have instated legal hunting in recent years (Hunter 2015, The Cougar Fund 2023).

Adults are large and slender with muscular limbs and a long, black-tipped tail that is about one third of

the animal's total length. Males are typically larger than females. Males generally weigh 55–65 kg (121–143 lbs.) with a length of 2.2–2.3 m (7.2–7.5 ft.) from nose to tail tip, and females generally weigh 35–45 kg (77–99 lbs.) with a length of 2.0–2.1 m (6.6–6.9 ft.) (Currier 1983).

Deer (*Odocoileus* spp.) are the most common prey of mountain lions in the United States, Canada and parts of Mexico, making up about 70% of their diet (Ruth and Murphy 2009). The relationship between mountain lions and deer is so strong that lion distribution throughout the Americas has been described as largely a function of deer distribution (Young and Goldman 1946, Pierce et al. 2000). However, mountain lions are opportunistic predators and known to eat up to 232 different species of mammals, birds and reptiles across their extensive geographic range (Karandikar et al. 2022). This includes but is not limited to elk (*Cervus canadensis*), feral horses (*Equus ferus caballas*), feral burros (*Equus asinus*), guanaco (*Llama guanicoe),* wild pigs (*Sus scrofa)*, pronghorn (*Antilocapra americana*), bighorn sheep (*Ovis canadensis*), brocket deer (*Mazama* sp.), ocelots and related felids (*Leopardus* sp.), greater rhea (*Rhea americana),* coyotes (*Canis latrans*), bobcats (*Lynx rufus*), porcupines (*Erethizon dorsatum*), fishers (*Pekania pennanti*), rodents, wild turkeys (*Meleagris gallopavo*), and livestock (Young and Goldman 1946, Currier 1983, Iriarte et al. 1990, Sweitzer et al. 1997, Wengert et al. 2014, Allen et al. 2015, Vickers and Garcelon 2022).

Mountain lions reach sexual maturity at two to four years, and females care for their young for the first one to two years (Quigley and Hornocker 2009). They have a polygynous social structure, and males do not contribute to rearing young (Logan and Sweanor 2009). Mates locate each other with auditory and olfactory signals including scrapes, made by using their hind feet creating a shallow trough with a small mound of ground debris at the distal end. These forms of communication are also vital for maintaining family cohesion and avoiding competition or direct threats from other mountain lions. Identity, social status, and reproductive condition may all be possible functions of scent markers (Logan and Sweanor 2009). Mountain lion scent marks seem to serve as "bulletin boards," which males and females visit to determine the temporal presence, reproductive status, quality, and possibly even the individual identity of other mountain lions (Currier 1983, Logan and Sweanor 2001, Harmsen et al. 2010, Allen et al. 2014).

Gestation lasts 82–96 days (Young and Goldman 1946, Currier 1983, Hunter 2015). Litter size ranges from one to six, though two to four kittens are typical (Pierce and Bleich 2003, Beier et al. 2010, Riley et al. 2014). Reproductive females seek refuge from human activities. Wilmers et al. (2013) found that mountain lions exhibiting reproductive behaviors (denning and chemical and vocal communication) avoided human disturbances by distances four times greater than non-reproductive mountain lions. At 12–18 months, mothers may come into estrus and become aggressive towards their young, encouraging dispersal (Pierce and Bleich 2003). Intraspecific predation is a known source of mortality in mountain lion populations (Beier and Barrett 1993, Logan and Sweanor 2001, Allen 2014). Survivorship of dispersing mountain lions is low relative to adults with established home ranges, and dispersing young are more likely than resident mountain lions to be involved in depredation incidents or other conflicts with humans as they try to find prey without the advantage of an established home range (Torres et al. 1996).

A study of juvenile lion dispersal was conducted by Beier (1995) in the Santa Ana Mountains of

southern California from 1988 to 1992. Juvenile mountain lions dispersed via habitat corridors in a landscape fragmented by urbanization, and some dispersers used corridors containing manmade features such as golf courses and major freeways. Each collared male dispersed over several weeks to months, and as many as four temporary home ranges were occupied sequentially. The mean dispersal distance from a sample of eight males was 63 km (39.1 mi.). Three of the male dispersers died by vehicle strikes, one was shot, one died of disease, and one died of natural cause, leaving only two surviving dispersers. The one monitored female disperser wandered throughout the northern half of the Santa Ana Mountains, changing directions ≥ 5 times upon encountering the urban-wildland interface and covered ≥ 342 km (212.5 mi.) without establishing a temporary home range. Four months after her dispersal date, she returned to the edge of her natal range and bedded near her mother for one day, dying near that location days later of unknown causes. All travel in corridors and habitat peninsulas occurred at night. It was noted that a dispersing lion cannot use a corridor unless its normal travel pattern causes it to encounter the corridor entrance.

Vickers et al. (2015) observed numerous southern California study animals dispersing > 80 km (50 mi.), and one young male moved > 140 km (87 mi.) from California into northern Mexico and back. Mountain lions are known to be capable of dispersing at least 2,450 km (1,522 mi.), and most long-distance dispersers are thought to be young males in search of available mates (Hawley et al. 2016).

Mountain lions are primarily solitary, territorial, and occur in low density. They require large areas of habitat with adequate prey abundance (Quigley and Hornocker 2009). They have large home ranges often comprised of multiple vegetation community types including riparian, chaparral, oak woodlands, coniferous forests, grasslands, and desert environments including rocky desert uplands (Grinnell 1914, Grinnell et al. 1937, Williams 1986, Dickson et al. 2005, McClanahan et al. 2017, Dellinger et al. 2018) and occur from near sea level to high mountain elevations (Grinnell et al. 1937, Young and Goldman 1946, Hunter 2015).

Average home range size in California ranges from 300–350 km^2 (116–135 mi^2) for males and 90–100 km^2 (35–39 mi^2) for females (Grigione et al. 2002, Riley et al. 2021) and varies with prey density. While male home ranges can overlap spatially, male mountain lions are territorial, making temporal overlap between males rare (Logan and Sweanor 2001). However, males attempt to overlap their home ranges with multiple female home ranges to enhance breeding opportunities. Females are less territorial with their home ranges often including significant overlap, and the degree of home range overlap is typically greater where prey densities are higher (Stoner et al. 2018). Subadult males are generally met with aggression from resident adult males and tend to disperse farther from their mothers' home range than subadult females, up to nearly 500 km (310 mi; Pierce and Bleich 2003, Grigione et al. 2002). Due to these behavioral mechanisms, local abundance of male mountain lions is generally limited by available habitat (Maletzke et al. 2014), while female abundance is generally limited by prey availability (Stoner et al. 2018). Given the importance of females to population growth and because one male can breed with multiple females, mountain lion populations are ultimately limited by prey availability (Logan and Sweanor 2001).

2.1.1 Sources of Mortality

From 1974 to 2020, the primary drivers of mountain lion mortality in California were found to be anthropogenic when cause of death could be determined. The leading cause was permitted lethal removal resulting from livestock depredation incidents (17.5% of attributable mortalities), followed by vehicle strikes (14.8%; Benson et al. 2023). Other known mortality factors in order of importance were non strife natural mortality (12.5%), killing by other mountain lions (intraspecific predation or strife; 11.8%), poaching (9.9%), lethal removals to protect endangered bighorn sheep (5.3%), and other human causes (3.4%) (Benson et al. 2023). It should be noted that 76% of Benson et al.'s data was collected since 2000; therefore, the results are indicative of more recent causes of mortality. Other known causes of mortality include disease, catastrophic wildfires (Grinnell et al. 1937, Beier and Barrett 1993, Wilmers et al. 2013, Riley et al. 2014, Vickers et al. 2015) and complications associated with exposure to pesticides and rodenticides (Riley et al. 2007, Rudd and Rogers 2021). However, 24% of tracked mountain lions in Benson et al.'s (2023) study died of unknown causes, which is a greater proportion than those that died of any single known cause.

Dellinger et al. (2021a), using the same dataset (expanded to include 1972 and 1973), derived survival estimates for mountain lions by age, sex, and habitat association. They used data from radio-collared mountain lions across 24 study areas and found of the 629 collared individuals, 246 died while being monitored. Annual survival for all adults (≥3 years old; n = 430) and subadults (≥1 and <3 years old; n = 199) combined across the state was 0.746 (CI 0.719–0.774). Depredation removal was a greater source of mortality for males (n = 36; 0.085 [0.060–0.110]) than females (n = 20; 0.038 [0.024–0.053] Dellinger et al. 2021a). Annual survival estimates by sex and age-class are summarized in Table 2.

Table 2. Survival estimates (with confidence intervals) by sex and age-class for mountain lions in California from 1972–2020 (data from Dellinger et al. (2021b)).

	Males	**Females**
Subadult	0.636 (0.558–0.725)	0.740 (0.631–0.867)
Adult	0.698 (0.649–0.751)	0.806 (0.772–0.843)

Dellinger et al. (2021a) found survival rates varied by location, clustering into three categories representing animals with home ranges primarily located in urban, rural, or remote/wilderness settings. Animals occurring in remote/wilderness areas (n = 131) had higher annual survival rates (0.794 [0.740–0.853]) than animals in rural areas (n = 92; 0.591 [0.498–0.703]), while survival of animals occurring in urban areas were intermediate and not significantly different from either remote/wilderness or rural areas (n = 156; 0.735 [0.682–0.792].

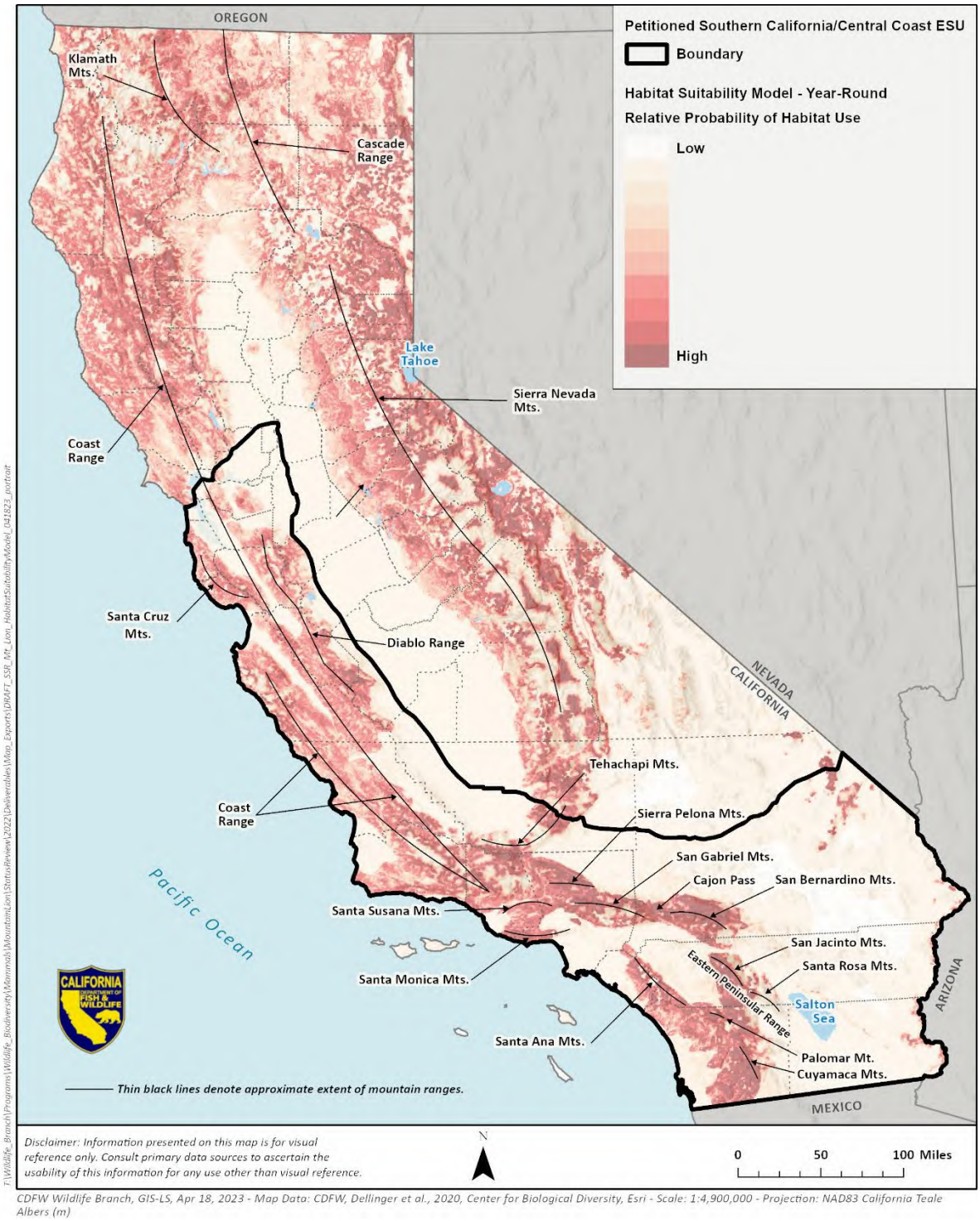
Mountain lions have few natural predators in California. Mountain lions are subordinate to black bears and gray wolves (*Canis lupus*) across parts of their geographic range including California (Elbroch and Kusler 2018). Black bears occasionally kill mountain lion kittens (Elbroch and Kusler 2018), but mainly affect mountain lions through kleptoparasitism of kill sites in California (Elbroch et al. 2015).

Where gray wolves and mountain lions coexist, wolves are known to affect adult and kitten survival, resource selection, prey selection, bedding locations, and population size (Bartnick et al. 2013, Elbroch et al. 2015, Kusler et al. 2017, Elbroch and Kusler 2018, Elbroch et al. 2020). Currently, no resident wolf packs or individuals are known to exist in the petitioned ESU area.

2.2 Range and Distribution

A species' range is the general geographic area within which a species normally occurs, while its distribution is the set of locations occupied by individuals of a species within its range at a given time. For purposes of CESA and this Status Review, the term range refers to the species' California range (*Cal. Forestry Assn. v. Cal. Fish and Game Com.* (2007) 156 Cal. App. 4th 1535, 1551), though emphasis is on the geographic area of the petitioned ESU. Mountain lions currently range throughout all California ecoregions. Though verified mountain lion sightings and encounters have occurred in all counties in the last decade, they are most commonly reported from the more mountainous and remote areas of the state (Dellinger et al. 2021b; Fig. 2). Mountain lions are most likely to establish home ranges in areas with sufficient forest and shrub habitat which promote presence of their primary prey, mule deer (*Odocoileus hemionus)* (Dellinger et al. 2020*a*). In California, these areas include the coastal mountain ranges from southern California north to the Oregon border, the southern Cascade Range, and the Sierra Nevada (Fig. 2). The areas with the least suitable habitat, and thus lowest densities of both mule deer and mountain lions, include intensively farmed areas of the Central Valley and lowlands of the inland desert regions of the state. However, recent survey work has found resident breeding populations of mountain lions near the Sutter Buttes in the Sacramento Valley and in the Mojave Desert (McClanahan et al. 2017, Dellinger et al. 2018). The distribution of mountain lions in California has changed little from what Grinnell et al. (1937) described, with a few notable exceptions: the large, high density urban areas of the San Francisco Bay Area and the Los Angeles–San Diego coastal plain and inland valleys, and intensively farmed agricultural areas such as the Salinas Valley and the Central Valley where historical reports noted mountain lions were not uncommon in riparian areas (Newberry 1857). Central Valley riparian corridors likely played an important role in connecting mountain lion populations in the Sierra Nevada with populations in coastal mountain ranges.

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557 **Figure 2.** Range and distribution of mountain lions in California based upon a habitat selection model (Dellinger et
558 al. 2020*a*). Darker red indicates a higher probability of mountain lion occupancy. Mountain lions may occur in

areas outside of this distribution, though such animals may include breeding and/or dispersing individuals. Major mountain ranges in the petitioned ESU are labeled.

2.3 Habitat That May Be Essential to the Continued Existence of the Species

Dellinger et al. (2021b) described general patterns of mountain lion habitat use in California:

> "Mountain lions are among the most widely distributed carnivore species (Logan and Sweanor 2001). This wide distribution is a product of their ability to persist in almost any habitat provided adequate prey is available. When establishing a home range, mountain lions select habitat with adequate prey and stalking cover to aid in meeting energetic demands. After establishing a home range, many things, including human activity, can influence habitat use patterns (Wilmers et al. 2013).
>
> In California, mountain lion habitat use patterns were found to be seasonal in the more temperate areas of the state (Dellinger et al. 2018) while, in the more Mediterranean areas, mountain lion habitat use patterns are more stable between seasons (Wilmers et al. 2013)."

Studies of mountain lions in North America have noted patterns of associations with vegetative and topographic cover, steep slopes, and higher elevations, and avoidance of open agricultural lands, sagebrush (*Artemesia tridentata*) dominated habitats, open meadows, and pastures (Murphy 1983, Logan and Irwin 1985, Laing 1988, Lindzey et al. 1994, Pierce and Bleich 2003). .

Zeller et al. (2017) found that in southern California, mountain lions preferred to establish home ranges that contained chaparral, scrub, and grasslands, but within those home ranges, spent their time in slightly more rugged terrain, riparian areas, and woodland. Dickson and Beier (2002) noted riparian areas were selected for in all seasons by mountain lions in southern California and suggested the preference is related to the presence of stalking cover and prey. Use of chaparral stands may be dependent on stand age. Burdett et al. (2010) speculated that dense, mature late seral chaparral may be avoided because mule deer prey cannot easily move through such stands. Other noted associations include strong preference for rugged areas and a strong avoidance of human development in the form of agricultural areas, urban areas, and roads (Burdett et al. 2010).

2.4 Population Structure

There are currently two recognized subspecies of mountain lion throughout the Americas (Culver et al. 2000, Kitchener et al. 2017). Lions in North and Central America are classified as *Puma concolor couguar,* while most mountain lions in South America are classified as *Puma concolor concolor* (the subspecific identity of some mountain lions west of the Andes in South America remains uncertain). This taxonomy is partly based on the finding that the entire North American population is genetically homogenous at three mitochondrial loci (Culver et al. 2000), which was further supported in an analysis by Caragiulo et al. (2014) which analyzed three different mitochondrial genes and used a larger number of modern mountain lion samples. Genetic diversity is greater in Central and South American mountain

lions, and it is hypothesized that the North American population derived from a recent (i.e., late Pleistocene circa 10,000 years ago) recolonization by a small number of founders whose ancestors originated in eastern South America 200,000–300,000 years ago (Culver et al. 2000, Caragiulo et al. 2014).

Several studies have demonstrated that the complex geography and land use patterns in California have influenced patterns of gene flow and genetic exchange among mountain lions in different areas of the state (Ernest et al. 2003, Gustafson et al. 2019, 2022). Two studies are especially relevant to understanding the genetic structure of mountain lions within the petitioned ESU. The first is Gustafson et al. (2019), which the petitioners referenced extensively. Gustafson et al. (2019) collected samples from 992 mountain lions around California and Nevada and used microsatellite markers—which undergo mutations at a relatively rapid rate and are appropriate for examining differences between populations at short timescales (on the order of hundreds of years). The authors identified nine clusters of similar genetics, which they referred to as genetic populations, in California and one cluster in Nevada. Though these populations show significant genetic differentiation, they are not fully isolated (Fig. 3). There is gene flow among many of the populations with the WSN population providing important recent connectivity between the Central Coast populations and populations to the north and east, and the SGSB population linking the EPR and SA populations with the WSN and the Central Coast populations.

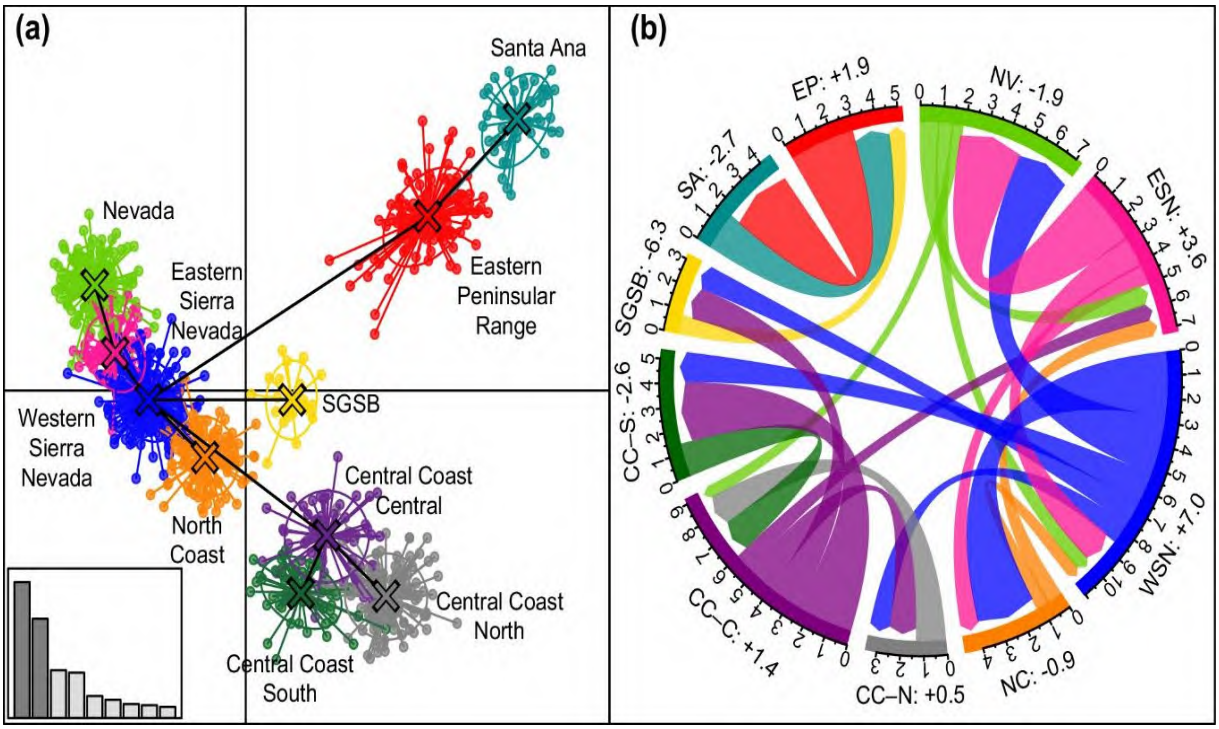
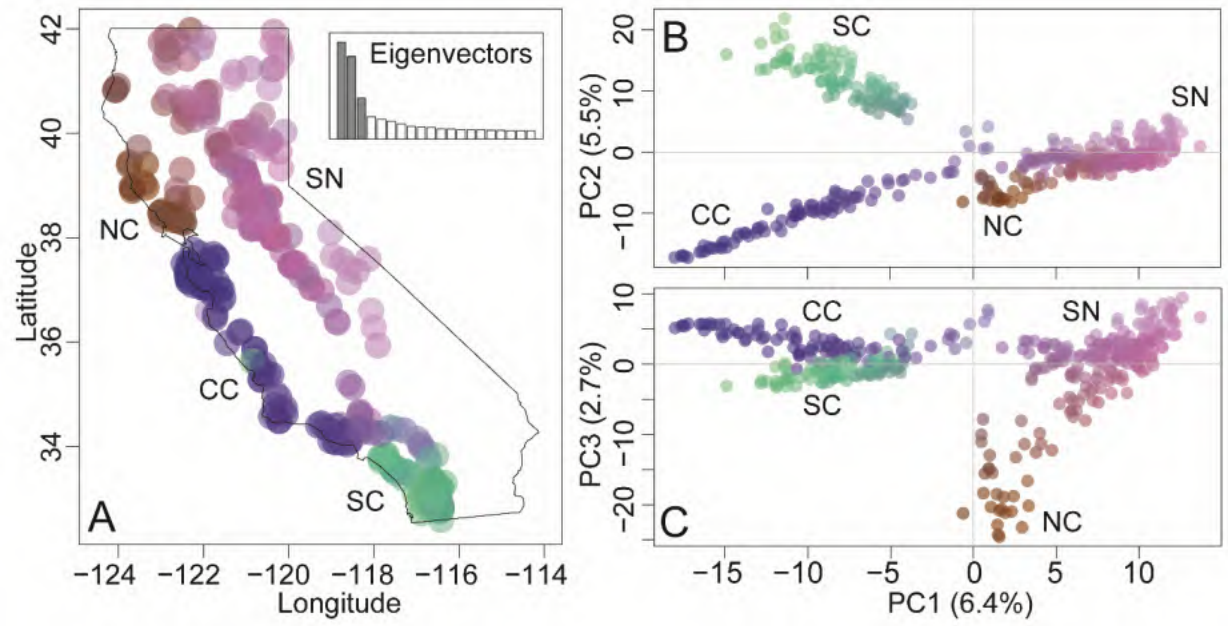


Figure 3. Functional connectedness of puma populations, based on (**a**) discriminant analysis of principal components and (**b**) bi-directional migration rate estimates (multiplied by 100 for visualization). Each dot represents an individual (**a**). Each color (**a,b**) represents a population. Black lines (**a**) indicate the most closely

related population based on genetic dissimilarities. The inset barplot (**a**) shows which axes are being displayed (i.e., discriminate functions 1 and 2) and the relative proportion of variation explained by each of the 9 discriminant functions. Two-thirds of the individuals in each population are contained within the corresponding ellipsoid. For a biologically meaningful interpretation, only estimates of interpopulation migration rates with 95% confidence intervals that do not cross 0 are presented (**b**). Net genetic source-sink migration rates are presented next to population names with positive values indicating net genetic source and negative values indicating net genetic sink (e.g., WSN exported 9% of migrants and received 2% so its net rate is +7%). *NV* Nevada, *ESN* Eastern Sierra Nevada, *WSN* Western Sierra Nevada, *NC* North Coast, *CC-N* Northern section of the Central Coast, *CC-C* Central section of the Central Coast, *CC-S* Southern section of the Central Coast, *SGSB* San Gabriel San Bernardino, *SA* Santa Ana, *EP* Eastern Peninsular Range. Reproduced from Gustafson et al. (2019).

The second study relevant to understanding the genetic structure of mountain lions within the petitioned ESU is Gustafson et al. (2022), which analyzed 16,285 genome-wide single-nucleotide polymorphisms[1] (SNPs) from 401 pumas sampled broadly across the state. SNPs can be used to understand the differences among populations at evolutionary timescales relevant to the discussion of ESUs (i.e., thousands to tens of thousands of years). SNPs are known to resolve population genetic structure with higher resolution and greater statistical power than the microsatellites that were used in the 2019 study (Narum et al. 2013, Vendrami et al. 2017, Hohenlohe et al. 2018). Using SNPs, Gustafson et al.'s (2022) best supported model identified four broad-scale genetic clusters concordant with California's geography: North Coast (NC); Sierra Nevada (SN); Central Coast (CC), which includes Gustafson et al.'s (2019) CC-N, CC-C, and CC-S genetic populations; and Southern Coast (SC), which includes Gustafson et al.'s (2019) SA, SGSB, and EPR (Fig. 4).



[1] Random substitutions of the nucleotides at identified positions on DNA which typically do not code for physiological or behavioral traits.

Figure 4. Principal component analysis (PCA) of 401 pumas at 16,285 SNPs reveals four broad-scale genetically discernable populations (NC = North Coast, CC = Central Coast, SC = Southern Coast, SN = Sierra Nevada). (A) The colorplot (R package *adegenet*) of the PCA represents colors corresponding to a combination of the first 3 eigenvectors. The inset plot shows the proportion of the variance explained by shaded PC eigenvectors 1–3 compared to other eigenvectors. The color values are plotted at sample locations to demonstrate geographic structure. Colorplots of (B) PC1 and PC2 and (C) PC1 and PC3 resolved the 4 broad-scale genetically discernable populations. Reproduced from Gustafson et al. (2022).

On a finer scale, both cluster analyses and genetic differentiation tests by Gustafson et al. (2022) also support the presence of nested substructure within the four well-supported, broad-scale populations. The authors found evidence of 10 fine-scale genetically discernable populations roughly approximate to the genetic populations identified by Gustafson et al. (2019). Consistent with the 2019 study, there is evidence these fine-scale populations are not fully genetically isolated. Evidence of historic genetic exchange among the fine-scale populations with the WSN population providing important connectivity between the Central Coast populations and populations to the north and east, and the SGSB population linking the EPR and SA populations with the WSN and the Central Coast populations from Gustafson et al.'s (2019) microsatellite analysis (Fig. 3) is further supported by the SNP analysis (Gustafson et al. 2022). Additionally, the CC-S genetic population is of critical importance to sustaining statewide gene flow because of the intersection of dispersal corridors connecting the SN, CC, and SC broad scale genetic populations. Both publications suggest a pattern of population structure consistent with both natural landscape features (e.g., Central Valley, San Francisco Bay, Sierra Nevada Crest) and anthropogenic development (e.g., roads and highways, housing developments) impeding gene flow at various temporal and spatial scales resulting in gene flow among mountain lion populations in California following a "horseshoe" network around the Central Valley. San Francisco Bay acts as the open end of the horseshoe, with NC, WSN, ESN, CC-C, and CC-N comprising the body of the horseshoe (Ernest et al. 2003, Gustafson et al. 2019, 2022). Notably, the Santa Monica Mountains, SGSB, SA, and EPR are not part of the horseshoe.

2.4.1 Management Units

Although populations are linked, natural topography and anthropogenic development of the California landscape has resulted in local populations experiencing different demographic rates, levels of connectivity, and genetic variation—even over short geographic distances. We propose an alternate conceptual framework, the Management Unit (MU) (outlined below), to understand and conserve contemporary California mountain lion populations. We propose that the existing population genetic data of Gustafson et al. (2019) can be used to delineate the boundaries of six MUs within the petitioned area.

The management unit concept represents an important tool for the conservation and management of discrete populations in relation to contemporary landscape change. Management units have been defined as demographically independent populations whose growth rate depends primarily on local births and deaths rather than immigration (Moritz 1994). Therefore, there is a requirement of limited connectivity among MUs that emphasizes the notion of demographic independence and thus the need for separate management (Taylor and Dizon 1999). The MU concept becomes particularly useful for

delineating groups for purposes such as monitoring the effects of human activity on population abundance and regulating those activities (Palsbøll et al. 2007, Schwartz et al. 2007). The identification of MUs is therefore central to the near-term management and conservation of mountain lions in California. The populations and the areas of habitat they occupy are important for maintaining genetic variation and contributing to the long-term adaptability and persistence of the species. Substantial threats to portions of the statewide population exist—habitat loss and fragmentation, mortalities from vehicle strikes and depredation take, habitat degradation from climate change and wildfires, and exposure to and mortality from toxic rodenticides—which necessitates long-term planning and management to ensure their persistence.

The delineation of MUs requires a threshold of dispersal rates among populations, in this case dispersal meaning the movement of individuals from the birth population into another. Work by Hasting (1993) suggests that population growth rates within occupied patches of habitat become correlated at dispersal rates above 10%, effectively resulting in a single demographic unit (i.e., population) among patches (or in this context, a management unit). By this threshold, populations warrant assignment to different MUs if the rate of dispersal among populations is < 10% (Palsbøll et al. 2007). However, movement data based on direct observations are not always available for natural populations, and the use of population genetic analyses has been proposed as an indirect means of inferring levels of connectivity. Estimates of population genetic divergence, which is a function of migration rate, are increasingly being used to delineate the boundaries of MUs (Funk et al. 2012).

We are defining MUs based on a genetic differentiation of 10%, which is a conservative estimate. Use of the Gustafson et al. (2019) dataset is appropriate for this purpose as it is based on microsatellite markers which have a faster mutation rate and should reflect patterns of connectivity over shorter timescales (Funk et al. 2012). Gustafson et al. (2019) present bi-directional estimates of the migration rate between local populations in their manuscript. None of the six genetic populations within the petitioned area have a net bi-directional migration rate estimate of 10% or greater. These results provide conservative evidence suggesting the genetic populations within the petitioned area(s) are demographically independent and warrant management as separate MUs.

The SNP data presented in Gustafson et al. (2022) would be less suitable for this purpose. Those populations relevant to the petitioned area include CC-N, CC-C, CC-S, SGSB, EPR, and SA as identified in Gustafson et al. (2019). We will refer to these Management Units going forward and assess them under various criteria for listing under CESA in Section 6.

3. STATUS AND TRENDS IN CALIFORNIA

3.1 Trends in Distribution and Abundance

Significant changes in mountain lion distribution have occurred within the petitioned ESU due to habitat loss and fragmentation from land use changes as early as the late 1700s and continuing to the present from ongoing development and the associated transportation and infrastructure networks. Many areas within the historical range of mountain lions have been modified by urban and agricultural

development, primarily in the San Francisco Bay Area, southern California, and the Central Valley, making them mostly unsuitable for mountain lions. The highly urbanized zone spreading out from Los Angeles as well as coastal development between Los Angeles and San Diego to the border with Mexico has supplanted large areas of lion habitat in the coastal valleys and plains between isolated patches of remaining habitat in the Santa Monica, San Gabriel, San Bernardino, and Santa Ana mountains (Fig. 5; Vickers et al. 2015, Benson et al. 2016, 2019, Gustafson et al. 2019). The Eastern Peninsular Mountains are also affected by human development and road networks but to a lesser degree than the aforementioned four mountain ranges. Likewise, remaining habitat in the Santa Cruz Mountains and southern San Francisco Bay Area is increasingly constricted by development and busy highways (Wilmers 2014, Wang et al. 2017). However, establishing temporal trends in distribution is difficult due to the paucity of reliable historical data.

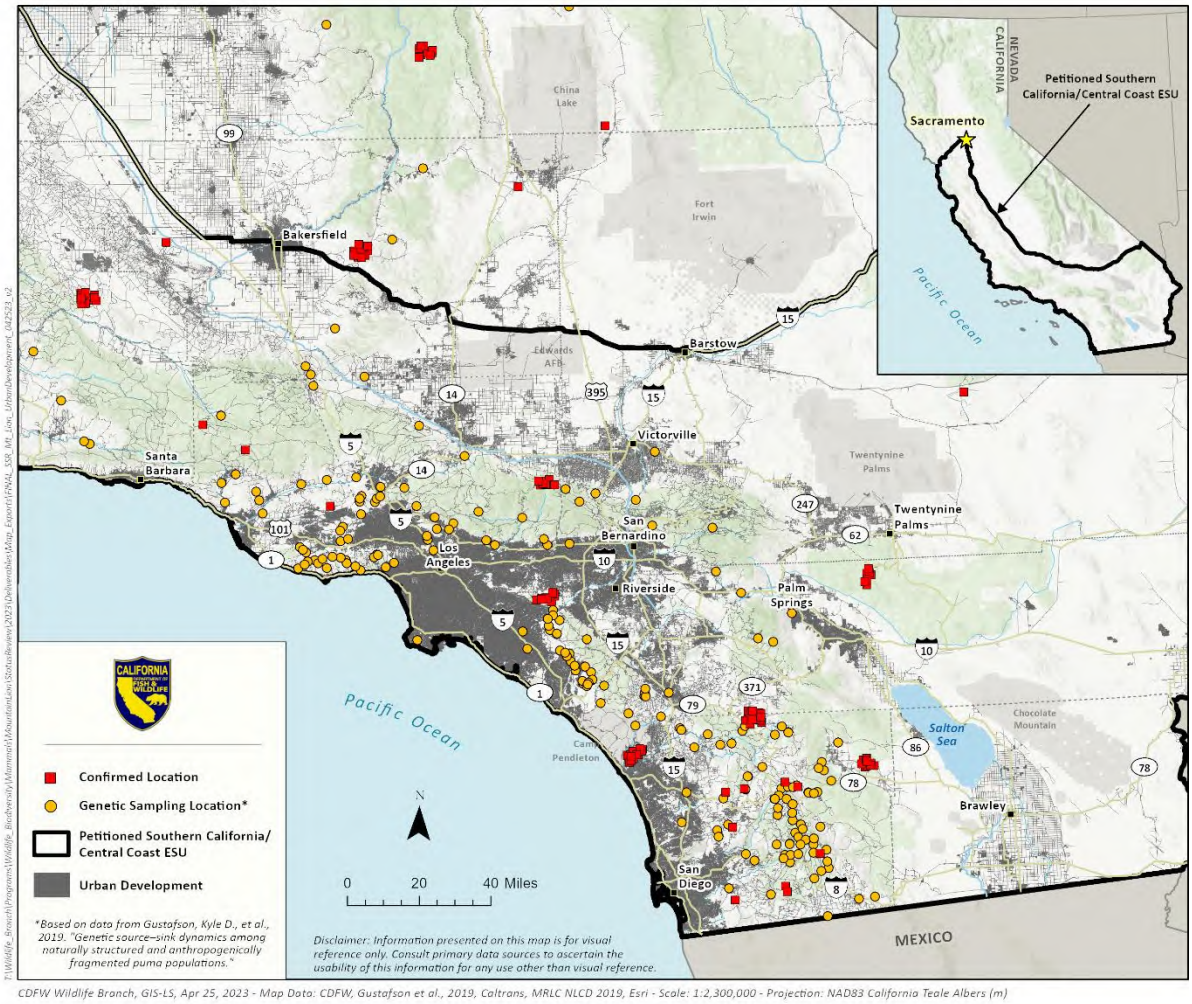


Figure 5. Map of extent of human development in southern California. Included on the map are genetic sample locations from Gustafson et al. 2019 (orange circles, samples collected 1992-2016) and confirmed locations of

mountain lions from CDFW camera traps (red squares, images captured 2009-2022). Note: does not show agricultural development.

There are no rigorous or systematic early California mountain lion population estimates available. The first data-driven estimate was made during years that a trapping bounty was in effect in California, when biologists estimated there were 600 mountain lions in California, 10 years prior to the end of the bounty period in 1953 (McLean 1954, Dellinger and Torres 2020). L. W. Sitton (1977), nearly 10 years after the conclusion of the bounty period, estimated that there were approximately 2,400 mountain lions in California. A 1989 study estimated 4,100–5,700 mountain lions in the state, based on the amount of suitable habitat and adult density estimates from prior studies (Mansfield and Weaver 1989).

Two long-term survival studies on radio-collared mountain lions in the SA provide some insight into population trend for mountain lions in rural enclaves in southern California (Beier 1993, Vickers et al. 2015). Studying 32 radio-collared mountain lions from 1988–1993, researchers found a 75% adult survival rate (Beier and Barrett 1993), which is similar to adult survival rates in other populations, e.g., the CC-S Management Unit (Riley et al. 2014). However, in a more recent SA study, 31 mountain lions marked from 2001 to 2013 had a survival rate of 56.5% across all sexes and age groups (Vickers et al. 2015). These results, combined with genetic information compiled in Gustafson et al. (2019), suggest that semi-rural areas such as the SA are population sinks for mountain lions, while remote, undeveloped areas (e.g., the Sierra Nevada) act as source populations (Dellinger et al. 2021a,b; Benson et al. 2023).

3.2 Population Size

The Department recently used fecal DNA data from 336 individual mountain lions collected from 13 study sites widely distributed throughout the state to estimate the statewide mountain lion population size using a spatial capture recapture model. The result is a statewide estimate of 3,242 (95% CI 2,826-3,742) mountain lions. It is important to note that this population estimate includes all age classes of mountain lions, including dependent young. More modeling work is required to provide an accurate assessment of how lion density varies in different habitats of the state in order to derive population estimates for specific management units (CDFW unpublished data).

Using the effective population sizes presented in Gustafson et al. 2019, an estimate of adult population can be created for the management units within the petitioned ESU (Table 3). Mountain lion population estimates in the table are derived from the estimated ratio of effective population size (N_e) to total adult population size (N). Effective population size essentially estimates the number of breeding adults in a population that successfully pass their genes on to future generations, recognizing that only a portion of adult animals in a population breed (see section 4.9.3 for more information on N_e).

Table 3. Effective population size and estimated total adult population of central coast and southern California mountain lion Management Units (derived from Gustafson et al. 2019).

Population	**Effective Population Size (N_e)**	**Estimated Total Adult Population (N)**[a]
Central Coast North (CC-N)	16.6	33–66
Central Coast Central (CC-C)	56.6	113–226
Central Coast South (CC-S)	2.7[b]	5–10
Santa Ana Mountains (SA)	15.6[c]	31–62
San Gabriel/San Bernardino Mountains (SGSB)	5	10–20
Eastern Peninsular Range (EPR)	31.6	63–126
Total Petitioned ESU	**128.1**	**255–510**

[a] Calculations are based on the estimated ratio of effective to total adult population size (N_e/N) of Florida panthers being 0.25–0.5 (Ballou et al. 1989). This ratio was used in the Florida Panther Recovery Plan (USFWS 2008) and is inclusive of estimates derived for other wild felids including ocelots (*Leoparuds pardalis;* Janečka et al. 2008) and tigers (*Panthera tigris*; Smith and McDougal 1991). It is recognized that these derived population estimates, while informative, are not definitive and may be superseded by new population estimates being developed by the Department.

[b] Benson et al. (2019) calculated an N_e of 4 for the Santa Monica Mountains population within the CC-S. Applying the Ballou et al. (1989) factors would lead to an estimate of 8–16 mountain lions in this area, which is roughly consistent with current estimates of this well-monitored population.

[c] Several studies provide N_e calculation for the SA population. Ernest et al. (2014) calculated an N_e of 5.1 and Benson et al. (2019) calculated an N_e of 6. Applying the Ballou et al. (1989) factors to the most recent calculation would lead to an estimate of 12–24 mountain lions in the SA, which is roughly consistent with current estimates.

The N_e/N method is one method of generating population estimates for mountain lions that are informative, but not definitive. However, the best currently available data agree that most of the Management Units within the petitioned ESU have small population sizes and low genetic variation (see Section 4.9), which could put them at increased risk of local extirpation (Beier 1993, 1995, Dickson et al. 2005, Ernest et al. 2014, Riley et al. 2014, Vickers et al. 2015, Benson et al. 2016, 2019, Gustafson et al. 2019).

4. FACTORS AFFECTING ABILITY TO SURVIVE AND REPRODUCE

4.1 Past and Threatened Modification and Destruction of Habitat

4.1.1 Urbanization

Anthropogenic habitat loss and fragmentation has been occurring in California since the arrival of Spanish settlers in the 18th century and increased dramatically with expansion of mining and agriculture in the mid-19th century. Early 20th century naturalists catalogued the flora and fauna throughout the state and noted the loss of formerly abundant prey species of the mountain lion, including elk, mule deer, pronghorn, and beaver (Stephens 1906, Grinnell 1914, Merriam 1919, Leopold 1966). Successive waves of agricultural and other development, including roads and highways, resulted in the conversion of natural vegetation, and led to further loss and fragmentation of mountain lion habitat. Development impacts have been extensive in the greater San Francisco Bay area, Los Angeles Basin and adjacent mountain ranges, Sacramento, and San Joaquin valleys (water diversions, agricultural development, and residential development), and the South Coast Province (residential, commercial, agricultural, and industrial uses).

The California State Wildlife Action Plan (SWAP) summarizes existing stressors on wildlife populations and ecosystems in the state and describes recent and ongoing habitat loss, fragmentation, and degradation in California (CDFW 2015). The SWAP reports significant habitat loss among many important ecosystems throughout the state. For example, over 195,000 ha (480,000 acres) of rangeland habitats were converted in California between 1984 and 2008 (approximately 3% of available rangelands) primarily due to residential and commercial development and agricultural intensification (Cameron et al. 2014). Additionally, habitat degradation—resulting from pollution, invasive species, livestock grazing, intensive recreation, soil erosion, drought, flooding, or wildfire—is a widespread stressor to wildlife populations in California (CDFW 2015).

Habitat fragmentation occurs when portions of habitat are lost or degraded such that natural areas are divided into small and isolated remnants (CDFW 2015). This fragmentation can have numerous negative impacts on wildlife including declining biodiversity and impairment of ecosystem functions; isolation of species into small subpopulations susceptible to extinction; and inhibition of movement between populations that leads to reduced genetic variation and inbreeding (Ibid.). Species with large home ranges, like mountain lions, require large contiguous areas of habitat or connectivity between multiple diffuse patches of habitat as resources are dispersed across a broader area, habitat fragmentation may lead to a loss of the habitat necessary for survival (e.g., sufficient breeding or foraging habitat) (Ibid.). In California, examples of habitat fragmentation include the conversion of native grasslands to agriculture in the Central Valley, which fragmented once continuous habitat into small patches, and in southern California, urbanization of historic habitat and movement corridors between mountain ranges (Ibid.).

In southern California in particular, human populations are especially dense, and land conversion is extensive. The significant amount of urban, suburban, and rural development in this area—resulting from population pressures of the region's 24 million residents—has led to substantial habitat loss and fragmentation (CDFW 2015). Currently, nearly 40% of the land area in southern coastal California is in urban and suburban use (CAL FIRE 2010). Beyond the immediate footprint of the development, urban, suburban, and rural growth patterns have fragmented the landscape (CDFW 2015). Land-use planning and zoning laws have allowed sprawling development with

residential housing located far from existing urban centers, requiring new roads and infrastructure, as well as communities designed with large lot sizes and little or no preserved open space (Ibid.). These development patterns not only reduce the amount of habitat available but also degrade the quality of adjacent habitat making the remaining natural habitats more vulnerable to the incursion of invasive species, air, and water pollution, and altered fire regimes (Ibid.). In addition, the developed areas, roads, and utility corridors fragment the landscape leaving few or no corridors between natural areas (Ibid.).

The habitat loss and fragmentation described in the SWAP have caused reductions in the geographic distribution of mountain lions in the central and south coast regions of California. Moreover, in the absence of adequate habitat conservation efforts, including connectivity measures, such reductions are expected to continue. A study of mountain lion habitat in the CC-S and EPR MUs showed that nearly half of lion habitat in the study area is on private land, and approximately one-third of the lands that were available habitat in 1970 will be developed by 2030. Additionally, some habitat that is currently adjacent to development may become fragmented, with potential loss of connectivity and increased risk to mountain lions from vehicle strikes and depredation take (Burdett et al. 2010).

Additionally, limited habitat connectivity has resulted in highly restricted gene flow in many areas of central and southern California. For example, between the EPR and the SA MUs, connectivity is limited due to the barrier effect of Interstate 15 in the Temecula region. Similar connectivity challenges occur between the CC and WSN MUs. Recently published information on reproductive and morphological abnormalities in mountain lions indicate inbreeding in the CC-S (Huffmeyer et al. 2022). This study provides new evidence of inadequate habitat connectivity and highly impeded gene flow for these populations (see section 4.9 for more information).

Residential and industrial development is projected to continue throughout the petitioned ESU, even in the areas that are already highly urbanized (United States Environmental Protection Agency (USEPA) 2017). Projections of increased housing density through the year 2050 demonstrate that continued development will exacerbate existing barriers to mountain lion movement, effectively rendering existing pathways less permeable, and in some areas may lead to complete isolation of portions of MUs (Ibid.). Areas that are projected become substantially more isolated by the year 2050 due to residential development include the Santa Cruz Mountains of the CC-N, the SGSB MU, the Santa Monica and Santa Susanna mountains in the CC-S MU; and the Sierra Palona and Tehachapi Mountains near the nexus of the WSN, CC-S, SGSB and EPR MUs (Ibid.).

The cumulative effects of approximately 200 years of major habitat loss and fragmentation due to development and road construction, loss of riparian habitat and vital water sources due to water diversions and dams, and the associated reduction and shifting of prey species appear to have contributed to the separation of mountain lions into smaller population units in the central and southern regions of California. In the Santa Monica Mountains, researchers have documented an unusually high number of mortalities from intraspecific aggression, presumably at least partially attributable to mountain lions being confined to remaining patches of suitable habitat and unable to disperse across anthropogenic barriers (Riley et al. 2014). The impact is most pronounced near large human population centers such as those in southern coastal California and the San Francisco Bay area.

4.1.2 Agriculture and Forestry

The conversion of native lands to intensively farmed crops and pasture has large swaths of land that no longer provide foraging and reproductive habitat for mountain lions. This conversion began as early as the 1700s in coastal California and accelerated rapidly in the 19th and 20th centuries as water storage and delivery systems were developed enabling the irrigation of crops. Approximately 43% of California's land area is used for agricultural production (California Department of Food and Agriculture (CDFA) 2009). In recent years 3.6 million hectares (9,000,000 ac.) of land has been in intensively farmed irrigated agricultural production on average (California Department of Water Resources (DWR) 2023). Although the same pattern of conversion of native vegetation communities to agricultural uses occurred wherever suitable soils and adequate water existed, it is in California's 47,000 km^2 (18,000 mi^2) Central Valley, by far the largest contiguous region of intensively farmed land in the state, that the change has been most dramatic. The Central Valley appears to form a semi-permeable barrier between coastal mountain ranges from the Sierra Nevada and Cascade mountains. Historically the Central Valley contained extensive riparian forests along the Sacramento and San Joquin rivers, their tributaries, and in the delta which likely provided corridors of suitable cover for mountain lions living in and traveling through the valley. In places, riparian forest and scrub along tributary rivers descending to the Sacramento and San Joaquin rivers from the Sierra Nevada in the east and the Coast Ranges in the west likely facilitated genetic connection between the Western Sierra Nevada genetic group and the Central Coast MUs. However, an estimated that 92-97% of such forests have been lost through channelization, altered hydrology, and conversion to agricultural and urban uses, and much of the remaining riparian forest has been modified (CDFW 2014). Loss of Central Valley riparian forests and riparian scrub is likely a major driver of contemporary mountain lion population structure.

Although the impacts are less intense and less permanent, commercial timber harvesting may adversely modify mountain lion habitat at the northern extreme of the petitioned ESU. A study of mountain lion home ranges in the redwood forest of northwest California found mountain lions used forest areas with a greater proportion fragmentation and edge more frequently than areas of more contiguous forest; however, lions generally avoided areas of active timber harvest operations (Meinke 2004). Mountain lion home ranges included different stages of forest succession from freshly harvested stands to late seral forests, perhaps indicating commercial timber management, as regulated by CAL FIRE, does not fragment mountain lion habitat or isolate populations. Conversely, Smallwood(1994) found mountain lion use of forest stands of the central coast, north coast, and Sierra Nevada Mountains sharply declined within 6 years following clear cut harvest. Mountain lions generally prefer heterogeneous habitat, and redwood growth rates are fast compared to the conifer species of the Sierra Nevada, so it is possible that even recently harvested commercial timberland in the redwood forest of central California could continue to provide important mountain lion habitat.

4.2 Vehicle Strikes, Roads, and Rail Lines

As mentioned in the section on mortality sources (2.1.1), vehicle strikes are the second most common cause of known mortalities of mountain lions in California (Benson et al. 2023). The Road Ecology

Center at the University of California, Davis (UC Davis) has records of 535 mountain lions killed on state highways between 2015–2022 (Shilling et al. 2023). However, these records only include reported mountain lion mortalities, so the true number is likely higher. Figure 6 displays documented mountain lion mortality events caused by vehicle strikes from 2000 to 2021. The incidents were mapped from a collection of roadkill reports from Department records and from Dr. Fraser Shilling at the Road Ecology Center. Though the data were not collected systematically as part of any statewide scientific investigation, reported collisions are most common in or near the urban areas of the central and south coasts.

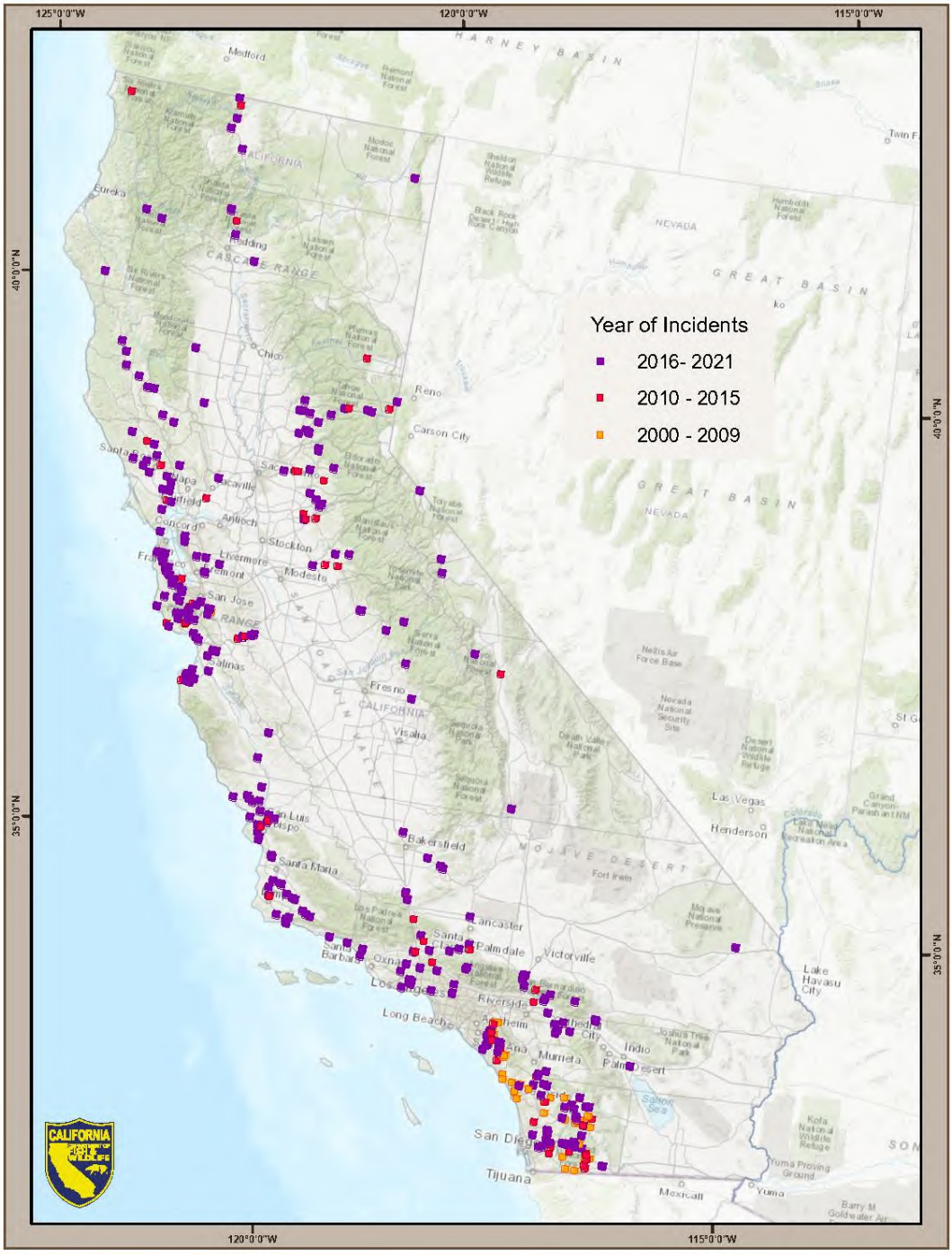


Figure 6. Mountain lion vehicle strike mortality incidents from 2000–2021 from a collection of roadkill reports from Department records and Dr. Fraser Shilling at the University of California, Davis, Road Ecology Center.

In southern California (SA and EPR), the Los Angeles and San Diego regions are major areas of road mortalities (Shilling et al. 2023). From 1981 to 2013, reported vehicle strikes accounted for 53% (50/94) of known mountain lion deaths in the SA MU (which includes the greater Los Angeles metropolitan area) and 30% (46/154) in the EPR MU (which includes the greater San Diego metropolitan area) (Vickers et al. 2015). Vehicle strikes remain the main mortality factor for mountain lions in the SA MU, and a tertiary mortality factor in the EPR MU (Ibid.). Due to the high levels of vehicle-related mortalities in the SA and EPR lion MUs, land protection alone may not be sufficient to ensure mountain lion persistence in the region (Ibid.).

In the Bay Area (CC-N), vehicle strikes are also a significant source of mortality. California State Route (SR)-12, SR-17, SR-1, and especially Interstate-280 have high numbers of mountain lion mortalities (Shilling et al. 2023). Shilling and Vickers (2023) identify the stretch of I-280 northwest of San Jose as the deadliest highway in California for mountain lions with 20 deaths along a 32 km (20 mi.) stretch from 2015–2022. At least six mountain lions were killed by vehicle strikes on Highway 17 in the Santa Cruz Mountains between 2008–2018 (Midpeninsula Regional Open Space 2017, Slade 2018), and news outlets reported at least three vehicle strikes killing mountain lions on I-280 in San Mateo County between 2014 and 2016. Unpublished Department records indicate ≥ 15 mountain lions killed by vehicle strikes on Highway 17 and ≥ 15 mountain lions killed by vehicles on I-280 from 2014 to 2020, and an additional 10 road killed mountain lions from the CC-N MU in 2021 alone (Terris Kasteen, pers. comm.).

Vehicle strikes also may also cause indirect mortality of dependent young mountain lions. When a female with dependent young is struck by a vehicle, the kittens likely starve to death or become easy prey for predators, including other mountain lions. If the kittens are larger and more mobile, they may approach areas where they are more likely to encounter humans as they search for food. This was seen in November 2017, when a mother mountain lion was killed by a vehicle strike in the SA and two of her kittens were found roaming near human development—one in a backyard and the other along a road (Veklerov 2018). Both kittens, too young to survive on their own, were removed from the wild and placed in the Oakland Zoo.

In addition to direct mortality from vehicle strikes, roads also pose a threat to mountain lions in terms of restricted movement. Radio and satellite-tracking data have revealed that mountain lions will sometimes approach a busy freeway, hesitate to cross, linger in the area, or sometimes pace back and forth parallel to the freeway before turning back (Stoner et al. 2008). Dr. Winston Vickers observed this behavior recently in a female lion that originated from the SA. The satellite-collared lion was heading easterly toward the EPR, but when she encountered I-15, she ranged up and down along the freeway before turning around, ultimately returning to the SA (W. Vickers, pers. comm.).

The threat of vehicle strikes is not limited to roads and highways. Trains also kill wildlife (Gangadharan et al. 2017), and railways often parallel highways and roads (e.g., an existing railway runs roughly parallel to Interstate-15 in the Cajon Pass area between the San Gabriel and San Bernardino Mountains). A high-speed rail line (HSR) is planned to run roughly parallel to I-15, and a HSR line is planned from the Victorville area to Las Vegas in the median of I-15, with a barrier wall at the base of

976 the HSR line. Other areas for HSR are the Central Valley and the route from San Jose through Pacheco
977 Pass.

978 Planning for safe wildlife crossings in southern California has been underway for nearly two decades. In
979 2008, the South Coast Missing Linkages Project identified areas of the state where linkages are needed
980 (Fig. 7). The County of Ventura has incorporated these linkages into their General Plan land use zones
981 to help ensure these important wildlife movement corridors remain passable (Ventura County 2019).
982 The Department and the California Department of Transportation (Caltrans) have announced there will
983 be three wildlife overcrossings along I-15 and the HSR line in San Bernardino County which should
984 facilitate the movement of mountain lions and other species (CDFW 2023a). In addition, current
985 undercrossings and culverts will be maintained and improved along the corridor.



Figure 7. Important wildlife corridors identified in the South Coast Missing Linkages Report (SC Wildlands 2008).

The Department has identified and prioritized selected wildlife barriers statewide, and 10 out of 12 high priority barriers were associated with mountain lions (CDFW 2022b). However, funding to

implement wildlife crossing projects, including land acquisition to make the crossing more natural and acceptable to wildlife, has been limited to date. The lack of wildlife crossings, particularly in highly urbanized areas or across major transportation corridors, contributes to the current mortality rates associated with vehicle strikes. There has been some recent movement on this issue; construction for the Wallis Annenberg Wildlife Crossing in the Liberty Canyon area of the CC-S MU (Fig. 8) broke ground in 2022. The overpass will facilitate mountain lion movement between the Santa Monica Mountains and the Simi Hills and could ultimately facilitate genetic exchange between the CC-S and the rest of the CC and/or SN. It may also minimize local vehicle-related mortality. And a wildlife undercrossing with associated fencing and habitat conservation was constructed under Highway 17 in the Santa Cruz Mountains in February of 2023. Another wildlife crossing over Highway 101 in San Benito County is in the planning and fundraising phase. Together, these crossings will facilitate the movement of mountain lions between the Santa Cruz Mountains in the CC-N MU and the Gabilan Mountains of the CC-C MU.



Figure 8. Rendering of Wallis Annenberg Liberty Canyon Wildlife Crossing. Source: Santa Monica Mountains Conservancy.

4.3 Predator Control and Overexploitation

4.3.1 Historical Overexploitation

The management of mountain lions in California has varied widely in the last century. In the early to mid-20th century, mountain lions were a bountied predator in California, like other western states (Young and Goldman 1946, Dellinger and Torres 2020). When the bounties ended in 1964, mountain lions were classified as a nuisance or vermin species—an unlimited number of mountain lions could be killed year-round without a hunting license, but there was no longer paid incentive for removal (Dellinger et al. 2021b). From 1969–1972, mountain lions were considered a game species and could be hunted with a proper hunting license; their status as a game species was reinstated from 1986–1990, but no mountain lions were harvested during this period (Ibid.). Between 1972–1986 and again 1990 to present, mountain lions were classified as a specially protected species preventing hunting (Dellinger and Torres 2020).

During the bounty period (pre-1964), paid incentives encouraged people to hunt and kill mountain lions resulting in approximately 12,580 mountain lions killed across California (Dellinger et al. 2021b). Nearly one-third of the bounties paid in the first few decades were in northern California in Humboldt, Trinity, Mendocino, and Lake counties (Dellinger and Torres 2020). Additionally, the Department employed 1–5 lion hunters whose only job was to remove mountain lions throughout the state (McLean 1954; Dellinger and Torres 2020).

After the bounty period, mountain lions become classified as a game species by the Department, and two hunting seasons took place (1970–1971) during which 118 animals were harvested from 4,953 permits issued (Dellinger et al. 2021b). Following the second hunting season, a legislative moratorium on mountain lion hunting was put into effect(Fitzhugh and Gorenzel 1986). However, this moratorium did allow mountain lions to be killed for injuring or killing pets and livestock under state issued depredation permits (Dellinger et al. 2021b). The moratorium expired in 1986 causing mountain lions to revert to their previous status as game animals (Ibid.). The Department then began to establish hunting zones and harvest quotas—a process that was near completion in 1990 when hunting tags had been issued for the newly established mountain lion zones (Ibid.). However, a voter ballot initiative (Proposition 117) was made law by California voters which classified mountain lions as a “specially protected mammal species” (FGC 2019). Mountain lions have retained this designation with the only allowable take occurring via depredation permits when mountain lions are encountered attacking or threatening livestock, after causing property damage, to protect public safety, or targeted removal for animals negatively impacting federally listed bighorn sheep populations (FGC 2019).

4.3.2 Livestock Depredation and Human Safety

The interactions between humans and mountain lions in California have profound impacts on the conservation and management of the species. Human-wildlife conflicts are interactions that result in perceived, potential, or actual negative impacts to one or more species. As the state’s trustee agency

for fish and wildlife resources (Fish & G. Code, § 1802), the Department's responsibilities include serving as the primary state agency charged with helping to resolve human-wildlife conflict, public safety, and depredation issues (CDFW 2015).

In some cases, mountain lions that are a threat to domesticated animals can be taken, both lethally and nonlethally. Mountain lions encountered in the act of pursuing, inflicting injury to, or killing livestock or domestic animals may be killed by landowners and their agents without prior authorization (Fish and G. Code, § 4807). The Department is also required to be responsive to depredation permit requests when mountain lions injure or are thought to have injured property such as livestock and pets (Fish & G. Code, § 4802 et seq.). Lethal removals are carried out under the authority of Department-issued depredation permits to the property owner experiencing the damage. The property owner can then designate a third party (e.g., local trapper) to carry out the depredation permit. Additionally, the Department may take or authorize local public safety agencies to take mountain lions perceived to be an imminent threat to public health and safety through nonlethal techniques or, when nonlethal techniques prove ineffective, through lethal take (Fish & G. Code, §§ 4801, 4801.5).

In 2013, the Department developed a situation-specific approach for responding to human-mountain lion conflict including: 1) mountain lions in areas of human habitation, 2) mountain lions depredating pets/livestock, and 3) mountain lion public safety situations. The most noteworthy change in management action reflected in this approach was specifying that only one mountain lion could be taken under a single depredation permit. In 2017, the Department again revised its approach, consistent with Fish and Game Code section 4801.5, to prioritize non-lethal measures for dealing with mountain lion depredation in the Santa Monica and Santa Ana mountains where research indicated that local mountain lion populations constrained by anthropogenic barriers lacked genetic variation (CDFW 2017). In 2020, the Department amended its mountain lion management policy to expand the area where non-lethal measures would be prioritized, consistent with Fish and Game Code section 4801.5 (CDFW 2020). Specifically, the Department has implemented a 3-step process across the central coast and southern parts of California to guide its case-specific response to mountain lion depredations. In this 3-step process, non-lethal measures (e.g., hazing and improvements to animal husbandry) are used to try and resolve depredations during the first two instances of a depredation event at a given property. If a third depredation event occurs at a property despite the implementation of non-lethal measures the Department considers authorizing lethal removal of the offending animal. It should be noted that this process is based on the individual property and not the individual mountain lion. Elsewhere across the state, the Department uses a 2-step process in response to depredation events, such that non-lethal measures are used after the first event. A lethal permit may potentially be issued if another depredation occurs at the same property.

From January 2010 through 2020, the Department recorded 3,637 reported mountain lion incidents. These include public safety concerns and depredations as well as sightings and complaints of nuisance animals. Of the incidents, 2,202 were reported depredations (predation on pets or livestock by mountain lions), 1,327 were classified as potential human conflict cases, and 108 were general nuisance. For incidents of any type, El Dorado County had the most reports (261 reports) followed by Shasta County (176) and Los Angeles County (168). Many reported mountain lion incidents involve

observations that cannot be confirmed, due largely to the transitory nature of wildlife sightings and incidents. For potential human conflict incidents, Los Angeles County had the most cases (108) followed by San Diego County (85), and Mendocino County (65). From 1986 to 2020, there were 19 reported mountain lion attacks on humans, 3 of them fatal, in California. Prior to the 2020 amendment to the Department's mountain lion management policy, 8.6% of all reported mountain lion depredations resulted in the lethal removal of one or more mountain lions from within the petitioned ESU. Following the amendment, the percentage declined to just 0.2% (CDFW Wildlife Incident Reporting System accessed 5/16/2023). The Department prioritizes human safety and lethally removes mountain lions that represent an immediate threat to public safety.

Depredation, wherein mountain lions attack pets and livestock, account for most reported mountain lion-human incidents. Conflicts related to depredation are increasing (Dellinger et al. 2021a) in part due to population growth and development in rural communities and natural areas and expansion of agricultural activities. From 1972 to 2020, at least 3,694 mountain lions were removed in depredation incidents (Dellinger et al. 2021b), and it was the leading cause of attributable mortality of collared mountain lions (Benson et al. 2023). Over the last 20 years, an average of approximately 92 mountain lions have been removed on depredation permits per year across California (Dellinger et al. 2021b). Over this same period, an average of 2.55 mountain lions were removed annually in the SC genetic group identified by Gustafson et al. (2022) (composed of the SGSB, SA, and EPR MUs), 1.4–2.7% of the estimated population size (as estimated by Gustafson et al. (2019)), and approximately 11.7 mountain lions were removed annually from the CC genetic group (composed of the CC-N, CC-C, and CC-S MUs), equating to an annual removal of 3.9–7.7% of the estimated population size (Dellinger et al. 2021b).

Of the mountain lions killed because of depredation, 66% are male (CDFW 2019), and approximately 33% involving dispersing subadult males (Torres et al. 1996). From 1981 to 2013 in the SA and EPR MUs, the number of male mountain lions taken for depredation exceeded the number of females removed by 340% (Vickers et al. 2015). Not only do mountain lions killed pursuant to depredation permits diminish the total abundance of mountain lions in these populations, but because they consist predominantly of males, the number of primary gene dispersers is also greatly reduced, which further inhibits adequate gene flow between lion populations in California (Vickers et al. 2017).

Most reported depredation incidents from 1972–2019 were of sheep and goats on small scale operations (Dellinger et al. 2021a). Interestingly, researchers have noted that at the county level, mountain lion depredation rates increase by 9% for every lion removed through a depredation permit the prior year (Dellinger et al. 2021a). The authors suggested this was likely a result of subadults moving to given areas when resident adults were removed. Those subadults are more likely to use areas closer to people and have less well-developed hunting skills and are likely to favor targeting easily killed domestic animals (Dellinger et al. 2021a). This suggests non-lethal measures instead of lethal removal in response to mountain lion depredation incidents could benefit both mountain lions and livestock owners.

Dellinger et al. (2021a) found that the number of reported depredation events involving pets trended upward from 1972 to 2019. Given that most depredation incidents involve pets and non-commercial livestock, it seems unlikely that the number of conflicts will decline in the future, particularly in the

urban southern coast region. Nisi et al. (2022) found that although mountain lions in the Santa Cruz Mountains avoided the areas where they were most likely to come into conflict with humans during the day, they were more likely to be in those areas at night when lethal responses are more likely to occur. Nisi et al. (2022) suggested that ways in which mountain lions interpret human cues and risk levels do not lead to changes in behavior that are sufficient to reduce conflict with humans. Therefore, improving livestock husbandry to minimize the risk of depredation is vital to further reduce the lethal take of mountain lions.

Mountain lions are occasionally removed when predating upon state and federally endangered Sierra Nevada bighorn sheep (*O. canadensis sierrae*) or state threatened and federally threatened Peninsular bighorn sheep (*O. canadensis nelson*). The Department is authorized to take such actions via Fish and Game Code section 4801, and such actions are identified in each species' federal recovery plan (USFWS 2000, 2007). Historically, this action has primarily affected the SN genetic cluster in the ESN outside the petitioned ESU boundary and where mountain lion populations are relatively large and well connected (CDFW 2021).

In addition to reported depredation take, poaching and other unpermitted take is rarely reported but has been observed in the CC-S, SA, and EPR (Beier and Barrett 1993, Riley et al. 2014, Vickers et al. 2015) as well as in the CC-N (Yap et al. 2019). Benson et al. (2023) reported 26 out of 263 known California mountain lion mortalities from 1974–2020 were due to poaching, accounting for 2%-3% of annual mortalities, a less frequent source of mortality than depredation take (6%), vehicle collisions (4%), natural mortality (3%), and being killed by another mountain lion (3%); although it is possible that collared study animals are illegally taken less frequently than unmarked animals. .

Benson et al. (2023) found that the annual rate mortality from killing for management purposes (0.06 [0.05–0.08]), was roughly equal to all types of natural mortality (0.06 [0.05–0.08]) and is additive to natural mortality. Collectively, all forms of permitted take are unlikely to negatively influence mountain lion populations and trends when viewed at the statewide level, nor in the large and well-connected NC and SN populations. However, the additive mortality resulting from depredations and human conflicts in areas where lion populations are already small and isolated such as California's central and south coasts may result in local population declines (Benson et al. 2023). Importantly, the authors noted the risk of mortality from management killing declined from 2001 to 2020, and raised the possibility that the decline may be related to the recent changes in CDFW's management policies.

4.4 Competition

Mountain lions compete with other large carnivores in most areas of their range. Black bears are known to occasionally displace mountain lions from their kills which deprives them of calories, potentially forcing them to expend additional energy hunting to procure more prey (Allen et al. 2021). In a study in Mendocino County, mountain lions did not seek bear-free areas to mitigate competition with black bears; rather, they increased their predation rates to compensate for the kills stolen by bears (Elbroch et al. 2015). It is unknown whether displacement by black bears occurs frequently enough to affect mountain lion survival and reproductive rates (Elbroch and Kusler 2018). Mountain

lions and bears overlap in space in almost all mountain lion habitats in California except for the Santa Cruz Mountains, and until recently the Santa Monica Mountains. In western North America gray wolves affect adult and kitten survival, directly kill individual mountain lions, and affect habitat and prey selection, bedding locations, and population size (Bartnick et al. 2013, Elbroch et al. 2015, Kusler et al. 2017, Elbroch and Kusler 2018, Elbroch et al. 2020)). Given the small size and limited distribution of California's current gray wolf population, competition between wolves and mountain lions has not been a significant threat to the persistence of mountain lions to date, and as wolves are currently absent from the petitioned ESU, wolf competition is not considered a current threat. Finally, smaller predators and scavengers such as coyotes are known to opportunistically feed from mountain lions kills (Brunet et al. 2022), although the degree this loss of food resources impacts lions is difficult to quantify.

Intraspecific conflict and aggression appear to be a significant mortality factor in areas where mountain lions occupy small patches of suitable habitat (Vickers et al. 2015). Intraspecific aggression has been identified as the leading cause of mortality for the nearly isolated mountain lions in the Santa Monica Mountains (a portion of the CC-S; Riley et al. 2014). Although intraspecific aggression is a common source of mortality in mountain lion populations (Beier and Barrett 1993, Logan and Sweanor 2001, Allen 2014), unusually high levels have been observed in the CC-S MU (Riley et al. 2014). About 41% of deaths of radio and satellite-collared mountain lions being tracked from 2002 to 2018 in the Santa Monica Mountains were from intraspecific aggression, with multiple cases of adult males killing their siblings, offspring sired by other males (i.e., infanticide), and previous mates (Riley et al. 2014). These high levels of intraspecific aggression/predation are likely due to limited available habitat in the Santa Monica Mountains, which are largely surrounded by urban and agricultural development and other dispersal barriers (Riley et al. 2014, Benson et al. 2019). Additionally, in the SA MU, intraspecific predation was documented on two occasions in recent years (W. Vickers, unpublished data). Therefore, this form of competition should be considered a potential threat to lion populations in small, isolated MUs such as the CC-S, SA, and the SGSB. However, the effect of competition on the entire petitioned ESU is unknown and is simply one potential piece of the cumulative impacts on mountain lions in California—not likely a significant threat on its own.

4.5 Toxicants

Mountain lions throughout California are exposed to toxic chemicals in their environment which can be lethal or debilitating depending on the extent of exposure. Some ingested toxicants can be transferred in utero to fetuses, and debilitated lions may be more susceptible to other forms of mortality such as starvation and traumatic injuries.

4.5.1 Pesticide Exposure

Anticoagulant rodenticide (AR) baits are commonly used to control rodent pests in urban, suburban, and agricultural areas (Litovitz et al. 1998, Maroni et al. 2000). As summarized in Serieys et al. (2015), ARs interrupt the production of vitamin K-dependent blood clotting proteins, leading to the depletion

of these proteins over a period of days and inducing mortality by internal hemorrhage. Comprised of two classes of compounds, ARs are the primary chemical method used worldwide for the control of rats and mice. First-generation ARs, including warfarin, diphacinone, and chlorophacinone, are more readily metabolized, have a shorter half-life in liver tissue (two weeks to several months), and must be consumed in multiple feedings to reach a lethal dose. Second-generation ARs include brodifacoum, bromadiolone, difenacoum, and difethialone, and were developed to target rodents with genetic resistance to warfarin. Due to increased toxicity and persistence in animal tissues, with half-lives ranging from 6–12 months, second-generation ARs may persist in liver tissue for more than a year in some species. Both classes of compounds have a delayed onset of action, and death from AR consumption can occur up to 10 days after ingestion. Individual rodents may continue to accumulate the compounds over a period of days, increasing their likelihood of capture by predators as they become weakened by the toxicant. For these reasons, ARs have the potential of creating primary and secondary poisoning risks to non-target wildlife; this is especially the case for predatory mammals as they consume targeted prey that have ingested ARs. AR exposure has been positively associated with proximity to urban areas, raising concerns about long-term conservation impacts of AR exposure on non-target wildlife populations on the fringe of urban areas (Hosea 2000, Riley et al. 2007, McMillin et al. 2008, Gabriel et al. 2012, Serieys et al. 2015, 2018)

Mountain lions use diverse habitats—including residential, periurban, suburban, and urban—where their diet may include native, exotic, invasive and domestic prey (Moss et al. 2016, Smith et al. 2016), exposing them to ARs otherwise used to control vertebrate pests. Further, mountain lions may also utilize public and private agricultural, industrial, and forested areas throughout the state, including remote locations on public lands where prohibited rodenticides are often used to protect illicit cannabis plantations (Gabriel et al. 2012). Previous and ongoing work by the Department's Wildlife Health Lab detected AR exposure in 96% (237/247) of tested mountain lion livers submitted between 2016 and 2018 (Fig. 9; Rudd and Rogers 2021). Second-generation ARs are more commonly detected than first-generation ARs, despite a 2014 California regulatory change restricting second-generation AR use to certified pesticide applicators (Rudd et al. 2018, Rudd and Rogers 2021). Seventy percent of the mountain lion livers (174/247) tested had three or more different ARs present at the time of death (Fig. 10). To date, there is no observable pathological condition consistent with AR exposure in necropsied mountain lions (Rudd et al. 2018).

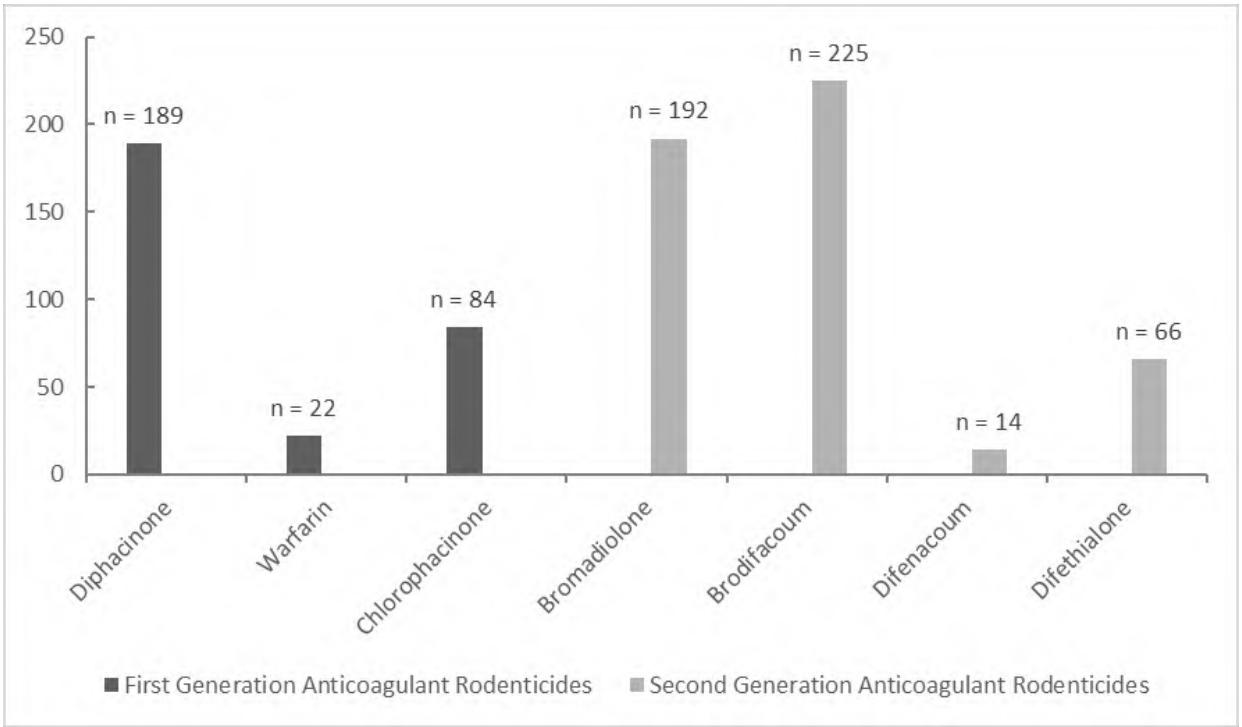


Figure 9. Anticoagulant rodenticide residues detected in 247 livers of mountain lions submitted to the Wildlife Health Laboratory for postmortem examination 2016–2018 (Rudd and Rogers 2021)

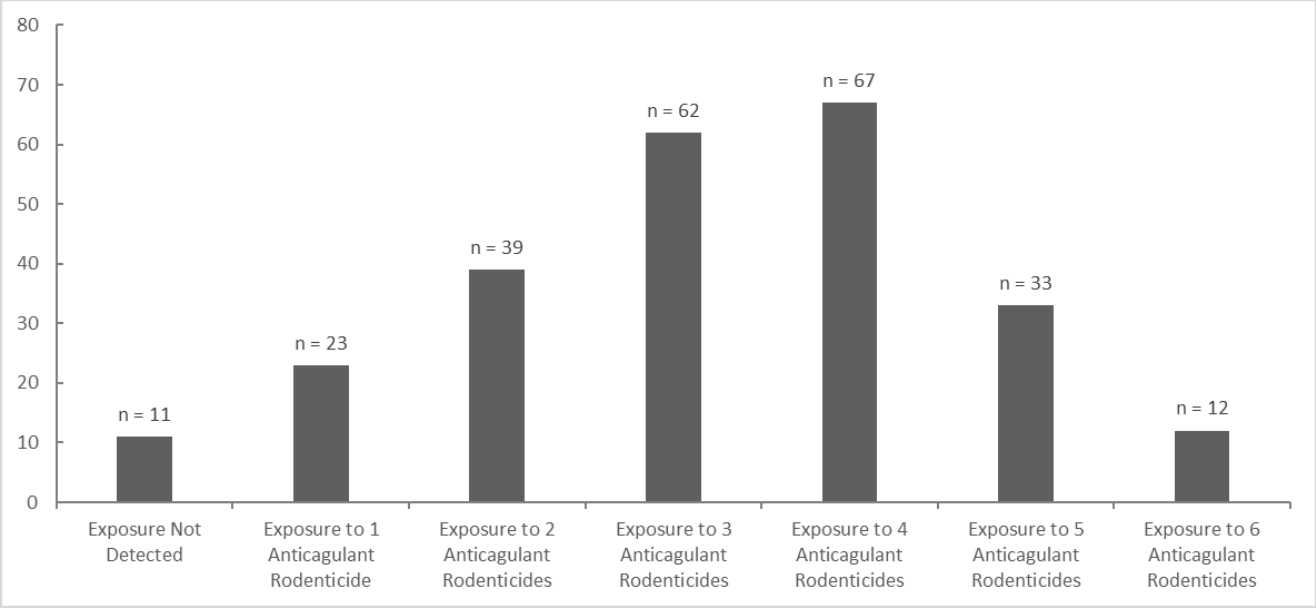


Figure 10. Number of different anticoagulant rodenticides analytes detected in 247 individual mountain lion livers analyzed from January 1, 2016–March 31, 2018 (Rudd and Rodgers 2021).

There is a high degree of variability among species and individuals in their vulnerability to AR exposure. Felids are relatively resistant to the coagulopathic effects of ARs (Kopanke et al. 2018). In the absence of a universal threshold value that could be indicative of AR toxicosis (i.e., poisoning), the diagnosis of AR-related toxicosis and coagulopathy (i.e., impaired clot formation leading to excessive bleeding) requires both the presence of one or more AR in the appropriate sample (e.g., liver or serum) and antemortem or postmortem evidence of a coagulopathy unrelated to another identifiable cause of hemorrhage (e.g., trauma, disease, or infection). It is important to note that exposure in the absence of toxicosis should not be ignored (van den Brink et al. 2018). The uncertainties about the magnitude and drivers of chronic exposure and/or sub-lethal levels of rodenticide exposure demonstrate the need for continued monitoring.

In the Santa Monica Mountains National Recreation Area (CC-S MU), the National Park Service has concluded the deaths of seven mountain lions since 2004 were associated with AR exposure and toxicosis (Riley et al. 2007, NPS 2021). Two mountain lions that died from AR toxicosis in 2004 also had infestations of notoedric mange (Riley et al. 2007, Uzal et al. 2007). Notoedric mange in felids, typically caused by the parasitic mite *Notoedres cati*, is assumed to be non-fatal in bobcats and mountain lions; however, AR exposure may make felids more susceptible to advanced mange disease (Riley et al. 2007).

Of particular interest, AR exposure was detected in the liver of a pregnant female mountain lion from Santa Barbara County and in the livers of her two fetuses (Table 4; Rudd et al. 2020). Many toxic substances, including ARs, can adversely affect fetal development and survival at doses that may not produce toxic effects in the mother (Gupta 2012). Fetuses are also typically more susceptible to AR toxicity because the placenta is the only source of vitamin K for the fetus (Gupta 2012). AR-related coagulopathy and toxicity was not observed in the two fetuses with exposure to brodifacoum and diphacinone (Rudd et al. 2020).

Table 4. Anticoagulant rodenticide detection in maternal and fetal mountain lion livers. BRD: brodifacoum, BRM: bromadiolone, CHL: chlorophacinone, COU: coumachlor, DIF: difethialone, DIPH: diphacinone, WAR: warfarin, DFN: difenacoum. An asterisk (*) indicates that the samples were pooled together for qualitative and quantitative analyses (i.e., samples too small to be evaluated individually).

ID	Mortality by cause	County	ARs detected in pregnant adult (ppb)	# of fetuses	ARs detected in fetal tissue (ppb)
Z16-1126	Depredation	Tuolumne	BRD (230), BRM (trace)	4*	Not detected
Z17-0199	HBC	Santa Barbara	BRD (71), BRM (130), CHL (trace), DIF (trace), DIPH (830)	2	1. BRD (trace), DIPH (150) 2. BRD (trace), DIPH (160)
Z17-0281	Depredation	Trinity	BRD, BRM, DIF, DIPH (all trace)	4*	Not detected
Z17-0328	Depredation	Yuba	BRD (trace), BRM (120), DIPH (trace)	3*	Not detected
Z19-0793	Depredation	Amador	BRD, BRM, DIPH (all trace)	3*	Not detected

Additionally, exposure to ARs may predispose animals to excessive hemorrhage following an otherwise non-lethal traumatic injury or increase sensitivity to additional exposure (van den Brink et al. 2018).

The Petition cited Rudd et al. (2019) to state that mountain lions in California are exposed to dangerously high levels of illegal pesticides, such as carbofuran. However, this citation is incorrect; the Department has not documented any cases of carbofuran toxicity to date. Further research is needed to investigate the lethal and sub-lethal effects of anticoagulants and other toxicants on wildlife in terrestrial environments (Riley et al. 2007, Gabriel et al. 2015, Rudd et al. 2018).

4.5.2 Mercury

Mercury is hypothesized to contribute to reproductive, endocrine, and immunosuppression issues documented in Florida panthers (Roelke 1991, Facemire et al. 1995). While morbidity and mortality resulting from mercury toxicity have not been documented in mountain lions in California, elevated mercury concentrations have been found in the fur and whiskers of mountain lions from the coastal region of the Santa Cruz Mountains (Weiss-Penzias et al. 2019).

4.6 Infectious Diseases

Mountain lions are afflicted by various viral, bacterial, and parasitic pathogens. It is not known if these pathogens and their respective diseases alone could imperil the species in California. However, small, isolated mountain lion populations are at greater risk from a catastrophic disease outbreak which could reduce their ability to persist into the future, especially when combined with other threats. Following is a list of the most common pathogens that could potentially affect mountain lion populations.

4.6.1 Viral Diseases

Feline leukemia virus (FeLV). FeLV is a common immunosuppressive viral pathogen in domestic cats known to cause morbidity and mortality. While infection is seemingly rare in non-domestic felids, FeLV is considered a disease of potential epidemic concern for small populations. Researchers have found infection prevalence in mountain lions to be low, ranging from 0–5.4% (Paul-Murphy et al. 1994, Foley et al. 2013). More recently, the Department, in collaboration with Colorado State University, documented a similar FeLV infection prevalence of 2.4% in lymph nodes collected from 130 necropsied CA mountain lions tested from 2016–2018 (J. Rudd, CDFW, pers. comm.). To date, the Department has documented only two mountain lion mortalities due to suspected FeLV-related infections (e.g., opportunistic bacterial and fungal infections and anemia)—one in 1993 (Jessup et al. 1993) and another in 2020 (J. Rudd and Q. Martins, unpublished data).

Puma lentivirus (PLV). PLV is a genus of immunosuppressive lentivirus that infects domestic and wild felids with some degree of species specificity (Lee et al. 2014) and includes feline immunodeficiency virus (FIV). PLV (type B) infection was recently detected in 46 necropsied mountain lion carcasses from California (35.4%; J. Rudd, CDFW, unpublished data) and is thought to be the cause of death for a 16-month-old male mountain lion that died in April 2018 in Modoc County (J. Rudd and D. Garcelon, unpublished data). However, the remainder of necropsied animals in which PLV infection was detected were aclinical and did not exhibit signs of pathology (J. Rudd, CDFW, unpublished data).

Rabies virus. Striped skunks (*Mephitis mephitis*) are the primary terrestrial wildlife reservoir for rabies in California, but other mesocarnivores, including raccoons, gray foxes (*Urocyon cinereoargenteus*), bobcats, and coyotes, can become infected and transmit the disease. Despite these species serving as potential sources of prey for mountain lions, there have been only two known cases of rabies in mountain lions in California—in 1909 in Santa Clara County (Storer 1923) and in 1994 in Mendocino County (CDFW 2000).

Pseudorabies virus (PrV). PrV is a highly transmissible porcine alphaherpesvirus whose natural hosts are members of the pig family Suidae (Pomeranz et al. 2005). The virus can cause respiratory, reproductive, and neurological symptoms in young piglets, while adult pigs show little to no clinical illness (Pomeranz et al. 2005, Müller et al. 2011). Infection of PrV into non-native hosts is typically fatal with mortalities documented in several carnivore species after consuming wild and domestic pigs, including bears *(Ursus arctos)* (Zanin et al. 1997), wolves (Verpoest et al. 2014), coyotes (Raymond et al. 1997), foxes (Bitsch et al. 1969), lynx (Lynx sp.; Masot et al. 2017), and Florida panther (Glass et al. 1994). In California, pseudorabies has been detected in wild pigs from 13 counties (McDougle 2017). Although PrV has not been detected in California mountain lions to date (Wisely et al. 2018), the high

prevalence of the virus and overlapping distribution of wild pigs and mountain lions in significant parts of California suggest that PrV could be a hazard to lions in California.

Feline Panleukopenia Virus (FPV). FPV belongs to a family of parvoviruses that are closely related to canine parvovirus and mink enteritis virus (Truyen and Parrish 2013). FPV primarily infects felids and has a high mortality rate, although individuals that do survive infection generally have life-long immunity. In natural domestic cat populations, FPV has the potential to regulate population sizes due to its high mortality rate, especially in young animals. In California, FPV was the most common pathogen detected in wild mountain lions from California, with an antibody prevalence of 36% in tested blood samples from 1991–2008 (Foley et al. 2013). Infection with FPV resulted in the morbidity and death of two six-week-old mountain lion siblings from Ventura County in 2021, and was the cause of morbidity in an ataxic, emaciated 11-month-old mountain lion from Nevada County that was euthanized in July 2022 (J. Rudd, CDFW, pers. comm.). Pathological findings for all three mountain lions demonstrated viral-associated encephalitis.

Highly Pathogenic Avian Influenza (HPAI). Since October 2021, outbreaks of H5N1 HPAI belonging to Eurasian lineage, clade 2.3.4.4 have been detected in wild birds and domestic poultry throughout Europe and North America. The majority of H5 HPAI virus detections in both wild and domestic birds have overlapped with annual fall migration and large aggregations of overwintering waterbirds (Verhagen et al. 2021). In addition to causing disease outbreaks in domestic poultry, currently circulating H5N1 HPAI appears to be persisting in wild bird reservoirs with multiple reports of spillover causing illness (e.g., lethargy, inappetence, neurologic signs) and death in a higher diversity of wild bird species than during previous avian influenza outbreaks, affecting raptors and avian scavengers such as turkey vultures and ravens (APHIS 2023). In the United States, similar illness and death have also been reported in mammals, primarily carnivores, including seals, red foxes (*Vulpes vulpes*), raccoons, striped skunks, coyotes, bears, bobcats, and mountain lions (CDFW 2023b). In California, five mountain lions have been documented to have died from the virus: two from Mono County in December 2022 and January 2023 and three from Modoc County in March 2023 (J. Rudd, CDFW, pers. comm.). Occasionally, wild birds, including waterfowl, can make up a component of the natural diet for mountain lions, and at least three of the mountain lions that died had a history of hunting wild Canada geese (J. Rudd, CDFW, pers. comm.). While infection with H5N1 HPAI is considered uncommon in mammals, there is evidence suggesting that certain mutations in the H5N1 virus may lead to mammal-to-mammal transmission (Foley et al. 2013). Given the five documented H5N1 HPAI-related mortalities in California mountain lions over a four-month period and infections in mammals in general, this is an emerging infectious disease that should be closely monitored so that these mutations can be detected as they may increase the zoonotic potential of H5N1 HPAI viruses.

Other viral diseases. The recent emergence of another coronavirus, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-II), which causes COVID-19 in humans, is of notable concern to wildlife, including free-ranging and captive felids (Martínez-Hernández et al. 2020, McAloose et al. 2020, Delahay et al. 2021, Giraldo-Ramirez et al. 2021). In 2021, the virus was reported in a captive mountain lion from a Texas zoo with signs of mild upper respiratory infection (e.g., coughing, wheezing);

however, to date, no mountain lions in California have tested positive for SARS-COV-II (J. Rudd and D. Clifford, CDFW, unpublished data).

In 2010, a feline coronavirus (FCV) was implicated as the cause of mortality in an emaciated young adult mountain lion that developed feline infectious peritonitis, a common disease associated with FCV infection (Stephenson et al. 2013).

Detection of other viral diseases in the mountain lion population also includes canine distemper virus (Foley et al. 2013), feline herpesvirus (Foley et al. 2013), gammaherpesvirus (Troyer et al. 2014), J. Rudd, CDFW, unpublished data), feline foamy virus (Kehl et al. 2013, Kechejian et al. 2019), and feline calicivirus (Foley et al. 2013). These pathogens and their associated diseases are not believed to cause significant population level morbidity or mortality.

4.6.2 Bacterial Diseases

Yersinia pestis. *Y. pestis* is the bacterial pathogen that causes plague. Plague exposure, either by flea bites or consumption of infected prey, is common in carnivores, and most species exhibit antibodies in areas where plague is endemic (Salkeld and Stapp 2006). Human plague infection can be acquired from animals, including mountain lions (Wong et al. 2009). The California Department of Public Health and the Department surveyed 92 mountain lion carcasses collected from 2016–2017 and detected *Y. pestis* antibodies in four mountain lions from plague endemic areas of the state—an overall antibody prevalence of 4.3%. The presence of antibodies demonstrates exposure to the pathogen at some time in the past. All four mountain lions, taken under depredation permits, were otherwise healthy on postmortem and histological examination with no evidence of active infection (J. Rudd, CDFW, unpublished data).

Leptospirosis. Leptospirosis is a potentially fatal zoonotic disease. Though there have been reports of exposure to, and infection by, *Leptospira* spp. in domestic cats (Ferris and Andrews 1965, Fenimore et al. 2012, Lapointe et al. 2013, Chan et al. 2014, Weis et al. 2017), there have been few studies of leptospirosis in wild felids. A study of necropsied mountain lions from California showed that 46% (63/136) of tested mountain lions were positive for *Leptospira* spp. exposure or infection (Straub et al. 2021). Nephritis (swelling of the nephrons in the kidneys) was a common comorbidity of necropsied mountain lions that had evidence of *Leptospira* spp. exposure or infection; however, nephritis alone was not a significant source of morbidity or mortality.

Other bacterial diseases. Other bacterial parasites that have been detected in the mountain lions include *Bartonella* sp. (Bevins et al. 2012) and *Erlichia equi* (Foley et al. 1999).

4.6.3 Parasitic Diseases

Mange. Notoedric and sarcoptic mange are skin diseases caused by highly contagious parasitic mites. Severe and sometimes fatal mange epidemics from these mites have been described worldwide, and wild felids in California have been infested with the mite *Notoedres cati* (Riley et al. 2007, Serieys et al. 2013). In wildlife, mange causes considerable suffering, predisposing the individual to secondary bacterial infections through open wounds, changes in behavior, emaciation, and death (Maehr et al.

1995, Bornstein et al. 2001, Serieys et al. 2013, Niedringhaus et al. 2019). Mange poses a considerable threat to wildlife species that are more social or have high spatial overlap, which can promote transmission (Rudd et al. 2020). Given mountain lions' largely solitary nature, the potential for disease spread is presumably low.

Other parasitic diseases. Other parasites have been detected in mountain lions including dermatophytosis (A. Herman, pers. comm.), *Toxoplasma gondii (*Bevins et al. 2012*), Trichonella sp.* (Reichard et al. 2016), J. Rudd, CDFW, unpublished data)*, Sarcosystis sp.* (Greiner et al. 1989), and *Clicospirura sp*. (Ferguson et al. 2011). Mortalities associated with these parasites have not been reported in California.

4.7 Wildland Fire and Fire Management

Fire is a natural disturbance in California ecosystems that historically benefitted many native wildlife species by encouraging the regeneration and growth of many plant species and creating landscape heterogeneity (Jennings et al. 2016). However, intense, high-severity burns can significantly disrupt natural ecosystems by changing vegetative and animal species compositions temporarily or long term (Williams et al. 2023). Wildfires in California may cause direct mortality to mountain lions in extreme conditions and result in temporary adverse modification of their habitats, however, deer populations typically respond favorably the resulting regeneration of vegetation.

In California's wildland-urban interface and in many habitats prone to fire, changes in temperature, humidity, and wind patterns attributable to climate change have led to more frequent wildfires that burn larger areas (Syphard et al. 2007, 2009, Jennings et al. 2016). Dennison et al. (2014), reviewing western U.S. fire data from 1984–2011, and Williams et al. (2019), reviewing California data from 1972–2018, reported an eight-fold increase in forest area burned in summer wildfires in the Sierra Nevada, Cascade, and North Coast ecoregions, but did not find significant trends in other ecoregions such as coastal chaparral in southern and central California. However, Jennings et al. (2016) found that fires have become more frequent in the shrubland ecosystems of southern California. Wildfires can also accelerate the impacts of climate change through the emission of short-lived climate pollutants like black carbon (soot) and methane that are tens to thousands of times greater than carbon dioxide (the focus of many greenhouse gas reduction efforts) in terms of warming effect and are responsible for 40% or more of global warming to date (CNRA 2016).

Keeley and Syphard (2021) distinguished fuel-dominated and wind-dominated fires and considered the latter type more dominant in the grasslands, shrublands, and woodlands of California's central and southern coast. They pointed out that wind-dominated fires rely on both an extreme wind event and an (usually human-caused) ignition source. The authors considered the major driver of wind-dominated fire impacts to be more frequent ignitions associated with human population growth and the expansion of residential developments into the wildland-urban interface (Keeley and Syphard 2021). Shifting weather patterns resulting from climate changes have further altered fire regimes in southern California. Climate models predict increasing temperatures and decreasing humidity under future climates (Miller and Schlegel 2006), and strong, dry easterly winds (i.e., Santa Ana winds) may become

more frequent and extend into the late fall and early winter when fuel loads are highest and fuel moistures lowest—suggesting extreme fire events will become more frequent in the future (Jennings et al. 2016).

Since 2000, a substantial proportion of the mountains in southwestern California where undeveloped mountain lion habitat remains have burned in wildfires (Fig. 11). Fire-return intervals (the number of years between successive fires in the same location) in southern California shrublands historically ranged from 30–100 years but are now 33% more frequent (Keeley et al. 1999, Lombardo et al. 2009, Safford et al. 2011, Jennings et al. 2016). This shortened interval between fires can interrupt vegetative community successional cycles, reduce plant diversity, favor the establishment of non-native species, and shift shrublands to grass-dominated landscapes (Keeley 2005, Jennings et al. 2016). Jennings et al. (2016) found that fire return frequencies in parts of southern California have increased to the point that the ecosystem is no longer resilient. They warn that if trends continue, mountain lion habitat may be lost as dominant vegetation communities convert to homogenous non-native annual grasslands, which are typically avoided by mountain lions.

The central coast of California has similarly experienced a succession of large, severe wildfires in the last two decades. Major fires in the year 2020 alone included the 160,508 ha (396,624 acres) SCU Complex Fire in the interior of the CC-N MU, the 35,009 ha (86,509 acres) CZU Lightning Complex Fire in the Santa Cruz Mountains, the 50,555 ha (124,924 acres) Dolan Fire in Big Sur, and the 19,461 ha (48,088 acres) River Fire on the eastern slopes of the Santa Lucia Mountains in Monterey County (https://www.fire.ca.gov/incidents/2020). In the central coast region, the annual distribution of fire sizes has trended toward larger fires in the last 75 years, although trends in the frequency of large fires in the same region over the same period are less clear (Keeley and Syphard 2021). Trends in annual area burned differ by responsibility area, with U.S. Forest Service (USFS)-managed areas experiencing an approximately ten-fold increase between 1940–2000, from 5,000 ha/million ha to nearly 50,000 ha/million ha. By contrast, within the California Department of Forestry and Fire Protection (CAL FIRE) responsibility area (largely private lands and state lands), the annual area burned decreased from approximately 15,000 ha/million ha in 1920 to less than 2,000 ha/million ha in 2010 (Keeley and Syphard 2017). Making predictions about future trends in this region is complicated by the interplay between precipitation levels and fuel accumulation. Within the Central Coast zone, projections indicate precipitation levels may increase in the north in coming decades, resulting in less frequent, but high severity fires; while in the south, precipitation is project to decrease, potentially limiting fuel accumulation thereby limiting fire severity, although fires may become more frequent due to prolonged dry periods (Langridge 2018). In the redwood (*Sequoia sempervirens*) forests of the Santa Cruz Mountains, burned areas likely continue to be used by mountain lions as redwoods are adapted to wildfire and trees commonly survive most wildfires and trees that succumb remain standing for decades. Additionally, redwood sprouts and seedlings are prolific following fires, numbering in the tens of thousands per hectare, and canopies develop rapidly (Lazzeri-Aerts and Russell 2014). Consequently, dense cover favored by mountain lions for hunting and travel develops within a few years following severe wildfire. In more xeric forests and shrublands of the CC-N and CC-S, fire effects on mountain lion habitat are similar to those described for southern California.

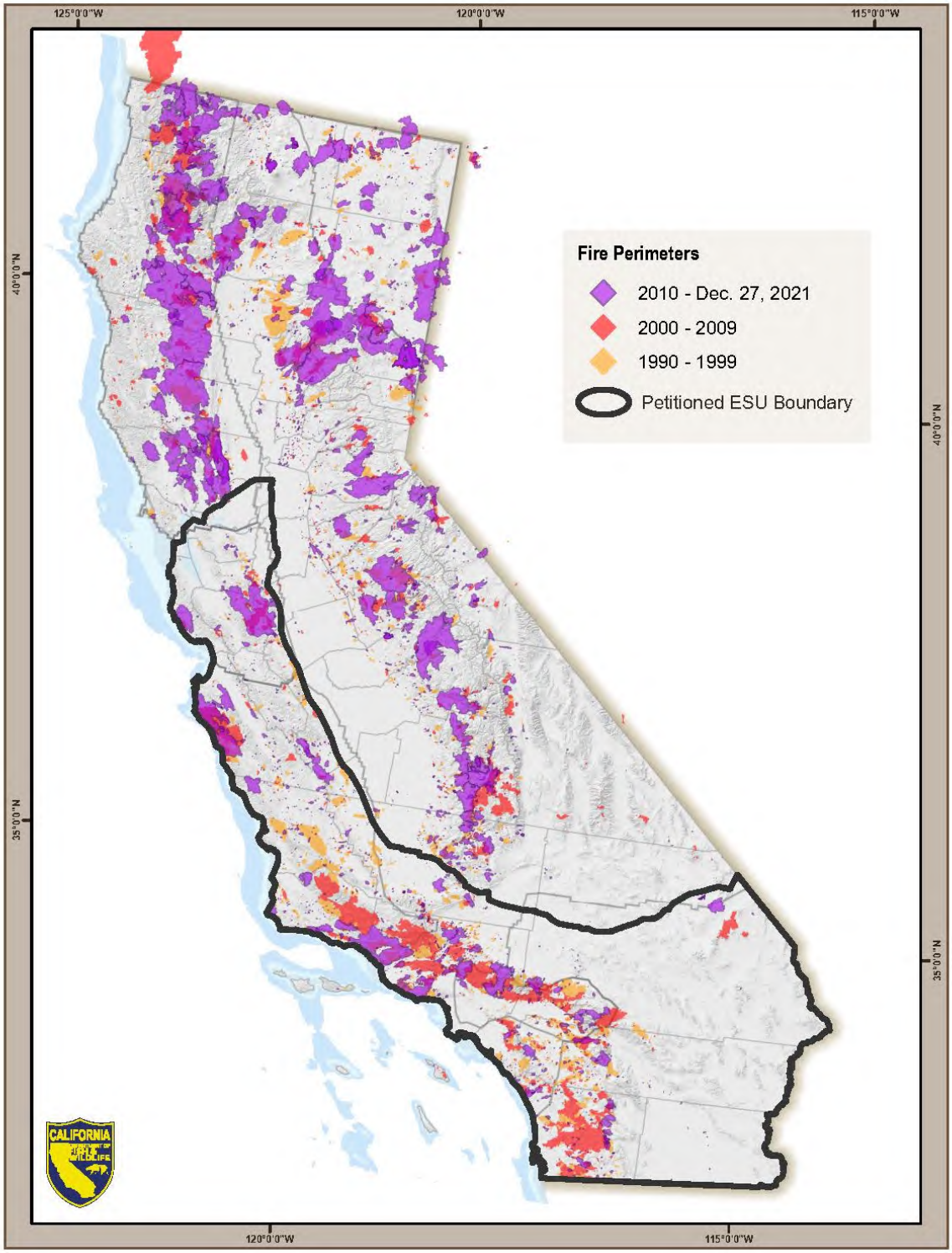


Figure 11. Wildfire perimeters in California by fire year.

While highly mobile mountain lions are likely able to escape most wildfires, quickly moving wind-driven catastrophic wildfires described by Keeley and Syphard (2021) are capable of overtaking fleeing mountain lions. When large fires with multiple heads develop, fleeing wildlife may become trapped between fire fronts (Fig. 12). Vickers et al. (2015) documented one death of a collared mountain lion in the SA and one in the EPR due to human-caused wildfires. The death of a collared mountain lion in the CC-S population found severely emaciated with burned feet following the 2018 Woolsey Fire can reasonably be attributed to wildfire-related injuries. A young lion found with burned paw pads following the 2018 Tomas Fire in the CC-C was treated and placed into captivity. An adult lion found unable to walk due to burned paw pads found in the 2020 Bobcat Fire in the San Gabriel Mountains was cared for and released to live another 10 months before dying of unknown causes. In northern California, one three-month-old male kitten suffering burn injuries to the feet and face from the 2020 Zogg Fire in Shasta County was treated and placed into captivity. The same year, the August Complex Fire in Colusa, Glenn, Mendocino, Tehama, Trinity, and Humboldt counties was likely responsible for the death of one adult female lion and the orphaning of her two kittens which were rescued and placed in captivity (D. Clifford, CDFW, pers. comm.).

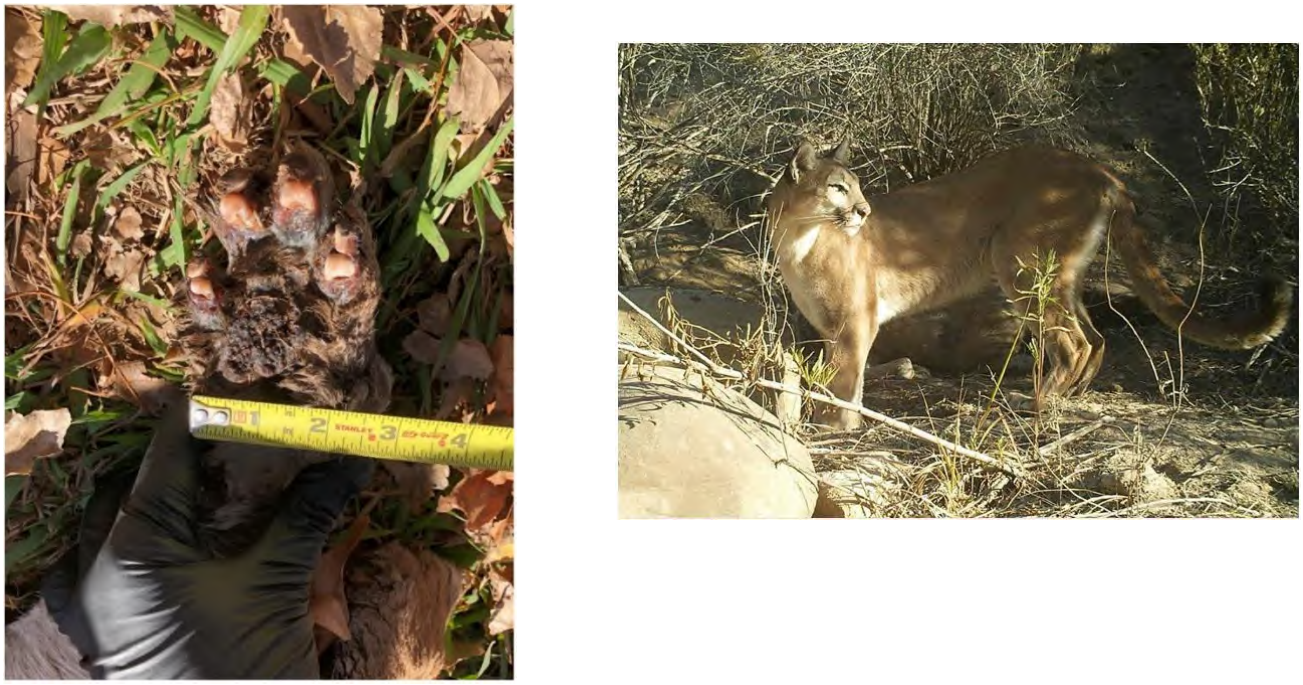


Figure 12. Left: Burned paw of female lion F121 (L) with phalanges showing, found deceased following the Bond Fire in Orange County, California. (Phot Credit: Nick Molsberry, CDFW). Right: F121 prior to the fire (Photo Credit: UC Davis Wildlife Health Center).

Additionally, wildfires temporarily displace mountain lions, increasing the distances they move and amount of area they use (Blakey et al. 2022). Their increased movement leads them to cross over roads more often exposing them to vehicle strikes, and brings them in contact with other mountain lions, increasing the chance of intraspecific aggression (Jennings et al. 2016, Blakey et al. 2022). Benson et al. (2019) noted that additional mortalities associated with catastrophic events such as wildfires, disease, or other unpredictable events could substantially increase extinction probabilities for small mountain lion populations.

Research on mountain lions occupying shrub-dominated habitat south of Los Angeles documented that mountain lions can respond opportunistically to burned areas, suggesting that they may benefit in the short-term from fire disturbance (i.e., within 9 years after a fire; Jennings et al. 2016). The overall pattern was greater use of burned areas by mountain lions than would be expected by their availability on the landscape (Ibid.). Additionally, of the 9,598 kill or cache sites analyzed by Jennings et al. (2016), far more than expected were in or near recent burns (≤ 6 years old), likely reflecting intensive use of recent burned areas by mule deer taking advantage of quickly growing fresh forage. Some researchers have speculated that dense, mature chaparral stands may be avoided by mountain lions because they are too dense for their main prey (mule deer) to navigate (Burdett et al. 2010), suggesting periodic disturbance from wildfires may be necessary to sustain lion populations. However, a study in the Santa Monica Mountains and Simi Hills after the 2018 Woolsey fire showed that, in general, mountain lions avoided the burn areas up to 15 months post fire (Blakey et al. 2022). These apparently contradictory results may be attributable to differences in the dominant vegetation communities and differences in burn frequency and severity between study sites.

Traditional fire suppression is evolving into fire management with a greater understanding of its importance in ecosystem health (Keeley and Syphard 2016). Several strategies are employed including prescribed burns and mechanical fuels reduction. Like wildfires themselves, fire management strategies have the potential to benefit or harm mountain lions and their prey. Prescribed fires and mechanical fuels removal lessen the likelihood of catastrophic wildfires, but they can also result in the temporary loss of riparian vegetation and the shrub and tree cover favored by mountain lions.

4.8 Climate Change

Climate change resulting from human-caused impacts (Bedsworth et al. 2018) threatens biodiversity through both direct effects and interrelated indirect threats (Garcia et al. 2014, González-Orozco et al. 2016). A species' vulnerability to the direct effects of climate change is a function of its level of exposure and its sensitivity to such effects mediated by its ability to adapt physiologically or behaviorally (Dawson et al. 2011). Indirect effects of climate change are ecosystem changes that affect organisms—including increased frequency and severity of drought, wildfires, flooding, and landslides—which in turn can lead to shifts in vegetation patterns, changes in habitat quality, and modified predator-prey relationships (Williams et al. 2008, Keeley and Syphard 2016). North America has already experienced climatic effects from increases in greenhouse gas emissions (U.S. Global Change Research Program 2017).

There has been a consistent trend in recent decades of warming temperatures in California. Average state temperatures have increased by about 1.67°C (3°F) (Frankson et al. 2022); four of the warmest years on record occurred in the last decade (OEHHA 2018), and 2021 was the warmest summer on record in the state (Frankson et al. 2022). Climate model projections for annual temperature in California in the 21st century range from 1.5–4.8°C (2.7–8.8°F) greater than the 1960–2005 mean (Bedsworth et al. 2018).

Rises in temperature have not been consistent across California. Rapacciuolo et al. (2014) found that while temperatures generally warmed in California between the historical period (1900–1939) and modern period (1970–2009), increases in mean annual temperature were greatest in southern California, an area roughly corresponding to the extent of the SC genetic group in Gustafson et al. (2022). The mean annual maximum temperature also increased in southern California, while decreasing in much of central and northern California (Rapacciuolo et al. 2014). Projections of future temperature conditions at specific locations in California are available from the State of California's Cal-Adapt program (https://cal-adapt.org/). Table 5 presents results for a representative location in each of the four broad mountain lion genetic cluster areas described in Gustafson et al. (2022) from Cal-Adapt's Local Climate Change Snapshot (https://cal-adapt.org/tools/local-climate-change-snapshot/). Three measures of change in environmental temperature are presented: Annual Average Maximum Air Temperature (AAT_{MAX}), Annual Average Minimum Temperature (AAT_{MIN}), and Number of Extreme Heat Days per Year (EHD)[2]. For each measure, a baseline value modeled from measurements recorded from 1961–1990 is presented, along with modeled future values for the end of the 21st century (2070–2099). Averaged modeled values for the High Emissions scenario (known as Representative Concentration Pathway 8.5)—which most closely tracks current emissions trends—are presented, along with the range of averages from all the model runs. The sites chosen as representative of the broad-scale genetically discernable populations are Willits, CA (NC), Placerville, CA (SN), Atascadero, CA (CC), and Fallbrook, CA (SC). Models for all temperature metrics of the four representative sites suggest substantial warming will occur at the sites during the 21st century.

Table 5. Baseline and projected changes in Annual Average Maximum Temperature (AAT_{MAX}), Annual Average Minimum Temperature (AAT_{MIN}), and Number of Extreme Heat Days (EHD) per Year for four representative sites in the North Coast (NC), Sierra Nevada (SN), Central Coast (CC), and Southern Coast (SC) mountain lion genetic cluster areas identified by Gustafson et al. (2022). Model data are derived from Cal-Adapt's Local Climate Change Snapshot tool, accessed November 2021. The CC cluster incorporates CC-N, CC-C, and CC-S, and the SC cluster is made up of SA, EPR, and SGSB. (For more detail, see Fig. 1.)

[2] AATMAX is calculated as the average of the maximum daily air temperatures recorded at a site over the entire year. AATMIN is likewise calculated as the average of all minimum daily temperatures for the year. The number of extreme heat days per year (EHD) is the modeled number of days when the daily maximum temperature is above a location-specific threshold temperature for the site. The threshold for a site is defined as the 98th percentile value of historical daily maximum temperatures (from 1961–1990, between April and October) observed at the location.

Metric	Model/Projection Years	NC	SN	CC	SC
AAT_{MAX} (°F)	Modeled Average (1961–1990)	68.4	71.6	71.7	74.6
AAT_{MAX} (°F)	Projected Average (2070–2099)	75.8	80.3	79.3	82.4
AAT_{MAX} (°F)	Projected Range	70.8–78.3	76.8–83.9	76.6–82.7	79.3–85.7
AAT_{MIN} (°F)	Modeled Average (1961–1990)	38.9	47.7	41.9	50.5
AAT_{MIN} (°F)	Projected Average (2070–2099)	46.1	55.7	49.1	58.1
AAT_{MIN} (°F)	Projected Range	42.2–48.7	52.5–58.9	46.4–51.6	55.4–60.5
EHD (Days/Yr)	Modeled Average (1961–1990)	3	3	5	4
EHD (Days/Yr)	Projected Average (2070–2099)	27	53	42	45
EHD (Days/Yr)	Projected Range	2–48	29–79	22–73	24–94

Precipitation change projections are less consistent than those for temperature, but recent studies indicate increasing variability in precipitation in California, with a greater number of "atmospheric river" storms in the valleys and leeward side of mountain ranges and an increased likelihood of extreme drought in other regions of the state primarily due to rising temperatures (Cayan et al. 2005, Williams et al. 2015, OEHHA 2018, Huang et al. 2020). Similar to temperature rises, changes in precipitation and water availability have also not been distributed equally across California. In the past century, southern California experienced a decline in total annual precipitation, while much of central and northern California had an increase in precipitation (Rapacciulo et al. 2014). With increased temperatures and decreased precipitation in southern California, the southern third of the state, including the southern Sierra Nevada, experienced a severe increase in mean climatic water deficit—the amount of water plants would use if it were available in the soil (Ibid.).

Increasing severity and frequency of drought is another consequence of climate change in California. The state recently (2011–2017) experienced the longest drought since the U.S. Drought Monitor began reporting in 2000 (NIDIS 2022*a*) and went through another serious drought from 2020–2022 (Fig. 13; NIDIS 2022b). A recent modeling effort using data on historical droughts indicates the mean state of drought from 2050–2099 in the southwestern U.S., inclusive of California, will likely exceed the Medieval-era megadrought between 1100–1300 CE, under both moderate and high greenhouse gas emissions models (Cook et al. 2015). The probability of a multidecadal (35-year) drought occurring during the late 21st century is greater than 80% in all models (Ibid.). This would represent a climatic shift that not only falls outside of contemporary variability in aridity but also be unprecedented in the past millennium (Ibid.).

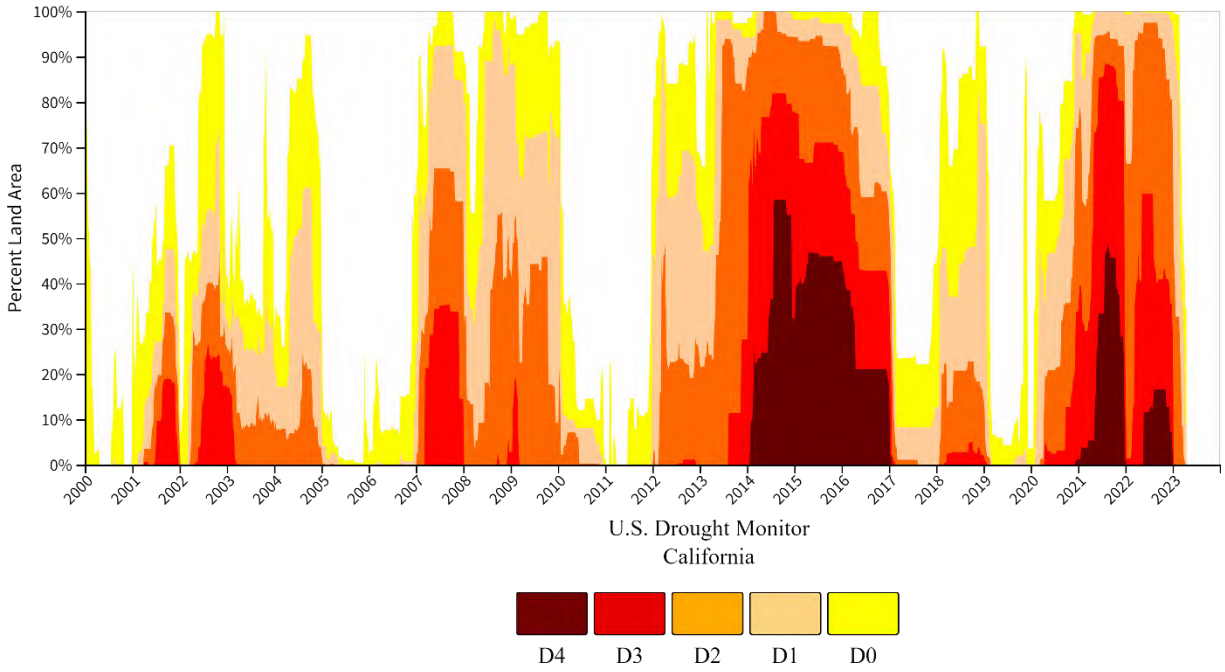


Figure 13. Percent of California land area in each Palmer Drought Index category, Jan 2000–April 2023. DO = Moderately Dry, D1 = Moderate Drought, D2 = Severe Drought, D3 = Extreme Drought, D4 = Exceptional Drought. (Source: NIDIS 2022)

Drought can also exacerbate the effects of other environmental stressors. During the recent severe drought, tree mortality increased dramatically; approximately 129 million trees died in California from 2012–2017 (OEHHA 2018). Multiple years of high temperatures and low precipitation left them weakened and more susceptible to pathogens and parasites (Ibid.). Vast areas of dead and dying trees are also more prone to severe wildfires (CNRA 2016)).

The frequency and extent of wildfire is influenced by temperature, fuel loads, and fuel moisture (Climate Change Science Program 2008). Increasing periods of drought combined with extreme heat and low humidity that stress or kill trees and other vegetation create ideal conditions for wildland fires (Ibid). As temperatures have warmed and snow melts earlier, large-wildfire frequency and duration has increased, and wildfire seasons lengthened (Westerling et al. 2006, OEHHA 2018). The years 2018, 2020, and 2021 were California's biggest recorded fire years, and the 7 largest fires ever recorded in California also occurred during those years (Wikipedia 2023). For more discussion of the impacts of fire on mountain lions, see section 4.7.

Climate change and its impacts on temperature, precipitation, and fire can also result in habitat modifications for wildlife species. Research suggests that most suitable mountain lion habitat in California is moderately vulnerable to climate change (Thorne et al. 2016, Dellinger et al. 2020*a*). Suitable mountain lion habitat could be lost in portions of southern California due to increased frequency and intensity of wildfires that would result in conversion to grasslands, which, as previously stated, are generally avoided by mountain lions (Jennings et al. 2016). Further, aspects of climate change, such as changing drought and wildfire regimes, may impact mountain lions via influences on prey populations.

For example, low rainfall has been found to negatively influence mule deer doe and fawn survival in desert regions of the western U.S., likely because there is less food available (Marshal et al. 2002, Bender et al. 2007, Monteith et al. 2014). With precipitation levels expected to become increasingly variable as the climate continues to change, mountain lion populations could be adversely impacted if there is a reduction in the amount and/or carrying capacity of suitable habitat available to them. Reductions in the area and quality of suitable habitat and carrying capacity could negatively influence gene flow and population sizes.

As large-bodied mammals, both mountain lions and deer may be sufficiently large to not be strongly affected directly by moderate increases in environmental temperature, which more drastically affect small-bodied mammals (Naya et al. 2018, Fuller et al. 2016). The generally nocturnal habits of mountain lions and their prey may mitigate impacts from warmer environments. As mountain lions in California currently occur across a variety of ecoregions and climatic conditions ranging from deserts to montane and coastal forests, broad near-term shifts in their distribution from the direct effects of a warming climate seem unlikely.

4.9 Risks to Small, Isolated Populations

Small, isolated mountain lion populations—such as the CC-N, CC-S, SA, and SGSB, which are each estimated to number ≤ 66 individuals (Table 3)—are inherently vulnerable to extinction due to multiple factors. These factors may include demographic stochasticity[3], genetic drift[4], or inbreeding, which can eventually lead to inbreeding depression[5]. Genetic drift and inbreeding both reduce genetic variation which can diminish the ability of a population to respond to changes in the environment (Primack 1993, Reed and Frankham 2003).

4.9.1 Demographic and Environmental Stochasticity

Reproduction and survival rates vary among individuals and between years in wildlife populations. This variation leads to demographic stochasticity, which tends to average out in large populations but has a much greater effect on the rate of growth or decline in small populations. If a small population declines, subsequent generations become even more susceptible to demographic stochasticity. Unpredictable changes in the natural environment can cause the size of small populations to vary dramatically while larger, more widely distributed populations would remain more stable because these changes normally occur only in localized areas of the entire population's geographic range (Primack 1993). For example, changes in the vegetation community, abundance of resources, or disease and parasite exposure can

[3] Population changes resulting from random variation in birth and death.

[4] The variation in the relative frequency of different genotypes (allele frequencies) in a small population, resulting from the chance disappearance of particular genes as individuals die or do not reproduce.

[5] Reduced biological fitness (health and fertility) resulting from the concentration of deleterious alleles in the population from the mating of closely related individuals.

cause the size of small, isolated populations to fluctuate wildly, possibly leading to local extinction (Primack 1993). Additionally, natural disasters such as droughts, fires, and severe storms can lead to dramatic population changes such that the disaster impacts most or all individuals in small populations. As populations get smaller, they become more vulnerable to demographic variation, environmental variation, genetic drift, and inbreeding depression. Each of these effects can amplify the impact of the other effects, further reducing population size and accelerating local extinction in what has been termed an extinction vortex (Primack 1993).

While the statewide population of mountain lions is large enough that demographic and environmental stochasticity is unlikely to be an issue, the smaller and more isolated populations (CC-N, CC-S, SA and SGSB) are potentially vulnerable to its impacts. Of specific concern are the increasingly large and severe fires leading to direct death or injury (see section 4.7). For example, the Woolsey Fire in 2018 burnt about 36,800 ha (91,000 acres) in the center and west of the Santa Monica Mountains Recreation Area (in the CC-S). According to the National Park Service, two of the 13 mountain lions with working radio-collars in and around the Santa Monica Mountains at the time of the Woolsey Fire succumbed to the fire or its impacts (NPS 2023). In such a small population (Table 3), the impact of just one event like the Woolsey Fire on the population could be strong, especially if the dead animals were breeding adults.

4.9.2 Inbreeding and Genetic Drift

Inbreeding and genetic drift can both result in decreased genetic variation in wildlife populations. Deleterious alleles (maladaptive genes) can be present at low frequency in even large, healthy populations. As populations become small, these maladaptive genes can increase in frequency, and populations may suffer the effects of inbreeding depression, resulting in offspring with a reduced ability to survive and reproduce (Frankham 2005, Harding et al. 2016). Genetic drift may also lead to the loss of beneficial alleles or the fixation of detrimental alleles in a small population due to a limited breeding pool (Hedrick and Kalinowski 2000). Detrimental fixed alleles can result in decreased fitness for all individuals and lead to population declines (Hedrick and Kalinowski 2000, Frankham 2005)

Multiple genetic studies have shown that certain mountain lion populations along the southern coast of California have particularly low genetic variation (Ernest et al. 2003, Gustafson et al. 2019, 2022) which may be the result of habitat fragmentation and genetic isolation. Analysis at the fine scale (10 genetic clusters) conducted by Gustafson et al. (2022) (called linkage decay analysis) showed evidence of inbreeding between closely related[6] individuals in at least four of the populations (see details in section 4.9.4 below). Saremi et al. (2019) investigated mountain lion genomes and found additional evidence of recent inbreeding among closely related individuals (i.e., runs of homozygosity) in some central and southern California populations.

However, the results of Gustafson et al. (2022) suggest the problems of inbreeding and homozygosity are not universal throughout California. Several California populations (e.g., Sierra Nevada) display little

[6] "A common ancestor less than three generations ago" (Saremi et al. 2019) i.e., first-cousins or closer

evidence of inbreeding (see section 4.9.4 below for details). Additionally, the analysis of genetic variation in the broad-scale groups suggests there is potential for the genetic variation remaining in the broad-scale groups to reduce the impacts of inbreeding depression in many of the fine-scale groups to negligible levels if gene flow can be enhanced. This finding also aligns with the results of Saremi et al. (2019) that indicated even though inbreeding had reduced variation in a considerable proportion of the genomes of individual mountain lions, these low-heterozygosity genome regions were generally not shared between populations. This suggests genetic restoration is possible even among genetically depauperate populations. When considering that genetic variation is high in multiple California populations when compared to a limited number of populations along the central and southern coasts, there is potential for long-term persistence of mountain lions throughout much of the state if adequate habitat can be protected and if habitat connectivity can be restored and/or enhanced in key locations.

4.9.3 Loss of Genetic Variation

The genetic variation of wildlife populations is fundamental to their risk of extinction—high levels of genetic variation have been shown to be positively correlated with survival and reproduction rates and decreased extinction risk (Hedrick and Kalinowski 2000, Reed and Frankham 2003). The concept of effective population size[7] (N_e) is fundamental to conservation genetics as it impacts the rate at which a population will lose genetic variation through genetic drift or inbreeding. Though N_e is determined by several factors, it is generally significantly less than the census population (i.e., the number of animals actually breeding in a population is usually significantly fewer than the total number of animals in the population; Palstra and Ruzzante 2008). The estimated statewide census mountain lion population size is 3,242 (95% CI 2,826-3,742) animals (CDFW Unpublished data), however, the estimated N_e of the 10 genetic clusters is approximately 483 (427.9–549.1) animals, which includes mountain lions from parts of Nevada (Gustafson et al. 2019) making the estimated N_e at least 8–12 times smaller than the census population. Furthermore, the population estimates of all but one of the fine-scale genetic clusters identified by Gustafson et al. (2019) are far below the several hundred reproductive individuals experts theorize are required to ensure long-term population viability (Traill et al. 2007, 2010, Flather et al. 2011), with several thousand individuals being the goal (Primack 1993). Observations of wild populations indicate that it is possible for small populations to persist, at least in the short term, in the face of low genetic variation; however, this does not imply that small populations will ultimately maintain long-term viability (Harding et al. 2016).

Gustafson et al. (2022) found that among the 10 fine-scale genetic populations, only the WSN had an estimated $N_e \geq 50$. An N_e above 50 is a long-standing, though controversial, threshold for whether a population is at risk of extinction via the harmful effects of inbreeding depression on demography (Franklin 1980). Yet, true extinction risk is often the result of the complicated interaction of both genetic and demographic factors. Recent analyses reveal that anywhere from 792,300–1,59,100 ha (1,957,816–

[7] The number of individuals in a population that are contributing to the next generation (i.e., reproducing and passing on their genes).

3,605,515 acres) of well-connected suitable habitat might be necessary to allow mountain lions to maintain an $N_e \geq 50$ (Dellinger et al. 2020*b*). Currently, five of the six Management Units in the petitioned ESU occupy areas with less suitable habitat than the thresholds mentioned above, suggesting long-term viability of mountain lions in these areas may be reduced unless management actions increase connectivity and/or habitat availability.

An important metric of genetic variation is heterozygosity (H_E)[8]. Adequate genetic variation is important for maintaining evolutionary potential, as this variation is the raw material that allows populations to adapt to changing conditions over generations. The amount of heterozygosity in California lion populations is highly variable (Gustafson et al. 2019; range of H_E = 0.33–0.53; based on microsatellite loci) but lower on average than other western states, including Wyoming, Nevada, Arizona, Utah, Colorado, and New Mexico (range of H_E = 0.49–0.59; (Anderson et al. 2004, McRae et al. 2005, Andreasen et al. 2012) Unlike California, these other states show less population genetic structure due to higher rates of gene flow, which in turn counteracts the effect of genetic drift in reducing heterozygosity (Anderson et al. 2004, McRae et al. 2005). The lower overall heterozygosity, as well as the large variance in heterozygosity among local populations, observed in California is most likely driven by the state's unique landscape and compounded by contemporary patterns of urban and transportation development (Ernest et al. 2003, Gustafson et al. 2019, 2022).

Gustafson et al. (2022) found that among the four broad-scale populations, California mountain lions have retained substantial heterozygosity, particularly in the Sierra Nevada region with its large stretches of undeveloped contiguous habitat (Dellinger et al. 2020*b*). Multiple genetic investigations have now demonstrated the importance of the Sierra Nevada region as a reservoir of genetic variation (Ernest et al. 2003, Gustafson et al. 2019). Bi-directional migration rate models based on genetic data indicated the WSN population serves as a significant source of migrants into other regions of California, importantly the EPR, CC-N, and SGSB (Fig. 1; Gustafson et al. 2019).

A population bottleneck is an event that greatly reduces the size of a population, and these events can have significant impacts on genetic variation as the resulting reduction in N_e increases both the strength of genetic drift and the probability of inbreeding among closely related individuals. Gustafson et al. (2019) found all of the fine-scale genetic populations appear to have gone through genetic bottlenecks within the last $2N_e$–$4N_e$ generations, except for the Modoc Plateau and North Coast. Assuming a mountain lion generation time of 5 years (Saremi et al. 2019), this suggests that the genetic populations with smaller N_e could have experienced bottlenecks within the last few decades, a timeframe consistent with anthropogenic effects. However, for some of the larger, more genetically diverse populations, interpretation of the potential cause of the genetic bottleneck event becomes more challenging (e.g., WSN bottleneck within the past 1,560–3,120 years). Large variance in the estimates of time-since-bottleneck suggest demographic declines of mountain lions in California cannot be associated with any one event or period, and the biological meaning of these findings should be interpreted cautiously.

[8] Heterozygosity refers to having inherited two different alleles for a particular trait compared to homozygosity, in which the inherited alleles are identical at a given location of the genome.

Gustafson et al. (2022) found no evidence for local adaptive differences among the four broad-scale geographic mountain lion populations (i.e., best-supported model of population structure). Though the appropriateness of using reduced representation genome sequencing data (in this case, restriction site-associated DNA sequencing data) to detect local adaptation has been questioned within the scientific literature (Lowry et al. 2017), this approach has been employed successfully in other studies (Catchen et al. 2017). Mountain lions are long-distance dispersers and inhabit all major mountain ranges in California (Dellinger et al. 2020*b*) suggesting local adaptation may be unlikely. The results of Gustafson et al. (2022) provide no evidence for locally adapted ecotypes warranting specific conservation status, nor risk of outbreeding depression resulting from the mixing of genetic populations as a result of active management (e.g. translocations) (Frankham et al. 2011). However, some unique alleles were identified in the SC genetic group which should be conserved to help preserve statewide genetic variation (Gustafson et al. 2022).

While genetic risks may significantly increase a small population's risk of extinction, it is important to note that a small population size alone is not necessarily predictive of reduced population viability. Implementation of a well-planned conservation strategy can substantially mitigate risks associated with small populations. A comprehensive plan for long term viability should include the principles of representation, resiliency, and redundancy (Shaffer and Stein 2000, Wolf et al. 2015).

4.9.4 Genetic Impacts on the Petitioned ESU and Related Management Units

Genetic variation within the petitioned ESU is highly variable. The analysis of genome-wide single-nucleotide polymorphisms conducted by Gustafson et al. (2022) elucidates evidence of retained genetic variation within California mountain lion genetic groups. Some of the four broad-scale genetic populations identified by the authors (figure 4) have relatively low genetic variation, while others have retained sufficient variation to be capable of serving as sources of genetic rescue under various management scenarios (i.e., assisted gene flow). Maintaining and enhancing connectivity within and among broad-scale groups, particularly with the SN and the CC, has the potential to counteract the effects of genetic drift and inbreeding to at-risk coastal populations. Gustafson et al. (2022) also found the broad-scale SC population shares little gene flow with other regions and yet has higher genetic variation and more unique alleles than the CC or NC broad-scale populations. Whether this variation is adaptive is unknown, but as a principle of biological conservation, genetic variation should be conserved to maximize genetic diversity in populations.

Sierra Nevada Group. This population is of critical importance to sustaining statewide gene flow as it is located at the intersection of dispersal corridors connecting the SN, CC, and SC groups. Enhancing connectivity through the Transverse Ranges including the Tehachapi, Sierra Pelona, San Gabriel, and San Bernardino mountains, represents a critical conservation priority.

Central Coast Group. The three management units of the CC group vary significantly in their levels of genetic variation. The CC-N and CC-S Management Units have low estimated N_e (CC-N: 15.1–18.2; CC-S: 2.5–2.9), limited habitat to retain a self-sustaining population of mountain lions (Gustafson et al. 2019, Dellinger et al. 2020b), and represent areas of genetic management concern. The analysis conducted by

Gustafson et al. (2022) in the CC-S and CC-N showed evidence of close inbreeding (note: the genetic clusters identified in Gustafson et al.'s 2022 report are not precisely analogous to the 10 genetic clusters identified in Gustafson et al. 2019). This finding is consistent with the whole genome sequencing results of Saremi et al. (2019) from the Santa Cruz and Santa Monica mountains which suggested close and recent inbreeding led to runs of homozygosity in the lion genomes.

The CC-S MU especially appears to have very low genetic variation and is exhibiting both genetic and phenotypic evidence of inbreeding (Ernest et al. 2014, Riley et al. 2014, Benson et al. 2019, Gustafson et al. 2019). This MU is one of two (see SA MU below) to have the lowest genetic variation observed for the species globally, apart from the endangered Florida panther (Riley et al. 2014). Phenotypic evidence of inbreeding depression in the form of kinked tails, failed descension of the testes, and abnormal sperm morphology have been observed, similar to Florida panthers (Huffmeyer et al. 2022, Ernest et al. 2014, Roelke et al. 1993). Freeway traffic is isolating the CC-S mountain lions (Ernest et al. 2014, Riley et al. 2014, Vickers et al. 2015), and contemporary gene flow has been severely limited. Projection models predict the extirpation of the CC-S population in 50 years without enhanced demographic dispersal and gene flow (Benson et al. 2016, 2019).

Conversely, the CC-C MU has ample habitat for maintaining a breeding population, a relatively large, estimated population size and exhibits little evidence of inbreeding (Dellinger et al. 2020b, 2021a, Gustafson et al. 2022). Bi-directional migration rate models indicate the CC-C serves as a significant source of migrants for the adjacent and more isolated areas of coastal California, including the Santa Cruz and Santa Monica mountains (Gustafson et al. 2019). This indicates that the CC-C will likely play a key role in efforts to increase connectivity and gene flow within the CC group in the petitioned ESU (Figs. 1,3). Given the apparent absence of gene flow across the Central Valley, this MU may be the only consistent source of migrants for CC-N and CC- S. Thus, maintaining connectivity to and within the CC-C MU is essential for the long-term viability of both adjacent MUs.

South Coast Group. The South Coast Group is comprised of 3 MUs: Santa Ana Mountains (SA), Eastern Peninsular Range (EPR), and the San Gabriel/San Bernardino ranges (SGSB). The SGSB Management Unit, in the South Coast group, has low observed genetic variation, a very small, estimated N_e (3.3–6.4 mountain lions), and exhibits evidence of inbreeding (Gustafson et al. 2019, 2022). Additionally, the SGSB mountain lions occupy small, isolated mountain ranges separated by urbanized areas and desert containing little shrub or tree cover which increases their risk for inbreeding depression (Gustafson et al. 2019). The area has a small amount of available suitable habitat and thus cannot support a large lion population (Dellinger et al. 2020b).

The SA MU has concerningly low genetic variation (Gustafson et al. 2019) and habitat availability (Dellinger et al. 2020b). The SA is the other MU to have the lowest genetic variation of any mountain lion population other than Florida panthers (Riley et al. 2014). Like the CC-S MU, genetic and phenotypic evidence of inbreeding depression in the form of kinked tails has been observed in the SA MU (Roelke et al. 1993, Ernest et al. 2014, Gustafson et al. 2022). Also, as with CC-S, the main isolation factor appears to be the freeways, which have limited gene flow in recent decades (Ernest et al. 2014, Riley et al. 2014, Vickers et al. 2015), and models similarly predict this population will be extinct in 50 years without intervention (Benson et al. 2016, 2019).

The EPR MU, on the other hand, shows little evidence of inbreeding and appears to have retained sufficient variation as to be capable of serving as a source of genetic rescue (Gustafson et al. 2019, 2022). Like the CC-C in the CC group, the EPR could perform an important role in increasing connectivity and gene flow in the SC group if connectivity is improved (Figs. 1,3). The EPR is the only MU known to exchange migrants with the SA MU, and management actions which enhance gene flow between these areas remain critical to the viability of the mountain lion population in the Santa Ana Mountains. Gene flow between EPR and the adjacent SGSB MUs appears limited. Further, the degree of dispersal from Arizona, Nevada, Mexico remains unknown (Gustafson et al. 2019). Connectivity between these MUs and adjacent populations in Mexico and Arizona may be curtailed by border barriers and the damming and major channelization of the Colorado River. Immigration and emigration patterns of mountain lions in the eastern area of the EPR have not been studied, and mountain lion density may be low in that area. Some gene flow may occur across the Colorado River from the Kofa National Wildlife Refuge into California, and some movement of mountain lions has been documented between the EPR and Mexico (Vickers et al. 2015; W. Vickers, unpublished data).

In summary, the recent results of Gustafson et al. (2022) demonstrate that genetically at-risk populations are nested within a broader-scale group of interconnected populations that collectively retain high genetic variation. This suggests that if connectivity can be maintained and enhanced at the broader scale, genetic variation within smaller MUs can be restored.

5. EXISTING MANAGEMENT

5.1 Land Ownership within the Petitioned Central Coast/Southern California ESU

Based on a GIS analysis of the petitioned ESU boundary, the total area is 15,273,700 ha (37,742,134 acres) (Table 6). Approximately 52% of that amount is public land and 48% is private. The Bureau of Land Management (BLM) owns the largest amount of land at 21%, followed by the U.S. Forest Service (9%), the National Park Service (6%), the Department of Defense (5%), and the California Department of Parks and Recreation (3%). Local (city or county) and Nonprofit Special Districts combined are 4% of the government agencies, while tribal lands total 167,700 ha (414,396 acres), which is 1% of the non-private land within the petitioned ESU (Table 6, Fig. 14).

Public (and private) lands are managed for many different purposes including recreation, extractive uses (timber harvest and mining), grazing, and wildlife habitat. Thus, a property's management would not necessarily benefit mountain lions, and many lands—particularly BLM lands in desert regions—likely support low densities of mountain lions.

Table 6. Land ownership within the petitioned Southern California/Central Coast ESU and the percentage of total land and public land in the petitioned ESU.

Land Ownership within Petitioned Evolutionarily Significant Unit	**Hectares**	**Acres**	**% of total land**	**% of public land**
Total Public Land	7,905,421	19,534,644	51.8%	—
Total Private Land	7,368,327	18,207,458	48.2%	—
U.S. Bureau of Land Management	3,183,887	7,867,525	20.8%	40.3%
U.S. Forest Service	1,430,387	3,534,548	9.4%	18.1%
U.S. National Park Service	928,264	2,293,781	6.1%	11.7%
U.S. Department of Defense and Camp Roberts	781,100	1,930,132	5.1%	9.9%
California Department of Parks and Recreation	435,636	1,076,476	2.9%	5.5%
Nonprofit, Special District, and Joint	383,076	946,597	2.5%	4.8%
Local (City or County)	231,070	570,984	1.5%	2.9%
Tribal Land	168,135	415,469	1.1%	2.1%
California Department of Fish and Wildlife	111,462	275,428	0.7%	1.4%
California State Lands Commission	97,683	241,379	0.6%	1.2%
U.S. Bureau of Reclamation	57,731	142,656	0.4%	0.7%
U.S. Fish and Wildlife Service	39,090	96,594	0.3%	0.5%
Other State	32,864	81,207	0.2%	0.4%
California Department of Water Resources	15,183	37,518	0.1%	0.2%
Other Federal	9,853	24,348	0.06%	0.1%

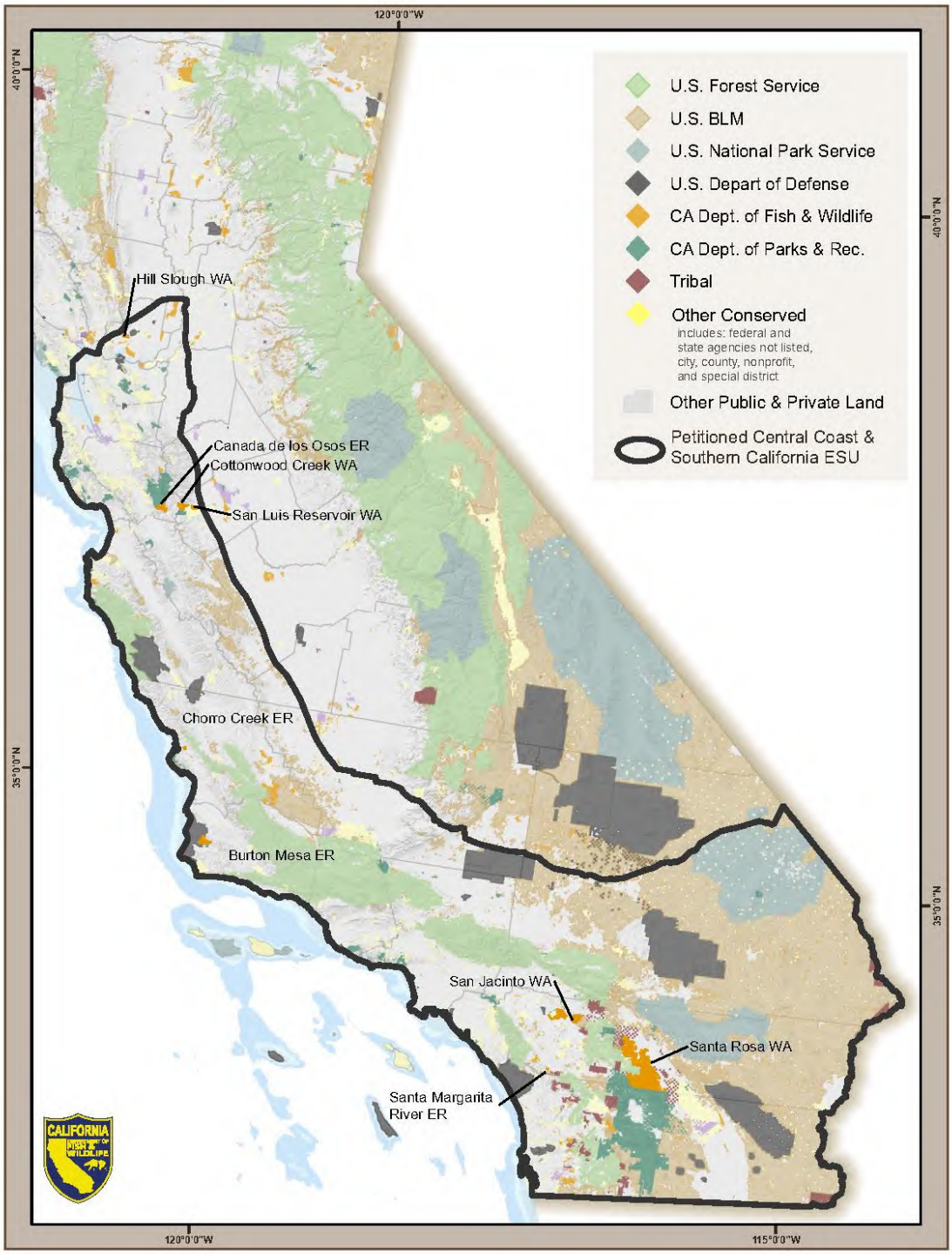


Figure 14. Public and tribal lands within the petitioned Southern California/Central Coast ESU for mountain lions with larger Department Wildlife Areas and Ecological Reserves labeled.

5.2 California Wildlife Protection Act

California voters through Proposition 117 adopted the California Wildlife Protection Act (CWPA) of 1990. Among other things, the CWPA specifically called out the loss of deer, mountain lion, and other wildlife habitat within California's mountain ranges and foothills, including the Simi Hills, and the Santa Lucia, Santa Susana, Santa Monica, San Gabriel, San Bernardino, San Jacinto, and Santa Ana mountains in southern California as well as the need to preserve habitat corridors to maintain the genetic integrity of California's wildlife. The CWPA, through the establishment of the Habitat Conservation Fund, included an ongoing annual appropriation of $14,500,000 for the acquisitions of deer and lion habitat in those areas. More generally, the CWPA emphasized the use of funds to acquire habitat needed to maintain connectivity between isolated or fragmented habitats to promote the genetic integrity of wildlife populations. The act also designated mountain lions as specially protected mammals and prohibited their taking, injury, possession or sale, except for instances where a lion represents an imminent threat to public safety or has damaged livestock or other property damage.

5.3 State, Federal, and Local Land Planning and Land Use Laws

The laws and regulations governing actions within the mountain lion's range vary by ownership. Several state and federal environmental laws apply to activities undertaken in California, and while they may not specifically address mountain lions, may indirectly provide some level of protection for the species and its habitat. The primary environmental laws are summarized below.

5.3.1 California Environmental Quality Act (CEQA)

The California Environmental Quality Act (CEQA) requires state and local agencies to identify, analyze, and consider alternatives to, and to publicly disclose environmental impacts from, projects over which they have discretionary authority (Pub. Resources Code § 21000 et seq.). CEQA requires an agency find that projects may have a significant adverse effect on the environment if they have the potential to substantially reduce the habitat, decrease the number, or restrict the range of any rare, threatened, or endangered species (Cal. Code Regs., tit. 14, §§ 15065(a)(1), 15380). CEQA establishes a duty for public agencies to avoid or minimize such potentially significant adverse effects where feasible (Cal. Code Regs., tit. 14, § 15021), and it differs substantially from NEPA in requiring potentially significant adverse effects be mitigated to a less than significant level unless overriding considerations are documented. In practice, implementation of CEQA by state and local governing bodies typically results in projects incorporating impact avoidance, minimization, and mitigation measures into project design and construction. A lead agency is not required to make a mandatory finding of significance conclusion for a project unless it determines on a project-specific basis that the project has the potential to: substantially reduce the habitat of a fish or wildlife species*;* cause a fish or wildlife population to drop below self-sustaining levels*;* threaten to eliminate a plant or animal community*;* or substantially reduce the number or restrict the range of an endangered, rare or threatened species. Under CEQA, a lead agency should identify and evaluate potential impacts to mountain lions, and if the impacts are found to

be significant, mitigate or justify them under the Biological Resources section of an environmental document prepared pursuant to CEQA.

Another important component of CEQA is the requirement that governing bodies disclose and consider project-related impacts that when considered alone may not be significant, but when viewed in concert with other past, present, and foreseeable related projects cumulatively results in a significant impact to the environment (i.e., cumulative impacts; Cal. Code Regs., tit. 14, § 15355). This requirement often results in the incorporation of wildlife movement corridors in local development and infrastructure projects (e.g., open space setbacks along stream corridors and property lines) which can provide opportunities for mountain lions to pass through urban and suburban landscape, although such corridors not always wide enough or vegetated with adequate shrub and tree cover to encourage use by mountain lions.

Section 21080.5 of the Public Resources Code provides that a regulatory program of a state agency shall be certified by the Secretary for Resources as being exempt from the requirements for preparing EIRs, negative declarations, and initial studies if the Secretary finds that the program meets the criteria of CEQA. A certified regulatory program (CRP) remains subject to other provisions in CEQA such as the policy of avoiding significant adverse effects on the environment where feasible. These CRPs include the regulation of timber harvest by CAL FIRE and the State Board of Forestry through the Forest Practice Act; the regulation of coastal development permits by the California Coastal Commission through the California Coastal Act of 1976, Division 20 (commencing with Section 30000) of the Public Resources Code and the preparation, approval, and certification of local coastal programs as provided in Sections 30500 through 30522 of the Public Resources Code; and the pesticide regulatory program administered by the Department of Pesticide Regulation and county agricultural commissioners. While these CRPs are exempt from some of the procedural requirements of CEQA, courts have consistently held that they remain subject to the broad policy goals and substantive standards of CEQA, including requirements to consider feasible alternatives and cumulative impacts and to recirculate environmental review documents in certain circumstances.

5.3.2 Z'Berg–Nejedley Forest Practice Act

The Z'Berg–Nejedley Forest Practice Act was originally enacted in 1973 to ensure that forest practices, including timber harvesting, are undertaken in a manner that will also preserve and protect California's fish, wildlife, forests, and streams. CAL FIRE disseminates regulations, known as the Forest Practice Rules, that support the statutes of the Forest Practice Act. The Forest Practice Rules implement the provisions of the Act in a manner consistent with other laws, including CEQA, Porter-Cologne, CESA, and the Timberland Productivity Act of 1982. CAL FIRE enforces these laws and regulations governing logging on private land. The only area within the petitioned ESU where commercial timber harvest commonly occurs is the redwood forest zone of Santa Cruz County and nearby minor areas of San Mateo and Santa Clara counties (CDTFA 2021).

5.3.3 Natural Community Conservation Plans and Habitat Conservation Plans

Habitat Conservation Plans (HCPs) and Natural Community Conservation Plans (NCCPs) are federally and state authorized conservation plans that permit incidental take of species listed under the federal Endangered Species Act (ESA) or CESA, respectively. Take authorization may be applied to species not currently listed but which may become listed as threatened or endangered over the term of the plan, which is often 25–75 years. Non-federal entities can obtain authorization for federally threatened and endangered species incidental to otherwise lawful activities through development and implementation of an HCP pursuant to Section 10 of the ESA. California's companion law, the Natural Community Conservation Planning Act of 1991, takes a broader approach than either CESA or ESA. An NCCP identifies and provides for the protection of plants, animals, and their habitats, while allowing compatible and appropriate economic activity. There are currently four HCPs in California that include mountain lions as a covered species; all four are also NCCPs, but only three include mountain lion as a covered species.

The 1998 San Diego Multiple Species Conservation Program (MSCP) is a 50-year NCCP/HCP that covers 233,099 ha (576,000 acres) in the southwestern portion of San Diego County and includes mountain lion as a covered species. The Program includes coverage for mountain lions as 81% of the core areas (± 42,492 ha, ± 105,000 acres) that will be conserved contain lion habitat, and the core areas have multiple connections to help maintain ecosystem balance. While the MSCP generally notes linkage areas were designed to accommodate "large animal movement," it does not identify linkages designed for mountain lions or contain specific measures designed to protect them. While the MSCP addresses specific design criteria for linkages and road crossings/under crossings are included in subarea plans, not all subarea plans are complete.

The San Diego Water Authority NCCP/HCP also includes mountain lion as a covered species. The Plan Area encompasses 401,448 ha (992,000 acres) in western San Diego and southwestern Riverside counties. The plan estimates that approximately 139 ha (344 acres) of potential mountain lion habitat could be impacted over the 55-year permit term with approximately 284 ha (702 acres) of potentially suitable habitat provided within the existing Preserve Area. The plan includes general conditions to avoid and minimize impacts to habitat linkages and wildlife movement corridors and includes habitat-based mitigation for unavoidable impacts.

The Orange County Transportation Authority NCCP/HCP (OCTA Plan) lists the mountain lion as a covered species for purposes of the federal HCP, but not for purposes of the NCCP permit. The OCTA Plan contains four "Species Goals" intended to offset impacts to mountain lions, including (1) acquiring 410 ha (1,013 acres) of suitable habitat; (2) realigning fencing near the Highway 241 toll road; (3) funding of the North Coal Canyon Restoration Project; and (4) a "wildlife crossing policy" requiring pre-construction surveys to ensure existing crossings "maintain or improve functionality" if modified by new freeway projects. However, the OCTA Plan does not require the construction of specific wildlife crossings.

A Western Riverside County Multiple Species HCP/NCCP, which covers approximately 510,227 ha (1,260,800 acres) in western Riverside County and proposes to set aside 202,343 ha (500,000 acres) for habitat, also lists the mountain lion as a covered species. Plan implementation is expected to result in

the loss of 53,418 ha (132,000 acres) of suitable mountain lion habitat and includes three biological objectives to mitigate these impacts related to the Conservation Area, Conservation Area Linkages, and maintaining or improving dispersal route functionality.

5.3.4 National Environmental Policy Act

Most federal land management actions must undergo National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. § 4321, et seq.) analysis. NEPA requires federal agencies to document, consider alternatives, and disclose to the public the impacts of major federal actions and decisions that may significantly impact the environment. The Department is not aware that the mountain lion is afforded any federal special status, and as such, impacts on the species are not required to be considered during NEPA analysis. The law directs federal agencies to adopt all practical means to minimize or mitigate adverse effects when selecting preferred alternatives or justify not doing so.

There are three local ordinances within the petitioned ESU that are relevant to mountain lions.

5.3.5 Ventura County Habitat Connectivity and Wildlife Movement Ordinances

A Ventura County Wildlife Connectivity Ordinance was adopted by the Ventura County Board of Supervisors in 2019 (the "Connectivity Ordinance") to facilitate wildlife connectivity and minimize habitat fragmentation for mountain lions, mule deer, California gnatcatchers (*Polioptila californica)*, bobcats, least Bell's vireos (*Vireo bellii pusillus)*, California red-legged frogs (*Rana draytonii)*, and other species. Two of the linkages targeted in the Connectivity Ordinance are the Santa Monica Mountains—Sierra Madre Mountains connection and the Sierra Madre Mountains—Castaic Connection, which connect wildlife habitat in the Santa Monica Mountains, Santa Susana Mountains, Simi Hills, and Los Padres National Forest. While implementation of the Connectivity Ordinance should help allow wildlife to move more easily through private lands between core habitat areas, it would not address connectivity across major roads and highways which is outside its jurisdiction (https://vcrma.org/habitat-connectivity-and-wildlife-movement-corridors).

5.3.6 Los Angeles County Significant Ecological Areas Plan

The Los Angeles County Significant Ecological Areas Program is currently in the process of updating its Significant Ecological Areas (SEAs) Ordinance. The draft ordinance is intended to protect biodiversity in SEAs from incompatible development and ensure that projects reduce habitat fragmentation and edge effects by providing technical review of impacts and requiring mitigation. Like the Ventura County ordinance, the SEAs designations can lead to compact development and allow wildlife to move across private lands more easily between core habitat areas. However, the SEA ordinance is not specifically designed to protect mountain lions (https://planning.lacounty.gov/long-range-planning/significant-ecological-areas-program/).

5.3.7 City of Los Angeles Draft Wildlife Ordinance

The City of Los Angeles Department of City Planning has developed draft regulations for the protection of wildlife within the city limits, including the promotion of wildlife movement corridors. One stated goal of the draft regulations is to improve wildlife mobility and connectivity opportunities along waterways, ridgelines, and natural open spaces. The Wildlife Pilot Study is intended to result in regulations that will help to preserve wildlife and promote habitat connectivity on small to medium size residential developments in a pilot study area in the Santa Monica Mountains between the 405 and 101 freeways (LACP 2023).

5.4 Management on Federal Lands

5.4.1 National Forest and Bureau of Land Management Resource Management Plans

The U.S. Department of Agriculture's Forest Service is responsible for developing forest management plans consistent with the National Forest Management Act requirements. These plans guide land use and development within national forests and grasslands in a way that balances use and protection of natural resources to support ecological, social, and economic sustainability. Within the petitioned Southern California/Central Coast ESU, the USFS has adopted Forest Management Plans for the Los Padres, Angeles, San Bernardino, and Cleveland National Forests. These plans identify conservation strategies for mountain lion related to land acquisition, preventing habitat fragmentation, monitoring, and fire management.

The U.S. Department of Interior's Bureau of Land Management prepares Resource Management Plans to provide broad-scale direction for managing public lands in accordance with the principles of multiple use and sustained yield, as mandated by the Federal Land Policy and Management Act. These plans establish goals, objectives, and decisions for air quality, biological resources, cultural resources, lands with wilderness characteristics, paleontological resources, visual resources, water resources, fire ecology and management, trail and travel management, lands and realty, land use authorizations, livestock grazing, minerals management, recreation and visitor services, and areas of critical environmental concern. Within the petitioned Southern California/Central Coast ESU, adopted BLM plans include the Southern Diablo Mountain Range, the central coast of California, the Carrizo Plain National Monument RMP, the Clear Creek RMP, the South Coast RMP, the West Mojave RMP, the Eastern San Diego County RMP, the Santa Rosa and San Jacinto Mountains National Monument RMP, the Northern and Eastern Colorado Desert Coordinated Management Plan, and the Desert Renewable Energy Conservation Plan. While these plans may not specifically address mountain lions, they aim to balance resource conservation and ecosystem health with commodity production and public use of the land and may indirectly provide some level of protection for mountain lions and their habitat.

5.4.2 Military Bases

The Sikes Act was established in 1960 to ensure conservation and protection of natural resources used by the Department of Defense. The U.S. Congress amended the Sikes Act in 1997 requiring the Department of Defense to develop and implement Integrated Natural Resources Management Plans. These plans outline how each military installation will manage its significant natural resources holistically while maintaining military readiness. Since these lands are often protected from access and use by the public, they may contain some of the more significant remaining large tracts of undeveloped land and thus be an important tool for species conservation and habitat connectivity. Military bases within the petitioned Southern California/Central Coast ESU include Fort Hunter Liggett, Camp Roberts, Camp San Luis Obispo, Vandenberg Space Force Base, Marine Corps Base Camp Pendleton, Naval Weapons Station Seal Beach, March Air Reserve Base, Marine Corps Air Station Miramar, Naval Air Facility El Centro, Chocolate Mountain Aerial Gunnery Range, and other installations.

5.4.3 National Recreation Areas, National Monuments, and National Preserves

The guiding principles for managing biological resources on the U.S. Department of the Interior's National Park Service lands include maintenance of animal populations native to park ecosystems (NPS 2006). The NPS also commits to work with other land managers on regional scientific and planning efforts. NPS management plans provide direction and guidance on a variety of issues including resource preservation, visitor use, development, and boundary management. These plans generally specify management objectives and may vary in the type of plan, ranging from a general management plan to wilderness plans to strategic facility investment plans. For example, the Santa Monica Mountains National Recreation Area General Management Plan (GMP) provides a framework for the area's management, administered by the National Park Service, California State Parks, and the Santa Monica Mountains Conservancy. The GMP includes mountain lions as a "park species of concern" and includes construction best management practices, facility siting, fire management, vegetation, and habitat connectivity strategies intended to mitigate project impacts. However, the GMP does not include specific actions for mountain lions.

Other federally managed lands such as Carrizo Plains National Monument, Fort Ord National Monument, Pinnacles National Park, Mojave National Preserve, Death Valley National Park, and the Golden Gate National Recreational Area, Muir Woods National Monument, provide habitat and important habitat corridors for mountain lions.

5.5 Management on State Lands

5.5.1 California Department of Fish and Wildlife

The Department is responsible for over 445,000 ha (1,100,000 acres) of fish and wildlife habitat, managed through 749 properties throughout the state, including 111,462 ha (275,428 acres) within the petitioned ESU. These properties provide habitat for a rich diversity of fish, wildlife, and plant species

and include representatives of most major ecosystem in the state. In addition, several private land conservation programs assist landowners with the management of wetlands, riparian habitats, native grasslands, and wildlife-friendly farmlands.

Most Department lands are classified as either Wildlife Areas or Ecological Reserves. Wildlife Areas are acquired for the conservation of wildlife and the habitats on which they depend, and to provide opportunities for recreational uses that are compatible with those conservation goals (Fish & G. Code §§ 1525 -1530, 1745). Ecological Reserves are acquired primarily for the purpose of protecting rare and endangered native species and specialized habitat types (Fish & G. Code § 1580). Certain public uses, deemed compatible with those goals, are authorized for ecological reserves—typically this includes hiking on established trails to observe native plants and wildlife (Fish & G. Code, § 1584). The Department prepares land management plans for Wildlife Areas and Ecological Reserves which are subject to public review under CEQA prior to being finalized.

The 167 Department properties within the petitioned Southern California/Central Coast ESU range from a fishing access property of less than 1 acre to the 117,197-acre Santa Rosa Wildlife Area in Riverside County. Of particular interest are Department properties in the coastal mountains of San Diego County, including Rancho Jamul Ecological, Sycuan Peak, Crestridge Ecological Reserve, and Hollenbeck Canyon Wildlife Area. Mountain lion densities appear to be high in these areas as indicated by the large number of vehicle strikes. The Santa Margarita River Ecological Reserve was rated as the best potential site for a wildlife crossing over Hwy 15 within the habitat linkage from the Santa Ana Mountains to the Palomar Mountains in the Eastern Peninsular Range (Riley et al. 2018). Other significant Department properties within the petitioned ESU include the Hill Slough Wildlife Area in Solano County; the Cottonwood Creek, Cañada de Los Osos and San Luis Reservoir Wildlife Areas in Merced and Santa Clara counties; the Chorro Creek Ecological Reserve in San Luis Obispo County; the Burton Mesa Ecological Reserve in Santa Barbara County; and San Jacinto Wildlife Area in Riverside County.

5.5.2 California State Parks

California's State Park System encompasses more than 607,000 ha (1.5 million acres) in approximately 280 parks. These parks are managed for public use and enjoyment and species and habitat protection through an integrated program of planning, restoration projects and evaluation, ongoing maintenance, and long-term monitoring. California Public Resource Code section 5019.53 declares:

> "The purpose of state parks shall be to preserve outstanding natural, scenic, and cultural values, indigenous aquatic and terrestrial fauna and flora and the most significant examples of ecological regions of California, such as the Sierra Nevada, northeast volcanic, great valley, coastal strip, Klamath-Siskiyou Mountains, southwest mountains and valleys, redwoods, foothills and low coastal mountains, and desert and desert mountains. Each state park shall be managed as a composite whole in order to restore, protect, and maintain its native environmental complexes to the extent compatible with the primary purpose for which the park was established."

A state park must have an approved general plan before major park facilities can be developed. These general plans direct the long-term management of the park. Some parks may also develop a more specific resource management plan. Big Basin Redwoods State Park in Santa Cruz County designates mountain lions as a species of special management concern, and the Park's Management Guidelines call for the Protection of known wildlife habitat linkages to permit movement of wildlife, increase species abundance and diversity, and monitor the functionality of core wildlife habitat areas and wildlife linkages (CA Parks 2013). Big Basin Redwoods State Park and surrounding parks including The Forest of Nisene Marks, Año Nuevo, Henry Cowell Redwoods, Wilder Ranch, Portola Redwoods, and Castle Rock State Park encompass over 22,250 ha (55,000 acres) of the Santa Cruz Mountains in the CC-N. Anza-Borrego Desert State Park in the EPR is the largest park in the state system at over 240,000 ha (600,000 acres) and contains over 161,000 ha (400,000 acres) of land managed as wilderness. Park-wide management goals include being proactive in biological conservation and managing for subspecies, evolutionary units, ecologically functional units, populations, or other levels of biological organization to conserve biodiversity; and management that encourages natural ecological process such as hydrologic processes, wildfire, and biotic community interactions to continue. Other wildlife-related goals and guidelines include species inventory and monitoring programs, protection of special status plants and animals, control of non-native plants and animals, and the protection of habitat buffers and movement corridors (CA Parks 2005). Other notable parks within the petitioned Southern California/Central Coast ESU boundary include Butano, Garapata, Andrew Molera, Julia Pfeifer Burns, Portola, Henry W. Coe, Henry Cowell, Castle Rock complex, Montaña de Oro, Point Magu, Malibu Creek, Topanga, Chino Hills, Lake Perris, and Cuyamaca Rancho.

5.5.3 Management on County and City Lands

Although generally smaller in size than conserved state and federal land units, city and county owned and managed lands conserve many key linkage areas or expand and buffer adjacent conservation lands. For example, a series of properties owned by the City of Los Angeles—including Runyun Canyon Park, Franklin Canyon Park and Stone Canyon and Encino Reservoirs—conserve the easternmost extant of the CC-S and provide partial linkage to Griffith Park (also owned by the City of Los Angeles). And Ventura County's Happy Camp Canyon Regional Park conserves an important part of the southern Santa Susanna Mountains that may serve as a key piece of future linkages between the Santa Monica Mountains/Simi Hills and the Santa Susannas. In the SA MU, parks and preserves owned and managed by Orange County serve as linkages and buffers to larger conserved areas in the Sana Ana Mountains. Important units include Whiting Ranch and Irvine Ranch Open Space Preserves and the Ronald Casper Wilderness Park. In the coastal EPR of San Diego County, the county's open space preserves in the Otay area and mitigation bank in Marron Valley complement the Department's Rancho Jamul Ecological Reserve and the BLM's Otay Wildlife Management Area to create a large block of contiguous conserved lands in the San Ysidro Mountains adjacent to the Mexican border.

5.6 Management in Neighboring States and Nations

5.6.1 Arizona

Mountain lions are found throughout Arizona in desert and forested mountain habitat. They are not considered endangered or threatened in Arizona and are classified as a big game species by the Arizona Game and Fish Department with regulated hunting zones throughout the state (AGFD). The population was recently estimated at 1,166 to 1,175 (95% CI = 622-2,558) adults and subadults statewide exclusive of tribal lands (Howard et al. 2020). Mountain lions have recently expanded into previously unoccupied areas in western Arizona near the California border where they were previously thought to be transient including the Kofa, Castle Dome, New Water, Palomas, and Eagle Tail mountains, where no evidence of mountain lions was detected during surveys in 1987 (Thompson, R. et al. 2008, Naidu et al. 2011).

The AGFD collects age and sex information and genetic material from harvested mountain lions to monitor populations and to evaluate metapopulations, connectivity and dispersal. Mountain lions are regulated by several statutes and Arizona Game and Fish Commission Order. It is unlawful to harvest a female lion with kittens or to harvest a spotted kitten. AGFD has established several mountain lion management zones in the state with harvest thresholds that require closing the season when the threshold is reached. Five different zones exist on the western border of Arizona abutting the California boundary, with a total of eight separate harvest units within those zones. For the 2022–2023 harvest season, the threshold quota for these units ranges from 3–17 mountain lions. The harvest data suggests that the mountain lion population is stable to increasing in many parts of Arizona. The current population estimate is 2,000–2,700 mountain lions statewide, with their annual average population estimate from 2004 to 2020 equal to 2,876 animals (AZGFD 2022).

5.6.2 Nevada

Mountain lions are classified as a game mammal in Nevada and both sexes can be hunted under special regulations. A tag is required to hunt mountain lions, and a resident or nonresident can obtain up to two tags a year. Hunting is allowed statewide, except for on the Sheldon National Antelope Refuge and a few hunt zones in the Las Vegas area. Andreasen et al. (2012) found that mountain lion populations in western Nevada commonly interbreed with individuals in the Sierra Nevada of California, and those populations are somewhat isolated from other Nevada populations by inhospitable playas in the Lahontan Basin. The authors also found that the Sierra Nevada population appears to receive more mountain lions from central and eastern Nevada than it contributes. In contrast, Gustafson et al. (2019) found more lions emigrate from the Western Sierra Nevada and Eastern Sierra Nevada genetic groups to Nevada than from Nevada to the Sierra Nevada groups.

5.6.3 Mexico

Mountain lions are distributed throughout Mexico along both coasts, in mountainous areas, deserts, sub-tropical and tropical forests, and deciduous dry, conifer, and oak forests (Valdez and Ortega-Santos 2019). Populations are found in most states except in areas with large human populations, including central Mexico and much of the Mexican Altiplano (Chávez and Ceballos 2014). Although, individuals

can live near human settlements and have been seen near large cities including Guadalajara, Mexico City, and Monterrey (del Castillo 2009). The great plasticity of this species, specifically in its diet (Núñez et al. 2000, Rosas-Rosas et al. 2003, 2008, Monroy-Vilchis et al. 2009) has facilitated its survival in almost all habitat types in Mexico. However, it is being extirpated regionally, mainly in those areas that have been transformed by agricultural development and urbanization (Valdez and Ortega-Santos 2019).

Threats to mountain lion survival in Mexico include habitat fragmentation, prey depletion, and illegal hunting(Valdez 1999, Rosas-Rosas et al. 2003, 2008). Additionally, widespread cattle ranching, agriculture expansion, and unlawful human settlement in protected natural areas threaten their survival in the long term (Galindo et al. 2016). The extensive past and present expansion of human-dominated landscapes and the concomitant habitat conversion are the major threats. Mountain lions are a major management concern where there are conflicts with livestock interests and where UMAs (Unidades para la Conservacion, Manejo y Aprovechamiento Sustentable de la Vida Silvestre or units for the conservation, management, and sustainable use of wildlife) have fenced in prey species for sport hunting (Rosas-Rosas et al. 2008, Ávila-Nájera et al. 2011). Because cattle ranching is the main economic activity in areas where mountain lions and jaguars (*Panthera onca*) occur, livestock losses from predation by these felid species are one of the most important economic factors affecting ranch owners (Rosas-Rosas and Valdez 2010). In most regions where trophy hunting is practiced on game ranches, owners believe mountain lions to be a threat to their investments in raising and maintaining game species (Rosas-Rosas et al. 2003), and predator control is considered necessary. However, trapping and poisoning large cats has not been common, even in areas with large livestock enterprises, at least in the last decade, but poisoning does occur (Rosas-Rosas, personal observation; Zarco-González et al. 2012, Rodríguez-Soto et al. 2013).

The status of the mountain lion in Mexico is tenuous because persistent predator control programs are indiscriminately removing individuals (Chávez and Ceballos 2014). In most states where predation on livestock is severe, ranchers resort to predator control without following a scientific management plan because there is a lack of federal and state conservation intervention programs (Rosas-Rosas et al. 2008, Rosas-Rosas and Valdez 2010). In addition to the mismanagement of livestock enterprises, increased narco-violence throughout the country may hamper conservation efforts. Despite this, larger-sized jaguar populations throughout Mexico have bounced back over the last 10 years indicating a growing population(Ceballos et al. 2021, 2022) which may impact co-occurring mountain lions in areas they co-occur. While some contemporary connectivity appears to exist between Californian and Mexican EPR lion populations where there is not a US Border Fence, gene flow has never been examined in close detail, and future studies are warranted to better understand this. While mountain lion conservation efforts are tenuous in northern Mexico, continued genetic contributions from Mexico in the absence of concerted mountain lion conservation efforts in northern Mexico are not assured. Cooperative international wildlife conservation efforts should be explored to ensure the persistence of this important linkage.

6. ASSESSMENT OF LISTABLE MANAGEMENT UNITS

6.1 Assessment of Evolutionary Significant Units

The petitioners propose listing the petitioned area, consisting of six identified genetic populations, as a single ESU. Alternatively, they request the Commission consider whether any of the six populations, individually or in combination, comprise one or more ESUs and meet the criteria for listing under CESA (see Fig. 1).

To determine whether a population could be considered an ESU under CESA, the Department has previously followed the approach used by the federal government for ESA (Waples 1991) which consists of two main criteria:

1) The population must be substantially reproductively isolated from other conspecific population units.
2) It must represent an important component in the evolutionary legacy of the species.

For criterion 1, isolation does not have to be absolute, but it must be strong enough to permit evolutionarily important differences to accrue in the different population units., it must also be of substantial ecological/genetic importance to the species as a whole (criterion 2). To make the determination for criterion 2, the following questions are relevant:

a) Is the population genetically distinct from other conspecific populations?
b) Does the population occupy unusual or distinctive habitat?
c) Does the population show evidence of unusual or distinctive adaptation to its environment?

Waples (1991) highlights the following types of information as useful for answering the above questions (Note: his examples are written to be specifically relevant to Pacific Salmon, so we have altered the language to make them more applicable to terrestrial organisms):

1) Genetic traits. Examples include presumably neutral characters detected by protein electrophoresis or DNA analyses as well as other genetically based traits that are more difficult to quantify.
2) Phenotypic traits. Examples include morphological and meristic characters, occurrence of parasites, and disease and parasite resistance.
3) Life-history traits. Examples include time, size, and age at reproduction; reproductive behavior; fecundity; migration patterns; and timing of emergence and outmigration.
4) Habitat characteristics. This category includes such physical characteristics of habitat encountered during the entire life cycle.

Waples (1991) notes:

> "The existence of substantial genetic differences from other conspecific populations based on protein electrophoresis or DNA analyses would strongly suggest that evolutionarily important, adaptive differences also exist. The failure to find such differences (or the absence of genetic data) would not rule out the possibility that such adaptive differences exist, but it would place a greater burden of proof on data for other characters. Data for habitat characteristics should be interpreted in a similar fashion: habitat differences suggest (but do

> not prove) the possibility of adaptive differences, whereas the inability to detect habitat differences constrains the scope of possible local adaptations but does not prove they do not exist. In evaluating data for phenotypic and life-history traits, every effort should be made to account for environmental effects that are manifested in periods shorter than one generation (and therefore do not reflect adaptations)."

When evaluating the petition, CDFW's first consideration was whether the petitioned ESU(s) meet the criteria for being considered an ESU. The second consideration was whether any of the populations within the petitioned ESU area meet the definition of an ESU, singly or in combination. We used several lines of genetic and ecological evidence to evaluate these potential ESUs.

As discussed in section 2.4, genetic evidence at the broadest geographic scale shows that there is only one recognized subspecies of mountain lion in North America (*Puma concolor cougar*; Culver et al. 2000, Caragiulo et al. 2014, Kitchener et al. 2017), indicating insufficient adaptive localized genetic, physiological, or behavioral variation has been found within North American mountain lion populations for taxonomists to recognize local subspecies.

It is important to understand the adaptive differences described in the ESU criteria are unlikely to develop when populations are isolated over short time scales (i.e., decades, or even hundreds of years). To explore potential adaptive differences among California populations, Gustafson et al. (2022) used several methods to evaluate genetic evidence of local adaptation among the genetic clusters. They found no outlier loci, which, when present, suggest local adaptation (Ibid.). Though detection of outlier loci can be limited when used in conjunction with a reduced representation of the genome, it has often been shown to be an effective approach (Catchen et al. 2017).

Mountain lions occupy much of California, except for heavily urbanized areas, intensively farmed areas of the Central Valley, and low elevation areas of the southern deserts. As noted earlier, when the landscape is permeable, they can disperse over long-distances (Sweanor et al. 2000, Hawley et al. 2016) and inhabit all major mountain ranges in California (Dellinger et al. 2020*b*). This widespread distribution and dispersal potential suggest local adaptation is unlikely and there is little evidence of morphological, mitochondrial, or adaptive genomic differences between mountain lions within the petitioned ESU or any of the petitioned populations and the broader statewide lion population to suggest the presence of distinct evolutionary lineages (Gustafson et al. 2022). While gene flow between the petitioned ESU and the NC and SN populations is limited, it does still occur (Gustafson et al. 2019, 2022).

The Management Units identified at a regional scale do have boundaries that in many areas correspond to anthropogenic barriers to dispersal (Gustafson et al. 2019), suggesting they have developed in recent decades or perhaps 100–200 years as land use has changed significantly within the petitioned ESU. Some of these Management Units represent small and somewhat isolated populations in areas where connectivity to the statewide population has been drastically reduced in the last 50–100 years due to expanding human development. However, there are no populations of mountain lions within the petitioned ESU boundary that have been isolated for much longer periods and, based on current scientific information, represent important portions of the evolutionary legacy of the mountain lion species.

Taken as a whole, the genetic evidence does not support applying the ESU concept to the overall petitioned area or any of the Management Units individually, as a subspecies or ESU for the following reasons:

1. There is only one recognized subspecies of mountain lion in North America (Puma concolor cougar) based on mitochondrial DNA data (Culver et al. 2000, Caragiulo et al. 2014, Kitchener et al. 2017), suggesting little potential for adaptive localized genetic variation among North American mountain lion populations. This would in turn make adaptive genetic variation among mountain lion populations within California even less likely.
2. Genetic investigations conducted by Gustafson et al. (2022) failed to detect distinct ecotypes or local adaptation, suggesting that the identified California genetic populations and Management Units do not represent an important component of the evolutionary legacy of the species.
3. Genetic data indicate habitat fragmentation and dispersal barriers have recently limited the ability of mountain lions to move freely between certain geographic areas and local populations in southern California and the central coast area (Gustafson et al. 2019). However, this fragmentation has mostly occurred within the last 200 years and has not yet resulted in genetic differentiation sufficient to represent an important component of the evolutionary legacy of the species. The most recent genetic study, which used SNPs to characterize variation across more of the genome, suggests many of these local populations separated by barriers have considerable shared ancestry and are more genetically similar than previously thought (Gustafson et al. 2022).

However, the Department recognizes that several of the populations/Management Units in the petitioned ESU are imperiled due to small populations sizes and isolation, and that populations considered distinct based on reproductive isolation and genetic differences may warrant specific conservation measures. In the sections below we further evaluate whether the six populations/Management Units, singly or in combination, warrant potential listing under CESA.

6.2 Assessment of Distinct Population Segments

While the petition is focused on ESUs and the Department has recommended listing ESUs in the past, its assessment of what may constitute a listable entity is not limited by federal ESU policy. The USFWS and NMFS (the Services) have also identified and listed Distinct Population Segments (DPS) pursuant to the ESA and have developed a policy for evaluating DPSs pursuant to the ESA. A DPS is a vertebrate population or group of populations that is discrete from other populations of the species and significant in relation to the entire species. DPSs have been used 137 times by USFWS to list imperiled populations rather than listing a species across its full range. Examples from California include the Southern Sierra Nevada fisher (85 Fed. Reg. 29532-29589 (May 15, 2020)), the Peninsular bighorn sheep (63 Fed. Reg. 13134-13150 (March 18, 1998)), and the Sierra Nevada bighorn sheep (64 Fed. Reg. 19300-19309 (April 20, 1999)). While the ESU designation and supporting policy has primarily been applied to fish

populations, the DPS designation has been more widely applied to, and policy is more relevant to terrestrial species.

To guide its evaluation of whether a possible DPS might warrant listing as threatened or endangered, the Services first evaluate two elements to determine if the population segment should be considered a DPS:

1) Discreteness of the population segment in relation to the remainder of the species.
2) Significance of the population segment in relation to the remainder of the species.

If the population segment being considered is a DPS, then the Services evaluate its conservation status (i.e., is the population segment, if treated as if it were a species, endangered or threatened?) (61 Fed. Reg. 4722-4725 (February 7, 1996)).

The elements are interpreted as follows:

Discreteness: a population segment may be considered discrete if it meets either of two conditions:

a) It is markedly separated from other populations of the same taxon because of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation.
b) It is delimited by an international government boundary, and there are significant differences between the countries in control of exploitation, management of habitat, conservation status, or regulatory mechanisms.

Significance: If a population segment is found to be discrete under one or more of the above conditions, its biological and ecological significance will then be considered. This consideration may include, but is not limited to, the following:

a) Persistence of the discrete population segment in an ecological setting unusual or unique for the taxon.
b) Evidence that loss of the discrete population segment would result in a significant gap in the range of a taxon.
c) Evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range.
d) Evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.

Imperiled Status: If a population segment is found to be both Discrete and Significant, and if treated as a species, could it be found to be threatened or endangered based on the listing factors established in the ESA?

Using this approach, we evaluated the following Management Units and groups to determine if they should be considered DPSs and if any of those DPSs meet the standards for listing presented in the federal policy:

1. Central Coast North (CC-N) Management Unit
2. Central Coast Central (CC-C) Management Unit

3. Central Coast South (CC-S) Management Unit
4. The Central Coast Group. Consists of three Management Units—CC-N, CC-C, and CC-S and is identified as a broad scale genetic cluster in Gustafson et al. (2022) within the petitioned ESU.
5. Santa Ana (SA) Management Unit
6. Eastern Peninsular Range (EPR) Management Unit
7. San Gabriel/San Bernardino (SGSB) Management Unit
8. Southern Coast Group. Identified as a broad scale genetic cluster in Gustafson et al. (2022) that is within the petitioned ESU. It is significantly isolated from the other Management Units in California. Consists of three Management Units—SA, EPR, and SGSB.

Table 7 summarizes our evaluation and decision process. For each Management Unit and Group considered for potential listing, its discreteness, significance, and impereled status are evaluated (consistent with federal DPS policy, for details of criteria, see above). Additional information about each MU and Group is presented in text below.

Table 7. Decision matrix summarizing evaluations of whether Management Units may be considered a Distinct Population Segment (DPS) and potentially warrant listing under CESA (based on federal DPS policy). For a unit to be considered a DPS, at least one "yes" is needed from each of the orange and green columns. To be potentially listed under CESA, that DPS must be imperiled.

Management Unit(s)	**Discreteness**		**Significance**				**Qualifying DPS?**	**Imperiled?**	**Recommendation**
	Markedly Separated	International Border	Unique Ecological Setting	Gap in Range	Only surviving natural occurrence	Markedly different genetic characteristics	Does the MU or Group Constitute a DPS?	May be Threatened or Endangered?	Could the DPS Warrant Listing as a Threatened or Endangered DPS?
CC-N (Includes Santa Cruz Mountains)	Yes	No	No	No	No	No	No	Yes	No
CC-C	No	No	No	Yes	No	No	No	No	No
CC-S (Includes Santa Monica Mountains)	No	No	No	No	No	No	No	Yes	No
Central Coast Group (CC-S, CC-C, CC-N)	No	No	No	Yes	No	Yes	No	No	No
SA	Yes	No	No	No	No	No	No	Yes	No
EPR	No	Yes	Yes	Yes	No	No	Yes	Yes	**Yes**
SGSB	No	No	No	Yes	No	No	No	Yes	No
South Coast Group (SA, EPR, SGSB)	Yes	Yes	No	Yes	No	Yes	Yes	Yes	**Yes**

6.2.1 Details of Assessment

To determine whether a mountain lion MU (or group of several MUs) is "markedly separate" from other MUs we relied upon genetic data from Gustafson et al. (2019, 2022), and when available, information from mountain lion movement studies. The federal DPS policy lists a variety of factors that can cause separateness (i.e., physical, physiological, ecological, or behavioral factors). For mountain lions, we considered that physical separateness was likely the strongest factor due to limits on connectivity caused by recent human development. We have genetic data that can shed some light on the extent of separateness, though there are several important limitations to the data that we discuss below.

Using microsatellite data from Gustafson et al. 2019, each sample from a mountain lion can tell us some information about the relatively recent ancestry of that animal, which can be represented as a pie chart. The different colors show what percentage of their ancestry has been assigned to different MUs. The SNP data from Gustafson et al. 2022 represent more of the genome and reveal ancestry further back in time. The 2022 study informs questions about the amount of genetic material historically shared between MUs and retained genetic variation within individuals and extant MUs. However, the effects of relatively recent (i.e. within the last few centuries) land use changes that restrict connectivity between MUs is not revealed by such data.

How to read the maps: Each pie chart represents the location where a genetic sample was obtained from an individual mountain lion and the genetic affinities of the lion. A pie chart that is fully or almost fully one color is good evidence that both parents were from the same MU. If the pie chart of a sampled lion is in the same MU as its parents (e.g., a fully gray sample in the Santa Cruz Mountains in Fig. 15), it means the sampled lion is unlikely to have moved from the MU of its parents. If it is found outside of the population of its parents (i.e., the fully gray sample near San Luis Obispo in Fig. 15), that is strong evidence that it is a first-generation migrant that moved to a new population during its lifetime. These individuals may have died without breeding or may have had offspring in the new location. A pie chart that is a 50/50 split is good evidence of a hybrid offspring among parents from two different MUs (i.e. likely the offspring of a migrant). As the pie pieces get smaller, MU hybridization occurred further and further back among more distant ancestors. Very small pie segments may represent statistical 'noise' in the ancestry calculation.

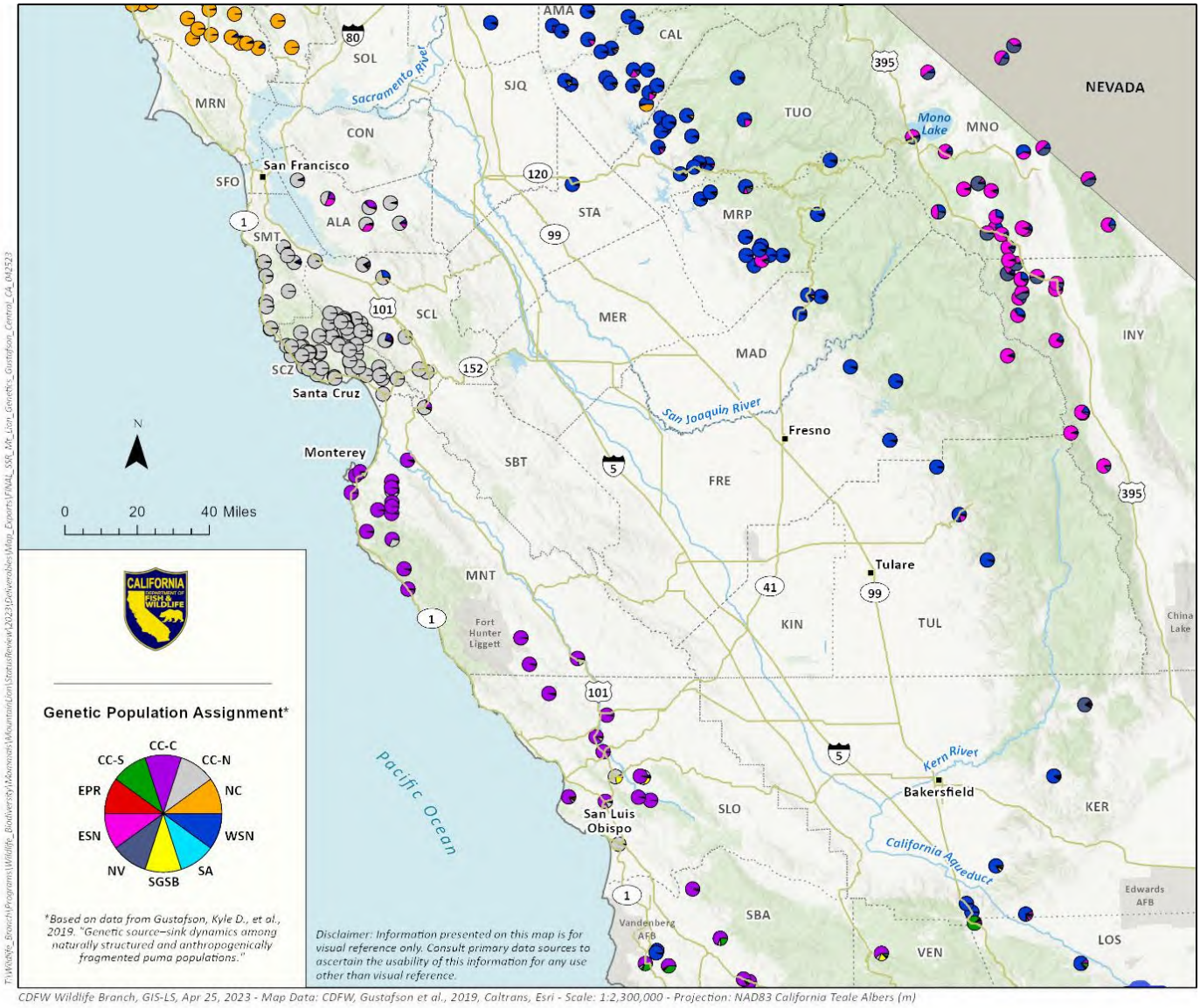


Figure 15. Assignment of individual mountain lions to genetic populations identified by Gustafson et al. 2019 using microsatellite DNA markers.

A solid pie chart outside of its parents' MU indicates the sampled animal was sampled outside its birth MU, but whether that animal was able to breed and have any lasting effect on the gene pool of the MU where it was sampled is unknown.

A mixed pie chart tells us gene flow (movement with breeding) occurred in the past; we do not know if it is still occurring. These mixed pie charts are an example of what is referred to as introgression (the transfer of genetic information from one population to another because of hybridization between them and repeated backcrossing).

Genetics can assess connectivity over longer time frames indicative of introgression and gene flow (mixed pie charts). However, it does not provide information about the extent of current connectivity.

In our discussion of markedly separate, we use the Gustafson et al. (2019) pie charts as part of the evidence to evaluate if there has been "recent" gene flow between populations (i.e., are they connected or are they 'markedly' separate from each other). To assess recent connectivity more adequately, we also consider anthropogenic barriers such as major roads and development. The pie charts from Gustafson et al. (2022) give additional information about gene flow further in the past, which provides historical context for the amount of gene flow seen in the Gustafson et al (2019) pie charts.

Central Coast-North

Discreteness

Markedly Separate: Yes. This MU is physically isolated from the NC cluster by the San Francisco Bay and Sacramento-San Joaquin Delta and heavily urbanized areas and future development is projected to exacerbate existing isolation. There is very little evidence of gene flow between the NC and CC-N in the 2019 ancestry assignment data. Most of the mountain lion pie charts in the Santa Cruz Mountains are almost fully gray, indicating little gene flow from outside CC-N into the mountains (Fig. 15). The samples collected from east of the San Francisco Bay show hybridization mainly with ESN, WSN, and CC-C. Ancestry from CC-N shows up in a few samples in CC-C, providing more evidence of some recent connectivity between CC-N and CC-C. However, the more solid grey and purple samples at the border of CC-N and CC-C in Fig. 15 (more recent ancestry) compared to more mixed samples at the same place in Fig. 16 (more historical ancestry) suggests the exchange of individuals between the CC-N and CC-C populations appears to be infrequent in recent times as compared to further in the past.

International Border: No.

Significance

Unique Ecological Setting: No. The coastal redwood and mixed conifer and hardwood forests that make up the Santa Cruz Mountains are also found in coastal mountains north of San Francisco Bay.

Gap in Range: No. The CC-N MU is effectively cut off to the north by San Francisco Bay and largely bounded on the east by development and agriculture in the Central Valley. The only major connection is south to CC-C. Losing this population would shrink the range but not create a new gap in the distribution of mountain lions in California.

Only Surviving Natural Occurrence: No.

Markedly Different Genetic Characteristics: No. CC-N is a fine scale genetic cluster, and the SNP data analyzed by Gustafson et al. (2022) suggest there is shared ancestry with the other CC populations. There is no evidence of local adaptive genetics.

Imperiled?

Threatened or Endangered: Yes. This is a small, isolated population with an effective population size of 16.6 and an estimated 33–66 adult animals.

Conclusion: Evidence does not support a designation as a threatened or endangered DPS.

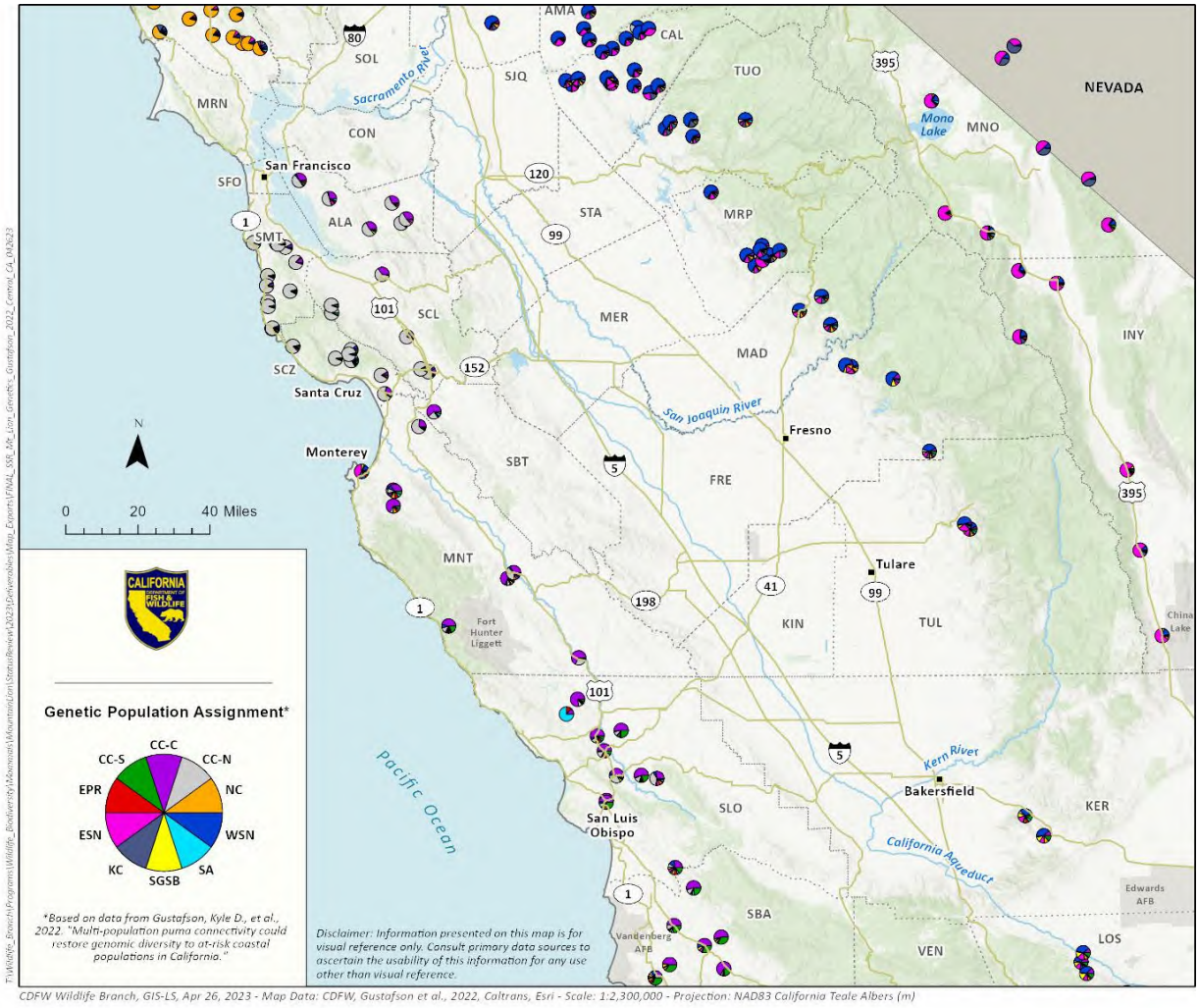


Figure 16. Assignment of individual mountain lions to genetic populations identified by Gustafson et al. 2022 using Single Nucleotide Polymorphisms.

Central Coast-Central

Discreteness

Markedly Separate: No. This MU is not delineated by major areas of human development. In consequence, there is some gene flow in from CC-N, and, especially in the south around Santa Barbara, samples show that there has been hybridization between CC-C and multiple other MUs. There is good representation of CC-C ancestry in CC-S, especially outside of the Santa Monica mountains, as would be expected if there were not major barriers to movement (Figs. 15–17).

International Border: No.

Significance

Unique Ecological Setting: No. The natural communities in CC-C are not unique.

Gap in Range: Yes. CC-C links the CC-N to the rest of the coastal populations. Losing CC-C would completely isolate the Santa Cruz Mountains, creating a gap in the range.

Only Surviving Natural Occurrence: No.

Markedly Different Genetic Characteristics: No. The SNP data suggest there is shared ancestry with the other two Central Coast populations (Gustafson et al. 2022). There is no evidence of local genetic adaptation.

Imperiled?

Threatened or Endangered: No. The CC-C is a relatively large contiguous MU with an effective population size of 56.6 and an estimated 113–226 adult animals. CC-C serves as a source for many surrounding populations.

Conclusion: Evidence does not support designation as a threatened or endangered DPS.

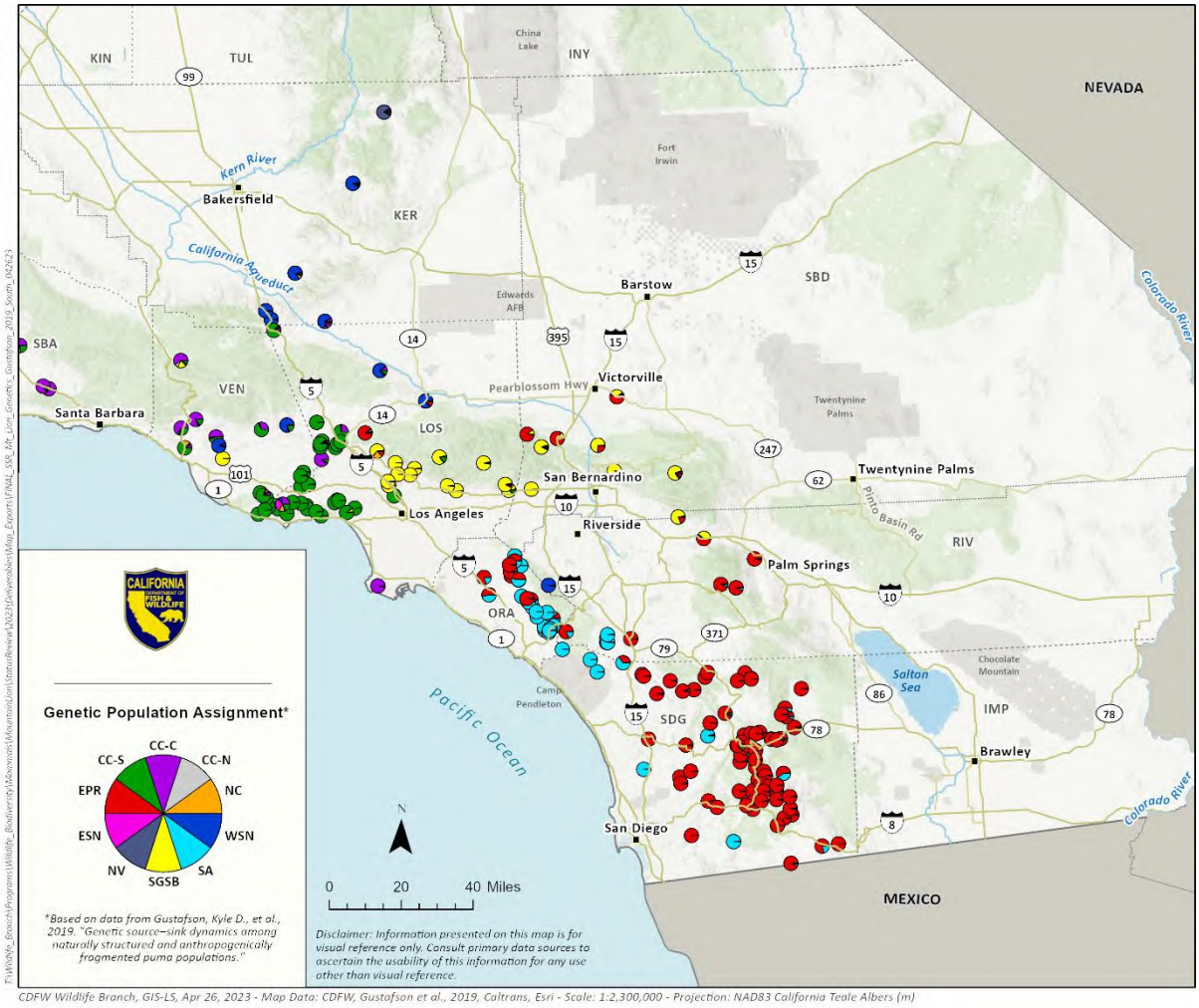


Figure 17. Assignment of individual mountain lions from southern Management Units to genetic populations identified by Gustafson et al. 2019 using microsatellite DNA markers.

Central Coast South

Discreteness

Markedly Separate: No. Although the Santa Monica Mountains have limited gene flow in and out and are bounded by heavy urbanization to the south and southeast, the larger MU still has connectivity to the central coast, the Sierra Nevada, and, to a much lesser extent, the southern California populations (Figs. 15–17). Most of the samples taken from northern CC-S show migration and hybridization in ways that suggest that area has connectivity to several MUs including CC-C and WSN.

International Border: No.

Significance

Unique Ecological Setting: No. The CC-S is composed of coastal plain, agricultural areas, chapparal, and montane woodlands and forests, all of which are represented elsewhere in the range of mountain lions in California.

Gap in Range: No. There is genetic evidence that this MU has some contemporary connectivity to the CC-C and WSN; however, if the CC-S MU were to become extirpated, the CC-C and WSN MUs would retain some connectivity via the Tehachapi Mountains and points west to the Santa Barbara area (Fig. 17). Connectivity to the SGSB is already very limited; therefore, loss of this MU would not create an additional gap between the South Coast group and MUs farther north. Connectivity across highway 101 linking the Santa Monica Mountains to the Simi Hills will be significantly improved following the completion of the Wallis Annenberg wildlife overpass, which will promote gene flow within the southern portion of this MU.

Only Surviving Natural Occurrence: No.

Markedly Different Genetic Characteristics: No. Gustafson et al.'s (2022) SNP data suggest there is shared ancestry between CC-S and the other CC populations (Fig. 18). There is no evidence of locally adaptive genetics.

Imperiled?

Threatened or Endangered: Yes. This is a small, mostly isolated population of 5–10 adult animals and an effective population size of 2.7 (Gustafson et al. 2019) and projected future development will likely further isolate the population.

Conclusion: Evidence does not support designation as an imperiled DPS, because it is neither discrete nor biologically significant.

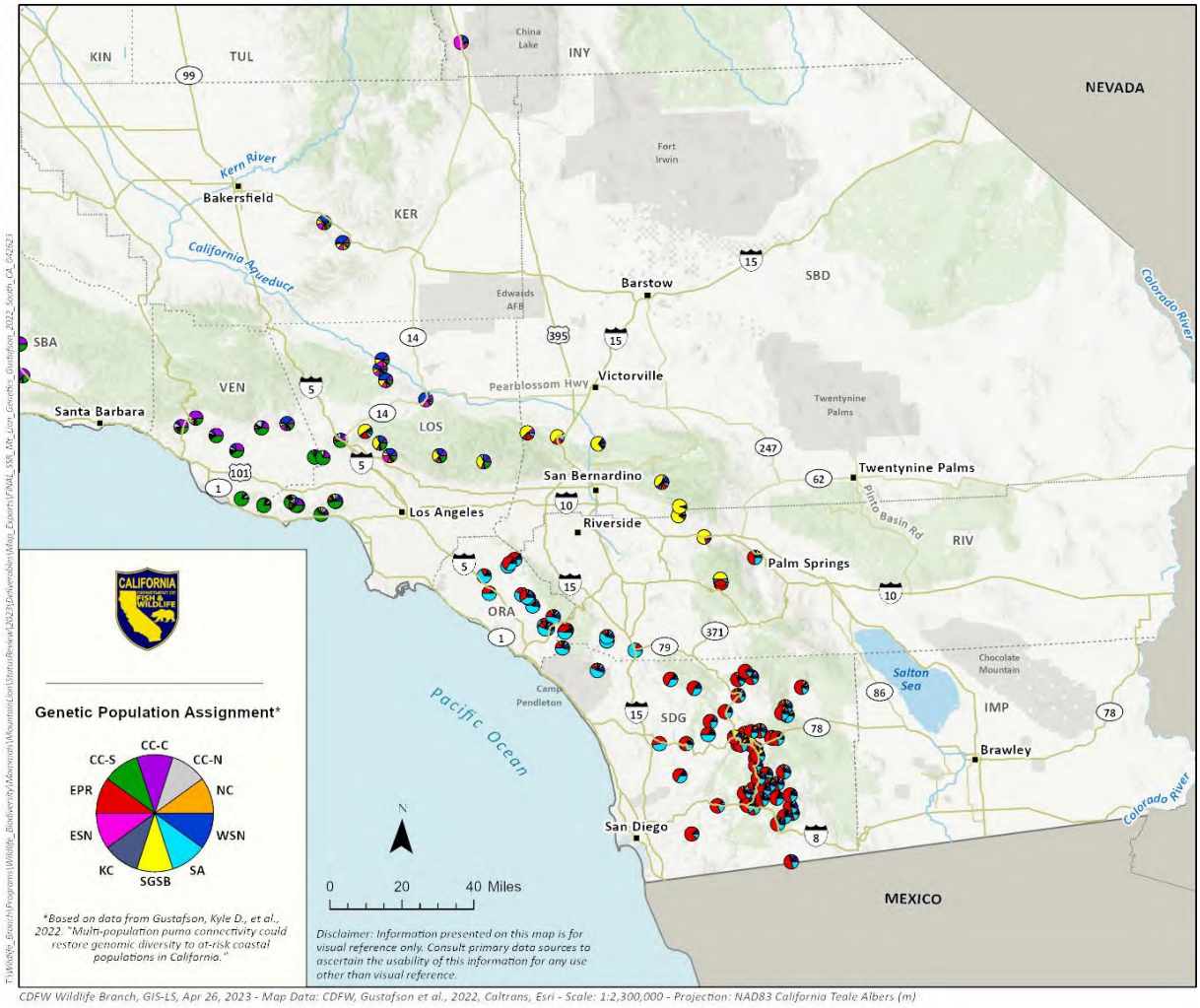


Figure 18. Assignment of individual mountain lions from southern Management Units to genetic populations identified by Gustafson et al. 2022 using Single Nucleotide Polymorphisms.

Central Coast Group

Discreteness

Markedly Separate: No. Genetic evidence shows that CC group is a distinct genetic group, distinct from the other three groups Gustafson et al. (2022) identified in California. However, there is evidence of gene flow and migration in the area from Santa Barbara through Ventura and towards the Tehachapi Mountains (Fig. 17), and it appears that there has been some genetic connectivity between the CC group and the SN group. There are areas of intense urbanization at the northern and southern edges (San Francisco and Los Angeles), and the intensive agriculture of the Central Valley forms a substantial barrier to the east. However, the Los Padres National Forest in the CC group is a large patch of public land that borders or approaches other large areas of public land in the SGSB and WSN, presenting broad interfaces that likely allow some mountain lions to move between neighboring groups and MUs (Fig. 16).

Therefore, the Central Coast Group does not appear to be markedly separated from other populations in California.

International Border: No.

Significance

Unique Ecological Setting: No. The Central Coast Group encompasses a wide range of vegetative types and ecological settings; however, no major ecosystems within its bounds are unique to the Central Coast Group, and though unique vegetative communities exist (e.g., Santa Lucia fir forest), their geographic scale is not large nor isolated enough to support uniquely adapted mountain lion populations.

Gap in Range: Yes. Loss of the Central Coast Group would considerably diminish the range of the mountain lion in California.

Only Surviving Natural Occurrence: No.

Markedly Different Genetic Characteristics: Yes. The SNP data suggests the Central Coast Group has experienced some degree of restricted genetic exchange with the larger California population for some time and it is one of four broad scale genetic clusters in California and is genetically distinct from the SC group and the SN group (Gustafson et al. 2022; Fig. 4), suggesting unique genomic variation may be present within the group.

Imperiled?

Threatened or Endangered: No. The Central Coast Group contains the CC-C MU which is one of the few MUs in California with an effective population size of ≥ 50. Although the Santa Cruz Mountains and Santa Monica Mountains populations within this group are small and isolated, the group encompasses a relatively large area of contiguous habitat, and collectively the estimated effective population size is 76 with an estimated 151–306 animals.

Conclusion: As the Central Coast Group is not discrete nor threatened with extinction, there is no support for designation as a threatened or endangered DPS.

Santa Ana

Discreteness

Markedly Separate: Yes. This population is classified as a fine-scale genetic group by Gustafson et al. (2019), and the Santa Ana MU is surrounded by human development to the north and east with I-15 running along much of its eastern and southern boundary. There is evidence that individual mountain lions from the EPR have been able to move into the population and breed (full red and half red pie charts in Fig. 17). However, that connectivity may no longer be present. A thirteen-year study (2001–2013) that collared 74 mountain lions in the EPR observed only one mountain lion move in the opposite direction from the SA to the EPR, and that individual was killed for depredating sheep before it could breed and introduce genetic material to the population (Vickers et al. 2015). Vickers et al. (2015) points out the strength of I-15 as a barrier between SA and EPR as traffic and nearby development have increased in recent years. Additionally, Huffmeyer et al. (2021) documented physiological evidence of

inbreeding depression in the population. Interestingly, Gustafson et al. (2019) found relatively robust connectivity between the SA genetic group and the EPR genetic group by examining microsatellite loci. The conflicting evidence between Vickers et al.'s (2015) telemetry study and Gustafson's et al.'s (2019) genetic work may, in part, be explained by worsening fragmentation from recent land use changes as many of the tissue samples analyzed by Gustafson et al. (2019) were obtained prior to the onset of Vickers et al.'s (2015) study.

International Border: No.

Significance

Unique Ecological Setting: No. The SA MU is comprised of coastal mountains that provide habitats similar to those found in in the EPR and CC-S MUs.

Gap in Range: No. This is a very small population that is connected only to EPR, and recent studies suggest the current strength of that connection is weak. Its loss would slightly reduce the range of, but not create a significant gap in, California's lion distribution.

Only Surviving Natural Occurrence: No.

Markedly Different Genetic Characteristics: No. The SA MU is a fine-scale genetic group, and SNP data suggest there is shared ancestry with the rest of the SC populations (Gustafson et al. 2022; Fig. 18). There is evidence of inbreeding in this population, but there is no evidence of adaptive genetic differentiation.

Imperiled?

Threatened or Endangered: Yes. This is a small, largely isolated population with an effective population size of 16 and an estimated 31–62 adult animals. Benson et al.'s (2019) demographic model of the SA population predicted a 15–17% chance of extirpation over a 50-year period with observed levels of immigration.

Conclusion: Although this MU is threatened with extinction and is discrete, it does not meet the criteria for significance; therefore, it does not meet the criteria for a listable DPS.

Eastern Peninsular Range

Discreteness

Markedly Separate: No. This population is classified as a fine-scale genetic group by Gustafson et al. (2019, 2022). Genetic evidence suggests historically there has been relatively robust connectivity between the EPR and SA MUs (Figs. 17 & 18), but Vickers et al. (2015) suggests that contemporary movement between these MUs is extremely limited. Historically there has been gene flow from the EPR to the SGSB MU, but the most recent genetic evidence suggests essentially no movement of mountain lions from the SGSB to EPR (Fig. 17). I-10 separates EPR from SGSB and is a busy interstate that likely creates a strong contemporary barrier. However, there are still potential areas where mountain lions can move in and out of the MU along its southern and eastern borders. Connectivity between mountain lions in the EPR and those in Baja California, Mexico and Arizona is poorly understood. Mountain lions

have been observed on the California–Baja California border in an unfenced/walled area suggesting the opportunity for the exchange of individuals (Vickers, UC Davis, unpub. data). And records suggest sporadic individuals in the mountainous regions of the Mojave (Dellinger et al. 2019) and Sonoran deserts which suggests some potential genetic exchange between mountain lions in the EPR and those living along the Colorado River in California and Arizona.

International Border: Yes. The EPR borders Baja California, Mexico. The international border is marked by walls and fences that attempt to manage human migration; although some significant sections of the border, including a large section of the Eastern Peninsular Mountains, remain open. However, the status of the mountain lion population in Baja California, Mexico and the frequency of lion movement across the border is unknown. Management of mountain lions is different in Baja California, Mexico compared to California; for example, trophy hunting is legal in Mexico. (See section 5.8.3 for details on differences between how California and Mexico manage mountain lions.)

Significance

Unique Ecological Setting: Yes. While the EPR is primarily characterized by coastal chapparal, woodland, and forest types which are represented elsewhere within the range of mountain lions in California, the habitat transitions in the east to more xeric creosote bush (*Larrea tridentata*) scrub, alluvial basins, and western Sonoran woodlands, basins, and scrub. These latter ecoregions are not represented elsewhere within the California range (Griffith et al. 2016).

Gap in Range: Yes. Loss of the EPR MU would isolate the SA MU and eliminate connections to lion populations in the peninsular ranges of Baja California, Mexico.

Only Surviving Natural Occurrence: No.

Markedly Different Genetic Characteristics: No. The EPR MU is a fine-scale genetic group with genetic evidence of historic connection to other SC populations (Gustafson et al. 2019, 2022; Fig. 18).

Imperiled?

Threatened or Endangered: Yes. The EPR MU is the largest population within the SC group; however, the effective population size is 32, with an estimated 63–126 adults. While there is some evidence of remaining connection with mountain lion populations in Baja California, Mexico, the EPR MU population is likely too small to ensure its long-term persistence.

Conclusion: The EPR MU is appropriately considered a Distinct Population Segment and it is imperiled.

San Gabriel/San Bernardino

Discreteness

Markedly Separate: No. This population is classified as a fine-scale genetic group by Gustafson et al. (2019, 2022). There is significant urban development along most of its southern boundary in the San Fernando Valley and the Inland Empire. To the north is less dense development and desert, although residential development in this area is projected to increase significantly by 2050. Despite the barriers of I-15 and I-10, there is evidence of moderate gene flow from EPR into SGSB (Figs. 3 & 17). There has been

very limited historical gene flow out of SGSB into CC-S and CC-C. However, it is likely that Highway 14 and I-5 are fairly strong contemporary barriers to movement (Fig. 17).

International Border: No.

Significance

Unique Ecological Setting: No. The southern California montane shrub, woodland, and forest ecoregion types composing the SGSB are also represented in the CC-C, CC-S, and EPR MUs (Griffith et al. 2016).

Gap in Range: Yes. Genetic evidence suggests the SGSB historically received infrequent migrants from CC-S, although few mountain lions appear to have moved from the SGSB to neighboring MUs (Figs. 17 & 18). Although limited, the connectivity between SGSB and the EPR may be the only mechanism through which the EPR and SA are connected to other California lion populations, and loss of SGSB would potentially fully isolate the SA and EPR MUs creating a significant gap in the California range.

Only Surviving Natural Occurrence: No.

Markedly Different Genetic Characteristics: No. SNP data suggest there is shared ancestry with the rest of the SC populations (Gustafson et al. 2022; Fig. 18).

Imperiled?

Threatened or Endangered: Yes. The SGSB MU is the smallest population within the South Coast Group with an effective population size of 5 and an estimated 10–20 adults.

Conclusion: While SGSB plays a significant role in facilitating genetic exchange between other MUs, it does not meet the criteria for discreteness, so the evidence does not support a designation as a DPS.

Southern Coast Group

Discreteness

Markedly Separate: Yes. Genetic evidence from Gustafson et al. (2022) shows that the SC group is a distinct genetic population, separate from other significant populations in California (Gustafson et al. 2019, 2022). Human development and roadways create significant barriers to movement and increase physical separation to the point where the San Gabriel and San Bernardino mountains are likely the only pathway of connectedness between the SC group and other California populations, and what connectivity there is, is likely tenuous. Consequently, the SC group is physically separated from other California populations.

International Border: Yes. The SC group borders Mexico. The international border is marked by walls and fences that attempt to manage human migration; although some significant sections of the border, including a large section of the Eastern Peninsular Mountains, remain open. However, the status of the mountain lion population in Baja California and the frequency of mountain lion movement across the border is unknown. Management of mountain lions in Mexico differs from management in California; for example, trophy hunting is legal in Mexico. (See section 5.8.3 for details on differences between how California and Mexico manage mountain lions.)

Significance

Unique Ecological Setting: Yes. The SC group encompasses desert and chaparral habitat on the eastern side of coastal mountain ranges that is unlike mountain lion-occupied habitat elsewhere in the state.

Gap in Range: Yes. While loss of the SC group would not bisect or isolate portions of the range of mountain lions within California, it could eliminate mountain lions from the entire southern fifth of the state (as mentioned elsewhere, the relationship of mountain lions in the EPR genetic group identified by Gustafson et al. (2019) to mountain lions in the eastern deserts and Colorado River corridor is poorly understood). Additionally, loss of the SC group would isolate coastal lion populations in California from those in Mexico.

Only Surviving Natural Occurrence: No.

Markedly Different Genetic Characteristics: Yes. Available SNP data from Gustafson et al. (2022) which are more reflective of longer-term separation of populations than the microsatellite analyses conducted by Gustafson et al. (2019) supports the South Coast group being a broad scale genetic group separated from other groups in California (Fig. 4), with higher genetic diversity and more private alleles than the Central Coast or North Coast broad scale genetic groups, suggesting the group retains unique genomic variations.

Imperiled?

Threatened or Endangered: Yes. Although the combined effective population size of the South Coast Group is about 53 with 101–208 adult animals (Gustafson et al. 2019), available habitat is limited in the Santa Ana, San Gabriel, and San Bernardino mountains. Also, those areas have limited connection with the Eastern Peninsular Mountains where most of the habitat lies. Three substantially disconnected populations exist in this group. Therefore, it is not meaningful to combine the effective population size estimates of the constituent MUs, and the group should be considered threatened. Additionally, projected future residential development will likely make movement of mountain lions between this group and the WSN and CC-S less frequent.

Conclusion: There is evidence supporting designation of the South Coast Group as a potentially threatened or endangered DPS.

6.3 Assessment of Significant Portion of Range

CESA requires that the Commission, in making its determination, consider whether mountain lions in California are in serious danger of becoming extinct throughout all or a significant portion of their range. While what comprises a “significant portion” of a species’ range is not further defined in CESA, our analysis in the Assessment of Distinct Population Segments section above addressed whether the MUs, singly or in combination, could be considered discrete “significant portions” of the species’ statewide range based upon whether those units are discrete from other populations, and whether they are ecologically or genetically significant. Only the EPR MU and the South Coast Group (composed of the SGSB, EPR, and SA MUs) were found to meet those criteria (they occupy discrete portions of the range

and are significant in terms of genetics, ecological setting, or range connectivity). Therefore, the Department considers the South Coast Group (and the EPR MU within) a significant portion of the mountain lion's range. The lion population in these areas is also imperiled.

7. SUMMARY OF LISTING FACTORS

CESA's implementing regulations identify key factors relevant to the Department's analysis and the Commission's decision on whether listing a species as threatened or endangered is warranted. A species will be listed as endangered or threatened if the Commission determines that the species' continued existence is in serious danger or is threatened by any one or any combination of the following factors: (1) present or threatened modification or destruction of its habitat; (2) overexploitation; (3) predation; (4) competition; (5) disease; or (6) other natural occurrences or human-related activities (Cal. Code Regs., tit. 14, § 670.1, subd. (i)).

This section provides summaries of information from the foregoing sections of this status review, arranged under each of the factors to be considered by the Commission in determining whether listing is warranted.

7.1 Present or Threatened Modification or Destruction of Habitat

The main threats affecting mountain lions in the petitioned ESU and MUs evaluated in this review are habitat loss and fragmentation from historical and ongoing transportation infrastructure expansion and development (including residential and commercial structures, intensive agriculture, HSR lines, canals, and reservoirs), and lack of sufficient connectivity between remaining habitat patches which has resulted in reduced genetic exchange between populations. The amount of suitable habitat available to mountain lion populations has been significantly reduced in and adjacent to areas such as the Central Valley, San Francisco Bay area, and the greater Los Angeles and San Diego urban areas. Over time significant barriers have developed which impede mountain lion movement and isolate populations and ongoing residential and commercial development is projected to exacerbate isolation. The lack of sufficient gene flow between isolated populations has resulted in inbreeding in some smaller populations which may reduce survival and reproductive fitness, as evidenced by physical abnormalities in some mountain lions in the small and isolated Santa Ana and Santa Monica populations.

Long-term maintenance of genetic variation within the two broad-scale genetic populations identified by Gustafson et al. (2022) and the six fine-scale genetic populations identified by Gustafason et al. (2019, 2022) in the petitioned area is reliant on habitat conservation and connectivity. Maintenance and enhancement of gene flow between the petitioned ESU and the larger, more genetically diverse mountain lion populations in the Sierra Nevada and through the Tehachapi Mountains, and the San Gabriel, and San Bernardino mountains is required to maintain viable populations in the petitioned area.

After evaluating the threat posed by the present and future modification and destruction of habitat to the statewide mountain lion population, the Department concludes that the remaining, relatively large

populations in the NC, SN, and portions of the CC are sufficient to preclude the threat of extinctions statewide, or in any of the four large-scale genetically discernable populations identified by Gustafson et al. (2022), presently and in the foreseeable future. As noted earlier in this report, some smaller fine-scale populations have well-documented significant risk factors at this time. In the most isolated habitat patches (e.g., Santa Monica Mountains, Santa Ana Mountains), it is conceivable that local extirpations may occur in the absence of efforts to improve habitat connectivity and remove barriers to movement. Management intervention to develop a broad wildlife crossing infrastructure, including the protection and enhancement of large blocks of suitable habitat on each side of crossing facilities, to link MUs would increase connectivity and potentially alleviate the genetic and stochastic risks associated with small populations. Such an effort will require adequate funding and concerted and sustained commitment by many parties to ensure proper design, placement, maintenance, and monitoring for effectiveness.

7.2 Overexploitation

Existing state laws and recent changes to the Department's approach to issuing mountain lion depredation permits have significantly reduced the risk of overexploitation in the petitioned ESU and statewide. Under current management, occasional take of individual mountain lions due to repeated depredations on a single property or for public safety in the petitioned ESU is foreseeable and may exacerbate the detrimental effects associated with small population size and limited genetic exchange in isolated mountain lion populations such as the Santa Monica Mountains (CC-S), SA, and EPR. Depredation take has been the leading cause of known mortality across the petitioned ESU and a major identified source of mortality in the EPR. Unauthorized take via shooting or trapping (i.e., poaching) is known to occur but is difficult to quantify. Overexploitation likely poses little threat to the statewide population nor to any of the four large-scale genetically discernable populations; however, for the MUs with small population sizes (SA, CC-N, CC-S, SGSB), the additive mortality from permitted take is a concern.

7.3 Predation

As large-bodied predators, adult mountain lions in California are subject to little predation pressure. Gray wolves sometimes kill both adult and juvenile mountain lions, and black bears are known to occasionally kill mountain lion kittens but rarely adults (Elbroch and Kusler 2018). However, predation by wolves and black bears is not known to be a significant cause of California mountain lion mortality or known to threaten the persistence of lion populations. Therefore, and given the current absence of gray wolves within the petitioned area, predation is not currently considered to present a significant threat to California mountain lion populations.

7.4 Competition

Black bears and gray wolves are known to displace mountain lions from their kills which potentially forces mountain lions to expend additional energy hunting to procure more prey (Elbroch et al. 2015,

Elbroch and Kusler 2018). Given the absence of wolves in the petitioned area, wolf competition would have no effect on central or southern coast lion populations. The potential impact of black bears in these areas remains unknown and warrants further study. Intraspecific conflict has been identified as the leading cause of mortality for the nearly isolated mountain lions in the Santa Monica Mountains within the CC-S (Riley et al. 2014). Intraspecific aggression appears to be a significant mortality factor where individual mountain lions occupy small patches of suitable habitat within habitat-limited landscapes, and therefore, this form of competition should be considered a significant threat to lion populations in the Santa Monica and Santa Ana mountains, and possibly within the SGSB MU. .

7.5 Disease

Mountain lions are susceptible to various viral, bacterial, and parasitic pathogens. Lions living near urban areas where the threat of domestic animals could play a role in disease transmission appear to be especially vulnerable. To the best of our knowledge, pathogens alone have not threatened large mountain lion populations (e.g., on the level of a state), and thus we do not think they represent a significant threat to the species in California. However, pathogens may be harmful to individuals and small populations, and, when combined with the serious threats of habitat loss and fragmentation, climate change, wildfires, and other threats, the possibility of a catastrophic disease outbreak further reduces the certainty that smaller, isolated, highly dense mountain lion populations will persist into the future.

7.6 Other Natural Occurrences or Human-related Activities

7.6.1 Vehicle-Related Mortality

Vehicle-related mortality is a major mortality factor for mountain lions in California. It is difficult to accurately assess the magnitude of the problem due to lack of systematic data collection. One estimate is that 100 mountain lions are killed every year by vehicle strikes (Pollard 2016), while a more recent report puts that number at 70 per year during the period from 2015 to 2022 (Shilling et al. 2023). Outside of the extensively studied populations of the CC-N and CC-S, it is difficult to quantify the impact of this threat on populations. Researchers have found that reported vehicle collisions are densest in the urban areas of the Bay Area, the central and south coasts, and the northern Sierra Nevada foothills. Dense clusters of reported vehicle strike mortalities also exist in more rural areas such as the I-5 corridor near the Oregon border and US 50, I-80, and SR-20 in the Sierra Nevada foothills (Shilling et al. 2023). Well-designed wildlife crossing structures and associated fencing to funnel animals to the crossing can reduce vehicle-related mortalities (Grilo et al. 2015, Villalobos-Hoffman et al. 2022). While such structures are extremely costly and require careful planning to be effective, there has been progress on the is front with the completion of the Highway 17 undercrossing in the Santa Cruz Mountains, construction of the Wallis Annenberg Wildlife Crossing underway in the CC-S, and several other structures in the planning stage. When such wildlife crossing structures and fencing become

widespread, lion mortality from vehicle strikes in the petitioned ESU and elsewhere in the state will likely be significantly reduced.

7.6.2 Toxicants

Mountain lions throughout California are exposed to toxic chemicals in their environment which can be lethal or debilitating, depending on the quantities ingested. Lions with toxicant-impaired functions may be more susceptible to other forms of mortality such as starvation and vehicle strikes. Lions can encounter ARs used to control vertebrate pests throughout the state, including remote locations where legal and prohibited rodenticides are used to protect illicit cannabis plantations. Necropsies have verified that nearly all tested mountain lions in California have been exposed to ARs. While toxicants are not known to directly cause significant mortality statewide, their effects may be additive to other sources of mortality. The population effects of toxicant exposure within smaller MUs is unknown.

7.6.3 Wildland Fire and Fire Management

The effect of wildfire on mountain lions is complex and understudied throughout their geographic range. Fire is a regular ecological process in many California vegetative communities, and many native plant species display adaptations to fire such as thick fire-resistant bark, post-fire crown-sprouting, and smoke-induced seed germination which can create better forage for deer, the main prey of mountain lions. Mountain lions have been documented using burned landscapes more frequently than expected based on availability during the first nine years post-fire. However, some areas of suitable shrub habitat have been converted to less suitable annual grasslands due to unnaturally frequent repeated burns in the same area resulting from increased human ignitions and the effects of climate change. Wildfires also cause mountain lion injury and direct mortality, which is likely additive to other sources of mortality. Fires are projected to become more frequent with climate change, resulting in the conversion of some preferred mountain lion woodland and shrubland habitat to grasslands, which are documented to be mostly avoided by lions. The impact of wildfire on the statewide mountain lion population, genetic groups or MUs is difficult to predict; however, some small patches of habitat such as the Santa Monica Mountains (CC-S) and Santa Ana Mountains (SA) may be vulnerable to large, severe fires (e.g., the Woolsey Fire Los Angeles and Ventura counties in 2018) that could modify most extant lion habitat in one or a few events, potentially threatening or even extirpating local populations.

7.6.4 Climate Change

Projections indicate the California climate will continue to warm, and precipitation events will become less predictable and droughts more frequent. These changes will influence the condition and distribution of vegetative communities and the animal communities that depend upon them. The Department is not aware of any study using bioclimatic modeling to project changes in the geographic range of the mountain lion or their main prey species (mule deer) based on climate variables. As large-bodied mammals, it may be that both mountain lions and mule deer are sufficiently large not to be affected directly by moderate increases or decreases in environmental temperature, which more

drastically affect small-bodied mammals with higher surface area to volume ratios. The generally nocturnal habits of mountain lions and their prey also help alleviate impacts from warmer environments. Mountain lions are known to occur across a wide variety of ecoregions ranging from deserts to temperate and coastal rainforests in California. The mountain lion's body size, foraging habits, and breadth of climates in the wide range of ecosystems the species occupies suggests the direct or indirect effects of climate change are unlikely to lead to near-term shifts in distribution of the species or population declines.

7.6.5 Risks to Small, Isolated Populations

Small, isolated populations are inherently vulnerable to extinction due to demographic stochasticity, inbreeding depression, and genetic drift which result in a loss of genetic variability and a reduced genetic capacity to respond to changes in the environment. A lack of immigration can also prevent isolated populations from recovering from stochastic extinctions or population declines, independent of genetic effects. In wildlife populations, genetic variation has been shown to be strongly correlated with high survival and reproduction rates, as well as decreased extinction risk. Genetic effects can amplify the impact of the other threats and random environmental effects to further reduce population sizes and accelerate populations towards extirpation in what has been termed an extinction vortex.

The estimated statewide mountain lion population estimate 3,242 (95% CI 2,826-3,742) animals is relatively robust for a large carnivore. In addition, there are the four major genetic population clusters in the state that contain high levels of genetic variation and exhibit little evidence of inbreeding depression (Gustafson et al. 2022). However, certain isolated populations, including the CC-N (Santa Cruz Mountains), CC-S (Santa Monica Mountains), SA, and SGSB (as delineated by Gustafson et al. 2022) are small enough that there are concerns about inbreeding and effective population size.

Certain small populations in southern California have particularly low genetic variation and the SA and CC-S populations exhibit high levels of inbreeding (Ernest et al. 2014, Riley et al. 2014, Benson et al. 2019, Gustafson et al. 2019). The SGSB and CC-N similarly have low observed genetic variation and effective population sizes. In contrast, the Klamath–Cascades, WSN, ESN, CC-C, and EPR populations show little evidence of inbreeding (Gustafson et al. 2019, 2022) and some level of genetic exchange between certain MUs appears to exist. As genetic variation is relatively high in multiple California populations compared to variation in several smaller central and southern coastal populations, there is high potential for long-term persistence of mountain lions throughout most of the state and all four broad-scale populations identified by Gustafson et al. (2022) if adequate habitat and connectivity can be protected.

8. PROTECTION AFFORDED BY LISTING

It is the policy of California to conserve, protect, restore, and enhance any endangered or threatened species and its habitat (Fish & G. Code, § 2052). If the Commission votes to list mountain lion

populations under CESA, the act would prohibit take[9] except under certain circumstances: 1) when authorized by the Department for scientific, education, or management purposes through research and management MOUs (Fish & G. Code, § 2081, subd. (a)); 2) when authorized by the Department through incidental take permits (ITPs) when take is incidental to otherwise lawful purposes and the impacts have been minimized and fully mitigated (Fish & G. Code, § 2081, subd. (b)); 3) under authority of Fish & Game Code section 2087 when take accidentally results from otherwise lawful routine and ongoing agricultural activities; 4) when take occurs on land covered by Voluntary Local Programs, NCCPs, or Safe Harbor Agreements (Fish & G. Code, §§ 2086, 2835, 2089.2, respectively); or 5) authorized take pursuant to the Wildlife Protection Act of 1990 (Fish & G. Code, § 4800, et seq.).

If mountain lion populations are listed under CESA, the impacts of any take caused by activities authorized through ITPs must be minimized and fully mitigated (Fish & G. Code, § 2081, subd. (b)). These conditions often include protection of habitat in perpetuity, development and implementation of a species-specific adaptive management plan, and funding through an endowment to pay for long-term monitoring and maintenance to ensure the mitigation land meets performance criteria. Obtaining an incidental take permit is voluntary. The Department cannot force compliance; however, any person violating the take prohibition may be criminally and civilly liable under state law.

Additional protection of mountain lions following listing would be expected to occur through state and local agency environmental review under CEQA. CEQA requires affected public agencies to analyze and disclose project-related environmental effects, including potentially significant impacts on wildlife species. The CEQA Guidelines require a mandatory finding of significant impact, thus requiring preparation of an Environmental Impact Report, when a project has the potential to substantially reduce the number or restrict the range of a threatened or endangered species (Cal. Code Regs. 14, §15065(a)(1)). In common practice, potential impacts to listed species are examined more closely in CEQA documents than potential impacts to unlisted species. Where significant impacts are identified under CEQA, the lead agencies must typically adopt project-specific avoidance, minimization, and mitigation measures to limit impacts to the species. State listing, in this respect, and consultation with the Department during state and local agency environmental review under CEQA would be expected to benefit mountain lions in the petitioned ESU in terms of reducing impacts from individual projects. Absent listing, such protection measures or mitigations might not occur.

CESA listing may also result in increased priority for limited conservation funds such as Wildlife Conservation Board, Local Assistance, and State Wildlife Grants, along with land acquisition assistance from non-governmental organizations (NGOs) such as The Nature Conservancy.

9. LISTING RECOMMENDATION

[9] "Take" is defined as hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill (Fish & G. Code, § 86).

CESA directs the Department to prepare this report regarding the status of the mountain lion in the petitioned Southern California/Central Coast ESU based upon the best scientific information available (Fish & G. Code, § 2074.6). CESA also directs the Department based on its analysis to indicate in the status report whether the petitioned action (i.e., listing as threatened) is warranted (Fish & G. Code, § 2074.6; Cal. Code Regs., tit. 14, § 670.1, subd. (f)).

Under CESA, an endangered species is defined as "a native species or subspecies…which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease" (Fish & G. Code, § 2062). A threatened species is defined as "a native species or subspecies…that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by [CESA]" (Fish and G. Code, § 2067).

The Legislature left to the Department and the Commission, which are responsible for providing the best scientific information and for making listing decisions, respectively, the interpretation of what constitutes a "species or subspecies" under CESA. (*Cal. Forestry Assn. v. Cal. Fish and G. Com.* (2007) 156 Cal.App.4th 1535, 1548-49). Courts should give a "great deal of deference" to Commission listing determinations supported by Department scientific expertise (*Central Coast Forest Assn. v. Fish & G. Com.* (2018) 18 Cal. App. 5th 1191, 1198-99). The Commission's authority to list necessarily includes discretion to determine what constitutes a species or subspecies (*Id*. at p. 1237). The Commission's determination of which populations to list under CESA goes beyond genetics to questions of policy (Ibid.).

The Department evaluated the petitioned ESU as well as those populations within the petitioned ESU to determine if they singly or in combination should be considered threatened or endangered pursuant to CESA. The Department has determined, based upon the best available scientific evidence, that there is currently insufficient evidence that the mountain lions within the petitioned ESU and the populations within the petitioned ESU boundary meet the criteria to be listed as threatened or endangered ESUs. The petitioned ESU, or any combination of its populations, do not meet the criteria to be considered as ESUs—they are not both substantially isolated from other populations *and* important components of the evolutionary legacy of the mountain lion species. Although movement of individuals is increasingly restricted, there is limited gene flow between the petitioned ESU and other mountain lion populations, and neither the petitioned ESU nor the Management Units within it are totally reproductively isolated. Nor is the petitioned ESU sufficiently genetically or morphologically differentiated from the larger California population to suggest the presence of distinct evolutionary lineages or evolutionarily important differences. Therefore, there is insufficient scientific evidence to classify the portions of the California mountain lion population petitioned for listing as one or several ESUs as defined by Waples (1991).

The Department has also examined populations within the petitioned ESU through the lens of federal Distinct Population Segment policy in recognition of the Petitioner's intent to examine the viability of major genetic or otherwise significant groupings of mountain lions in California. The South Coast Group (as defined by Gustafson et al. 2022) consists of three MUs (EPR, SA, and SGSB) and meets the federal

criteria to be considered a Distinct Population Segment, as the best available scientific evidence shows that it is discrete and biologically significant. Further, scientific evidence indicates the South Coast Group DPS is not in imminent danger of extinction, but it is likely imperiled if management actions are not taken to conserve and restore habitat connectivity between MUs to allow the exchange of individuals and facilitate genetic connections to the larger statewide population. Therefore, the Department recommends that the South Coast Group DPS be listed as Threatened under California law.

The Department recommends the boundary for the threatened South Coast Group be as delineated in Figure 19. Unlike the boundary of the proposed ESU, we do not include the desert regions in eastern San Bernardino, Riverside, and Imperial counties in the South Coast Group DPS. The EPR genetic cluster depicted in Gustafson et al. 2019 has ambiguous boundaries and Figure 2 in Gustafson et al. 2019 clearly shows there are no sample points within the desert regions in question. No tissue from mountain lions in this region were included in Gustafson et al.'s (2019, 2022) genetic analyses. Thus, the spatial interpolation of genetic clusters in this area cannot be considered reliable and population membership of mountain lions occupying these eastern regions cannot be determined.

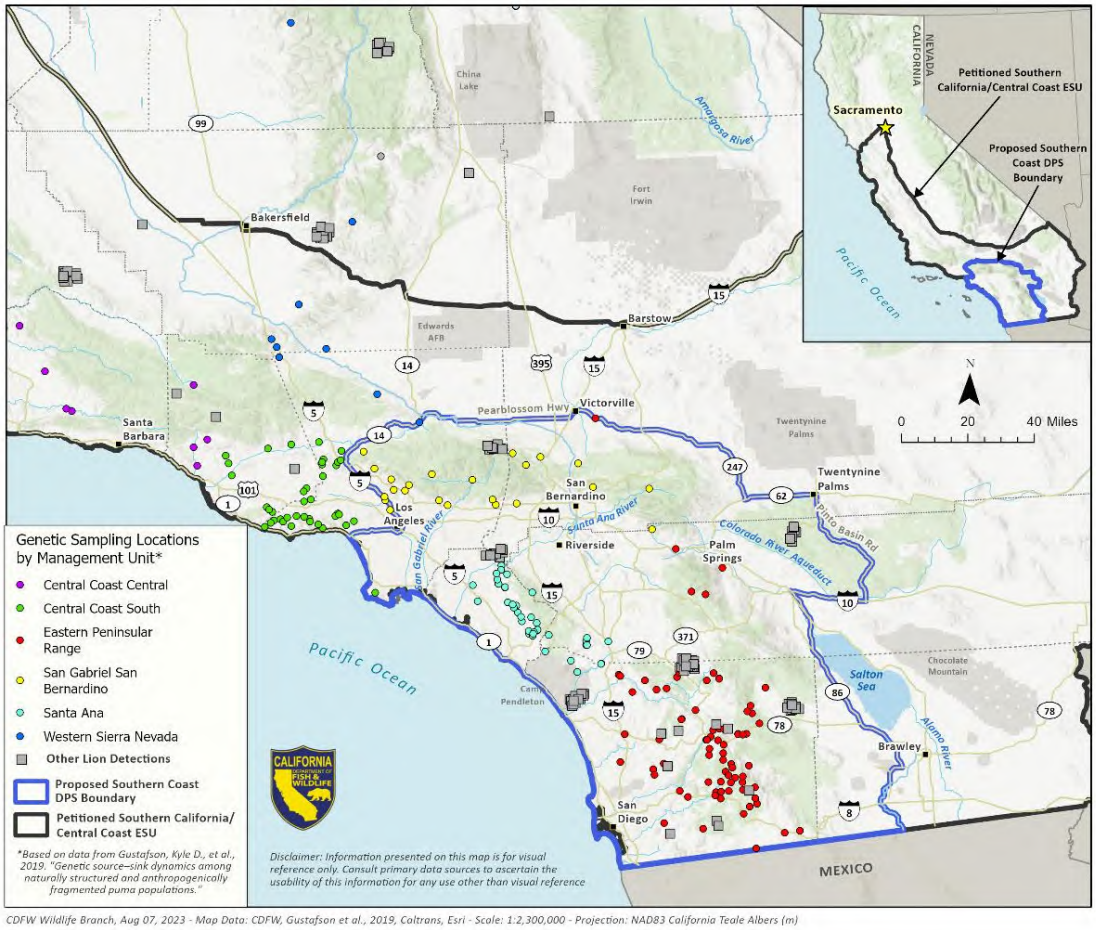


Figure 19. Proposed boundary of South Coast DPS recommended for threatened status. Points represent genetic sampling locations color coded by the Management Unit they lie within. Grey squares are confirmed locations of mountain lions from camera trap data (CDFW unpublished).

Mountain lions are known to occur in the desert regions of California and in Death Valley National Park (Lundgren et al. 2022), but camera trap data suggest they may exist at low densities (Dellinger et al. 2019). Genetic material from the eastern deserts has not been systematically collected, and, consequently, mountain lions in those areas have not been assigned to a genetic population nor has local gene flow been characterized. The nearest location for which genetic samples have been analyzed is the Mojave Desert region of Nevada (Andreasen et al. 2012). In a statewide genetic study of mountain lion population structure, Andreasen et al. (2012) found that animals from southern Nevada were genetically similar to individuals from the Great Basin and the Sierra Nevada region of California (Fig. 2, therein). Further, a doctoral dissertation found minimal evidence for gene flow between mountain lions from southwest Arizona and those from south coastal California and individuals sampled from the North Rim of the Grand Canyon were found to be more genetically similar to those from south coastal California (Naidu 2015). The results of these two studies suggest mountain lions from the desert regions of California may share more recent genetic ancestry with animals to the northeast—namely the Great Basin and Colorado Plateau—as compared to animals immediately across the lower Colorado River in southwest Arizona. A fuller understanding of the genetics of mountain lions from southeastern California would require additional study with a focus on sampling new locations of collecting scat or capture of individual mountain lions. This would be complicated by the fact that individuals in this region may occur at low density and likely have larger home ranges coupled with the hot arid conditions making samples difficult to obtain.

For the reasons stated above, we suggest it currently is not possible to assign population membership to mountain lions occupying the California deserts east of the samples examined by Gustafson et al. (2019, 2022) or to assess their current level of conservation risk. We therefore do not find it appropriate to include large portions of the Mojave and Sonoran deserts in the DPS area. Instead, we suggest the South Coast DPS be bounded by the foot of the eastern slope of the Peninsular Ranges (Fig. 19). We created a boundary that encompasses the areas where the genetic samples were found, as well as connected areas of suitable habitat with verifiable sightings of mountain lions via camera traps (GBIF 2023, CDFW, unpublished data).

10. MANAGEMENT AND RECOVERY ACTION RECOMMENDATIONS

California's statewide mountain lion population is complex and diverse. Large areas of the state appear to have robust, genetically diverse, and well-connected lion populations (e.g., NC and SN groups) while other populations show evidence of inbreeding depression and genetic isolation (e.g., SA, Santa Monica Mountains of the CC-S). Multiple genetic investigations have now demonstrated the importance of the Sierra Nevada region as a reservoir of genetic variation (Ernest et al. 2003, Gustafson et al. 2019). Bi-directional migration rate models based on genetic data indicated the western Sierra Nevada serves as a significant source of migrants into other regions of California (Gustafson et al. 2019). The overarching

goals of mountain lion management in the state should be maintaining and enhancing landscape connectivity between robust core populations and smaller, more isolated MUs within the CC and SC regions as well as enhancing and expanding remaining habitat patches and reducing mortality rates in those populations. Increased connectivity would help offset the risks to small populations that result from demographic and genetic factors. Benson et al. (2019) found that conserving mountain lions in isolated mountain ranges in greater Los Angeles (Santa Monica and Santa Ana mountains) is feasible with relatively modest increases in landscape connectivity.

Two MUs which may have significant relevance for restoring regional gene flow are the CC-C and EPR (Fig. 1). The CC-C MU has ample habitat for maintaining a breeding population (Dellinger et al. 2020*b*). Given the data indicating minimal gene flow across the Central Valley, this population may be the only consistent source of migrants for the CC-N and CC-S. Thus, maintaining connectivity to the CC-C MU may be essential for the long-term viability of both adjacent populations. Concurrently, maintaining connectivity and habitat quality within the CC-C population as the human population increases will be essential for that population to remain robust and a viable source for the CC-N and CC-S populations. The EPR is the only population known to exchange migrants with the SA population, and management actions which enhance gene flow between these areas will be critical to the sustainability and recovery of mountain lions in the SA. Dispersal in and out of the EPR is limited and the degree of dispersal across the border between the U.S. and Mexico remains unknown (Gustafson et al. 2019). While self-sustaining connectivity through a network of corridors and habitat patches with functional ecosystem processes would be ideal for long term sustainability, assisted gene flow between populations through targeted translocations should be considered as a short-term management action to augment the genetic variation of the most isolated small populations.

The specific recommendations below are compiled from sources including the Petitioners, mountain lion researchers, Gustafson et al. (2022), the Department, and others, and are designed to facilitate the above goals.

10.1 Connectivity

- Identify the most strategic locations for wildlife crossing structures, and design and build crossing infrastructure to improve wildlife connectivity and permeability at existing roads and highways, combined with protections of adjacent habitat to ensure perpetual wildlife access to the crossing structures and connections to the core protected habitat areas such as National Forests (South Coast Wildlands 2008). Crossing infrastructure should include, but is not limited to, overcrossings, underpasses, culverts, and exclusionary fencing that guides animals to safer crossing areas (Vickers et al. 2015). The following crossing locations have been identified by mountain lion experts and should be among the top priorities for the implementation of crossing infrastructure: (1) I-15 Freeway at Temecula Creek Bridge to enhance the Palomar Linkage and connect the Santa Ana and Eastern Peninsular Mountain Ranges (Ernest et al. 2014, Gustafson et al. 2017, Zeller et al. 2017, Riley et al. 2018) (2) I-15 Freeway at “Site 5” as

described in Riley et al. (2018) (3) I-280 between San Bruno and Cupertino, which is the "deadliest highway for mountain lions in California" according to Shilling and Vickers (2023).

- In recognition of the importance of the Sierra Nevada region as a reservoir of genetic variation and significant source of migrants into other regions of California (Ernest et al. 2003, Gustafson et al. 2019, 2022), acquire, maintain, and enhance corridors and patches of suitable habitat linking the SN, CC-S, SGSB, SA, and EPR populations, emphasizing the retention and expansion of protected habitat in the Santa Ana, Santa Monica, and San Gabriel mountains.
- Encourage land use and planning agencies at federal, state, county, and local levels of government to require analysis of regional wildlife connectivity in all new development proposals in primary travel corridors and habitat linkages, such as those in the Tehachapi and Sierra Pelona mountains (Gustafson et al. 2019) and between the SA and EPR (Vickers et al. 2015).
- Explore periodic assisted translocations of outbred animals (i.e., genetic rescues) to quickly increase genetic variation in small, isolated mountain lion populations such as the Santa Monica Mountains (CC-S) and SA (Johnson et al. 2010).
- Fund monitoring programs to evaluate the success of wildlife crossing structures, including monitoring the genetic variation and movements of mountain lion populations on either side.
- Dedicate sufficient funding from the Wildlife Conservation Board, Habitat Conservation Fund, and other state funding sources towards acquiring key mountain lion and wildlife habitat and for establishment of highway crossing infrastructure.
- Encourage the maintenance and restoration of riparian vegetation communities in the CC and SC regions to provide prey habitat, resting and feeding cover, and viable movement corridors between remaining patches of mountain lion habitat. This could include limiting water diversions in these areas.

10.2 Research and Monitoring

While the recommendations below apply statewide, priority should be given to projects that enhance understanding of mountain lion populations and behaviors in petitioned ESU area.

- Periodically replicate genetic analyses similar to Gustafson et al.'s (2019) work to monitor genetic variation within MUs and signals of mountain lion immigration and emigration.
- Investigate whether the wide range of environmental conditions (e.g., precipitation, temperature) across California, and/or localized areas of restricted gene flow, are associated with local adaptations or drift. Such information will be vital to choosing which populations to reconnect through the establishment of wildlife corridors or by translocation actions (i.e., assisted migration and genetic rescue).
- Determine mountain lion distribution, abundance, resource selection at multiple spatial scales, movements and dispersal patterns, foraging ecology, and to study landscape genetics in the Sonoran and Mojave deserts, and along the lower Colorado River region of the state. Work collaboratively with tribes, adjacent states, Baja California, Mexico, universities, other

government entities (e.g., Caltrans, BLM, NPS, State Parks, USGS, Military), IUCN and IUCN Species Survival Commission Cat Specialist Group, and other NGOs.

- Monitor responses to increasing fire frequency to assess how mountain lions, other carnivores, and their prey will be affected by large-scale changes that may pose a threat to landscape integrity and persistence of mountain lion populations in southern California ((Jennings et al. 2016).
- Evaluate trans-highway movements, resource selection, home range placement, and vehicle-related mortality of adult and subadult mountain lions (Cougar Management Guidelines Working Group 2005, McKinney 2011). Focus on interstates in the South Coast Group (i.e., I-5, I-10, I-15, 101, 405), and roadways throughout the state that contain priority barriers or history of mountain lion vehicle-inducted mortality (i.e., I-5 near Oregon border, I-80 and SH 50, 70, 49, 396, 89 in the Sierra Nevada.
- Investigate the influence of variation in black bear seasonal presence and density on mountain lion kill rates and prey selection, habitat use, and kitten and adult survival. Also investigate areas where bears and mountain lions overlap with gray wolves to understand interactions.
- Investigate the influence of gray wolf distribution and density on mountain lion abundance, habitat selection, prey selection and kill rates, kitten and adult survival, and movements at multiple spatial scales.
- Rapidly detect, diagnose, and determine the significance of disease outbreaks and emerging diseases such as avian influenza.
- Continue AR screening of livers from mountain lion carcasses to further enhance our understanding about the locations and effects that AR exposure has on mountain lion health and mortality. Continued monitoring should also measure the effectiveness of regulatory changes intended to reduce exposure of non-target wildlife to rodenticides (Rudd et al. 2018).
- Investigate potential correlations between habitat, genetics, and prevalence of health and disease issues.
- Determine conditions associated with human-mountain lion conflict hotspots.
- Assess efficacy of non-lethal measures for mitigating/deterring mountain lions from depredating domestic animals. Assess whether co-occuring carnivores and native ungulate populations impact the efficacy of non-lethal measures for mitigating human-mountain lion conflict.

10.3 Regulations and Policy

- Work with the California Department of Pesticide Regulation to improve the management of second-generation ARs such as brodifacoum, bromadiolone, difenacoum, and difethialone to reduce mountain lion exposure, with an emphasis on southern California and central coast mountain lion habitat areas and linkages and explore outreach efforts on this issue.
- Improve law enforcement for areas where use of second-generation ARs is restricted to ensure compliance with the state's regulations.

10.4 Partnerships and Coordination

- Continue to collaborate with Caltrans and others to analyze how projects in the State Highway Operation Protection Program and State Transportation Improvement Program can be designed to facilitate wildlife connectivity through wildlife passage features such as culverts, under crossings, overcrossings, bridges, directional fencing, scuppers, barrier breaks, roadside animal detection systems, signage, etc.
- Continue to collaborate with Caltrans and the Road Ecology Center at UC Davis to help collect and analyze roadkill data to identify hotspots where mountain lions, deer, and other animals are killed. Investigate funding channels for creating an open access statewide roadkill database for data download and analysis as needed by multiple interested parties. Encourage Caltrans to implement wildlife passage features to the greatest extent feasible and as expeditiously as possible.
- Continue to collaborate with external researchers, tribal members, agencies, universities, and NGOs to help solve habitat conservation, landscape connectivity, and vehicle-related and other mortality incidents in southern and central California.
- Encourage local governments to place conditions on new developments to minimize negative impacts on riparian systems and native vegetation by buffering the riparian areas to allow use by mountain lions and their prey. Promote efforts to restore riparian ecosystems and protected lands in the vicinity of wildlife crossing structures.

10.5 Public Education

- Continue to promote awareness and education regarding mountain lions, human safety, pet and livestock conflict prevention, pesticide exposure, and conservation messaging throughout southern California.
- Develop and implement outreach and education activities to promote use of predator-proof enclosures for domestic animals (Vickers et al. 2015).

11. ECONOMIC CONSIDERATIONS

The Department is charged in an advisory capacity to provide a written report and a related recommendation to the Commission based on the best scientific information available regarding the status of mountain lion in the petitioned Southern California/Central Coast ESU. The Department is not required to prepare an analysis of economic impacts (See Fish & G. Code, § 2074.6; Cal. Code Regs., tit. 14, § 670.1, subd. (f)).

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APPENDIX A – Acronyms, Abbreviations and Definitions

CDFW - California Department of Fish and Wildlife

Central Coast (CC), one of four genetic populations presented in Gustafson et al. 2022 based on Single Nucleotide Polymorphism data. Includes coastal mountains south of San Francisco Bay to and including the Santa Monica Mountains.

CEQA – California Environmental Quality Act

CESA - California Endangered Species Act

Commission - Fish and Game Commission

DPS - Distinct Population Segment

Department - California Department of Fish and Wildlife

Distinct Population Segment (DPS) - A vertebrate population or group of populations that is discrete from other populations of the species and significant in relation to the entire species.

Effective Population Size (Ne) - The number of individuals in a population that effectively participate in producing the next generation.

Evolutionary Significant Unit (ESU) - A term related to the federal Endangered Species Act originally applied to anadromous fish populations that designates a population that is substantially reproductively isolated from conspecific populations *and* represents an important component of the evolutionary legacy of the species.

Genetic Groups / Broad-Scale Genetic Groups – The four genetic groups for which Gustafson et al. (2022) found the strongest support through SNP analysis. These groups include:

Central Coast Group – Lions from the San Francisco Bay and Sacramento-San Joaquin Delta south through the Santa Monica Mountains inclusive of Gustafson et al.'s (2019) Central Coast-North, Central Coast-Central, and Central Coast-South genetic populations.

North Coast Group – Lions north of San Francisco Bay through the Coast Ranges to border with Oregon. Largely coincident with Gustafson et al.'s (2019) North Coast genetic population.

Sierra Nevada Group – Lions from the Klamath, Cascades, and Sierra Nevada mountains from the Oregon border south through the Tehachapi Mountains inclusive of Gustafson et al.'s (2019) Western Sierra Nevada and Eastern Sierra Nevada genetic populations.

Southern Coast Group – Lions in the San Gabriel and San Bernardino, Santa Ana, and Eastern Peninsular mountains inclusive of Gustafson et al.'s (2019) San Gabriel-San Bernardino, Santa Ana, and Eastern Peninsular Range genetic populations.

Management Unit (MU) - Demographically independent populations of conspecifics whose growth rate depends predominantly on local births and deaths rather than immigration.

Management Units identified in this report:

- **Central Coast North (CC-N**) - A geographic area based upon the CC-N genetic population identified by Gustafson et al.'s (2019) microsatellite marker analyses which

includes the Santa Cruz Mountains and east bay hills, extending south to approximately the Monterey County line.

- **Central Coast Central (CC-C)** - A geographic area based upon the CC-C genetic population identified by Gustafson et al.'s (2019) microsatellite marker analyses which generally includes coastal mountain ranges from southern Monterey Bay to Ventura County.
- **Central Coast South (CC-S)** - A geographic area based upon the CC-S genetic population identified by Gustafson et al.'s (2019) microsatellite marker analyses which includes the Santa Monica Mountains, Santa Susana Mountains, Sierra Pelona Mountains, and Simi Hills.
- **Eastern Peninsular Ranges (EPR)** - A geographic area based upon the EPR genetic population identified by Gustafson et al.'s (2019) microsatellite marker analyses which includes eastern San Diego County to the Colorado River and the border with Arizona and is bounded on the south by the border with Mexico.
- **Eastern Sierra Nevada (ESN)** - A geographic area based upon the Eastern Sierra Nevada genetic population identified by Gustafson et al.'s (2019) microsatellite marker analyses which extends from the east side of the Sierra Nevada crest to the Nevada border from northern Mono County south to northern San Bernardino County.
- **Nevada (NV)** - A geographic area based upon the Nevada genetic population identified by Gustafson et al.'s (2019) microsatellite marker analyses which encompasses most of the state of Nevada.
- **San Gabriel and San Bernardino Mountains (SGSB)** - A geographic area based upon the SGSB genetic population identified by Gustafson et al.'s (2019) microsatellite marker analyses and includes the San Gabriel and San Bernardino mountain ranges.
- **Santa Ana Mountains (SA)** - A geographic area based upon the SA genetic population identified by Gustafson et al.'s (2019) microsatellite marker analyses that encompasses the Santa Ana Mountains.
- **Western Sierra Nevada (WSN)** - A geographic area based upon the Western Sierra Nevada genetic population identified by Gustafson et al.'s (2019) microsatellite marker analyses that extends from the Oregon border through the Cascades and Sierra Nevada Mountains to the Tehachapi Mountains and includes the Sierra Nevada foothills and much of the Central Valley.

Microsatellite Markers - Repetitive segments of DNA scattered throughout the genome in noncoding regions between genes or within genes.

Principal Component Analysis (PCA) - A statistical multivariate technique which transforms a large number of correlated of variables into few uncorrelated variables which represents the whole data set.

Single Nucleotide Polymorphism (SNP) - a variation in nucleotides at a single position in a DNA sequence among individuals.

State Wildlife Action Plan (SWAP) – California's comprehensive plan for examining the health of wildlife populations and prescribing actions to conserve wildlife and vital habitat before they become more rare and more costly to protect.

USFS – U.S.D.A. Forest Service.

USFWS - United States Fish and Wildlife Service

APPENDIX C – Solicitations for Information

Tribal notice via email and hard copy mailing, statewide.

Fish and Game Commission's CESA Interested Parties list (Confidential list).

San Diego area USFWS biologist emailed solicitation letter to southern California biologists/land conservation planning group.

Heather Pert (CDFW) emailed a contacts group of biologists/land conservation planners.

Hard copy mailed to local Fish and Game Commissions and Board of Supervisors within and adjacent to the petitioned ESU counties.

State Parks, Caltrans, USFS, NPS, BLM notified via email.

Cattlemen's, BIA, Woolgrowers notified via email.

Additional contacts not yet listed; in process.

APPENDIX D – Public and Tribal Comments

CBD (also sent another set of comments later)

Vickers

Mountain Lion Foundation

Tribes, including Charley Dirk and his Tribe, from phone conversation.

Carmel area land manager (who sent pictures).

Escondido Conservancy

State Parks

Caltrans

Etc.

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APPENDIX E – External Peer Review Invitation Letters

4062 APPENDIX F – External Peer Review Comments

4063 APPENDIX G - California Department of Fish and Wildlife Human-Wildlife Conflict and Depredation
4064 Policies
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Status Review of the Southern California/ Central Coast Evolutionarily Significant Unit of Mountain Lion

Presentation to the California Fish and Game Commission

February 12, 2026

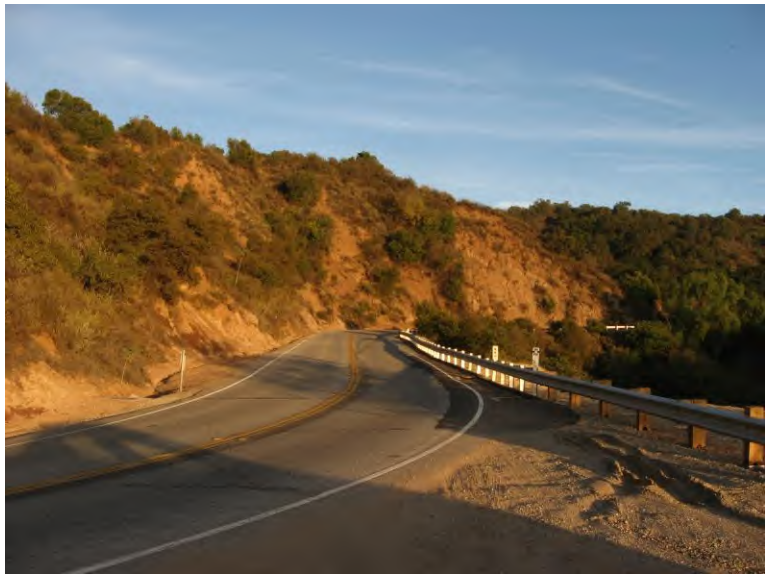
Daniel Applebee
Wildlife Branch

Presentation Overview

- Petition History
- Life History and Range
- Population Trends
- Threats
- Evaluation of Evolutionarily Significant Units (ESU)
- Department Recommendation

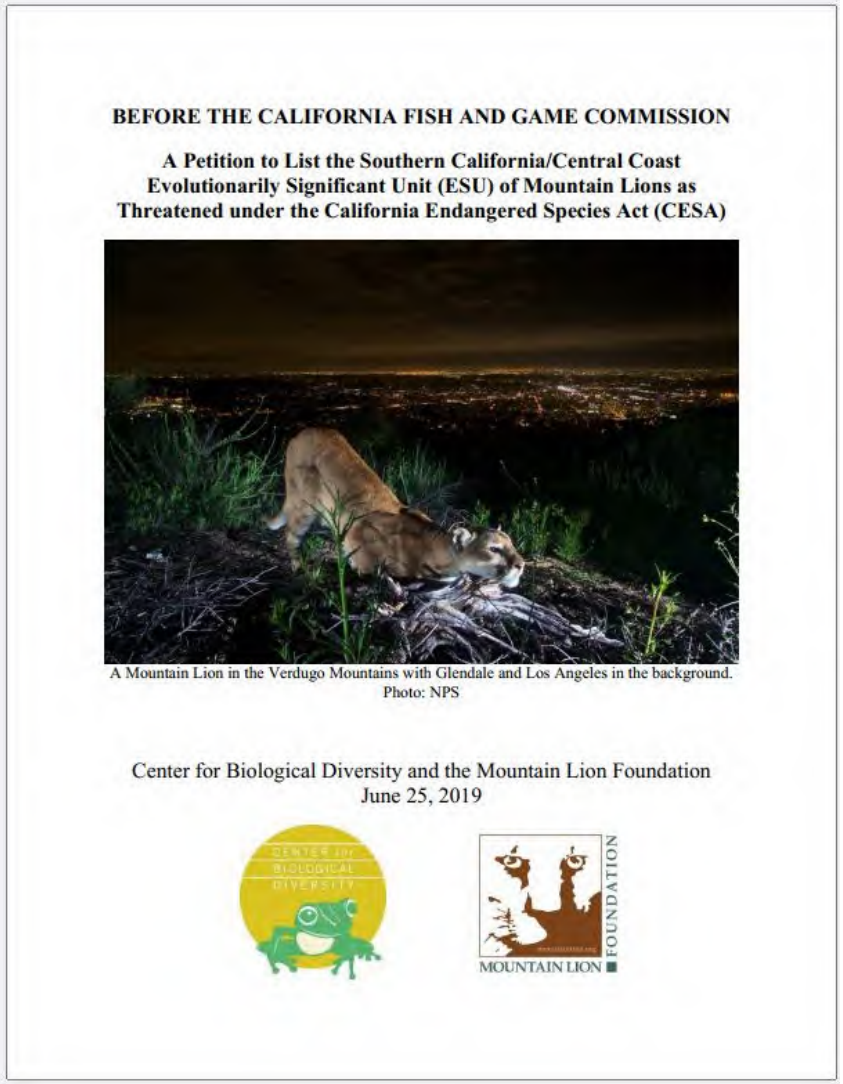






Ojai, California by Ken Lund

Petition History



BEFORE THE CALIFORNIA FISH AND GAME COMMISSION

A Petition to List the Southern California/Central Coast Evolutionarily Significant Unit (ESU) of Mountain Lions as Threatened under the California Endangered Species Act (CESA)

A Mountain Lion in the Verdugo Mountains with Glendale and Los Angeles in the background. Photo: NPS

Center for Biological Diversity and the Mountain Lion Foundation
June 25, 2019

- June 25, 2019 – The Center for Biological Diversity and the Mountain Lion Foundation petitioned FGC to list one or more Evolutionarily Significant Units of mountain lion as threatened or endangered

- April 16, 2020 – FGC found the petitioned action may be warranted initiating a Status Review

Petitioned Evolutionarily Significant Units

- A single Southern California/Central Coast ESU
- One or more populations, alone or in combination, if they comprise an ESU or ESUs
  - Central Coast – North (CC-N)
  - Central Coast – Central (CC-C)
  - Central Coast – South (CC-S)
  - San Gabriel and San Bernardino Mountains (SGSB)
  - Santa Ana Mountains (SA)
  - Eastern Peninsular Range (EPR)

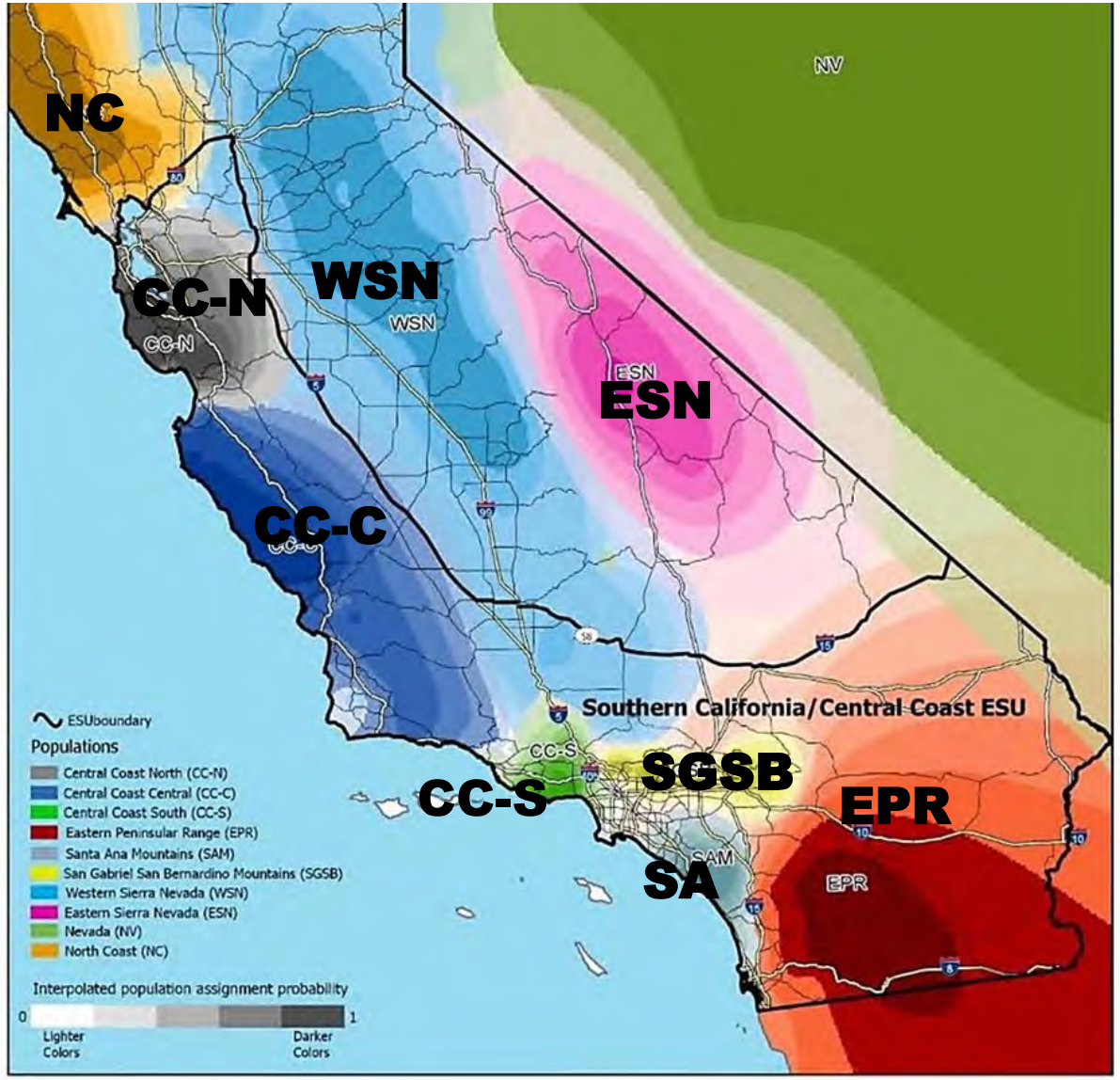


Figure derived from Gustafson et al. 2019

Mountain Lion Life History



- Large (77–143 lbs.), generally solitary carnivores
- Females breed every other year beginning at age two
- 1–6 kittens, independent at 12–18 months
- Young typically disperse tens to hundreds of miles from natal territory
- Home range size variable (16–192 $mi.^2$), varying by sex and season
- Compete with other carnivores for resources (e.g., bears, coyotes, and wolves)

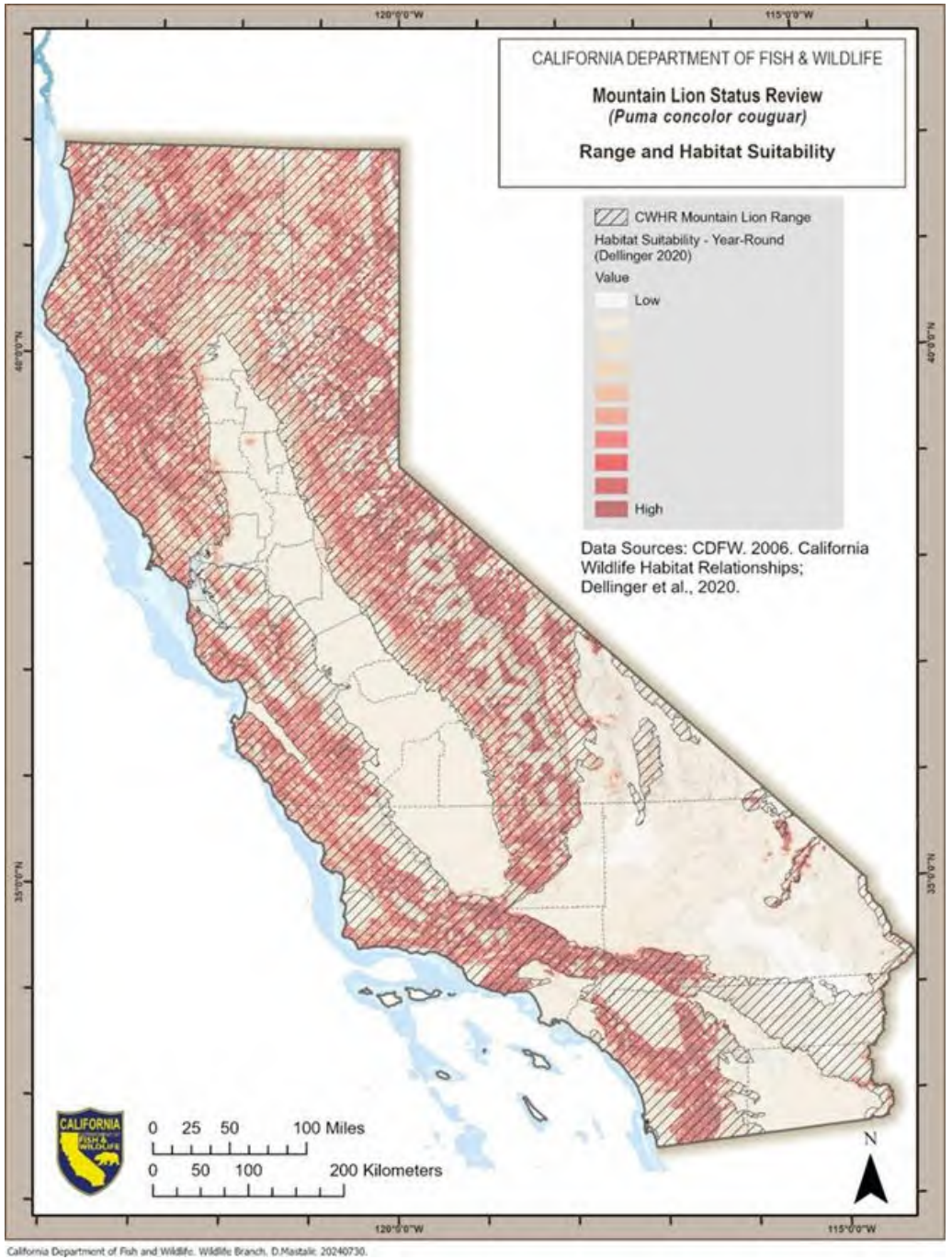
Mountain Lion Diet and Habitat

- Strongly linked to deer distribution (70% of diet in North America)
- Elk, burros, bighorn sheep, wild pigs, turkeys, domestic stock (primarily sheep and goats)
- Redwood coast to desert mountains
  - Prey
  - Cover
- Largely absent from urban and farmed areas

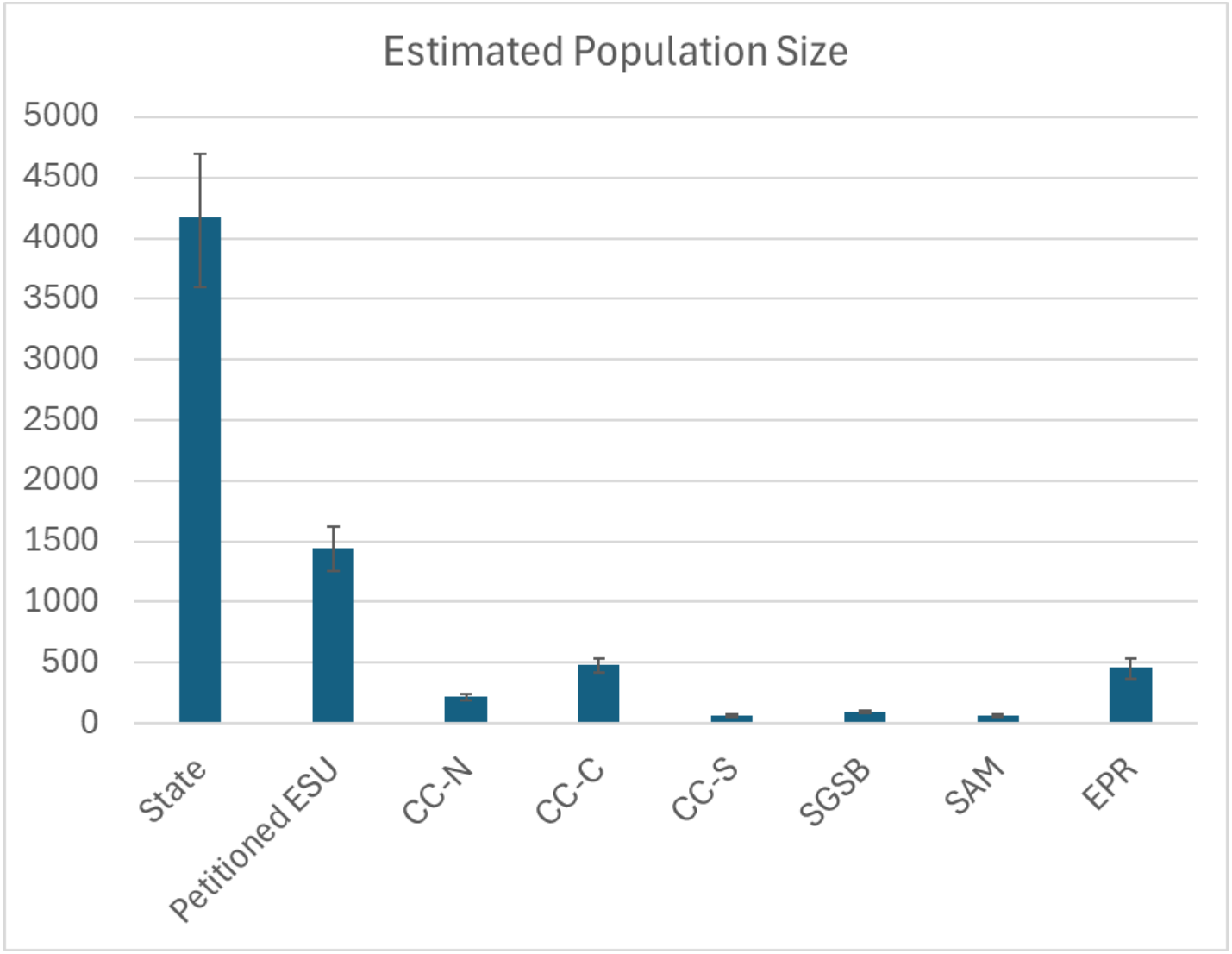


Mountain Lion Range in California

- Mountain lions inhabit much of California, especially areas of native forests, woodlands, and chaparral
- Urban and intensively farmed agricultural areas typically avoided
- Low densities in portions of the Mojave and Sonoran deserts



Mountain Lion Population



Statewide	**4,172**
Petitioned ESU	**1,449**
CC-N	**219**
CC-C	**480**
CC-S	**64**
SGSB	**94**
SAM	**67**
EPR	**459**

- Long-term trend unknown due to inconsistent methodologies
- Bountied 1906–1963
- Hunting suspended in 1972
- 1990 Proposition 117

Threats Evaluated



"Los Angeles" by Todd Jones Photography is licensed under CC BY 2.0

- Overexploitation
- Competition
- Wildfire
- Climate Change
- Diseases
- Toxicants
- Legal Removals
- **Vehicle Strikes**
- **Habitat Loss and Fragmentation**
- **Small, Isolated Populations**

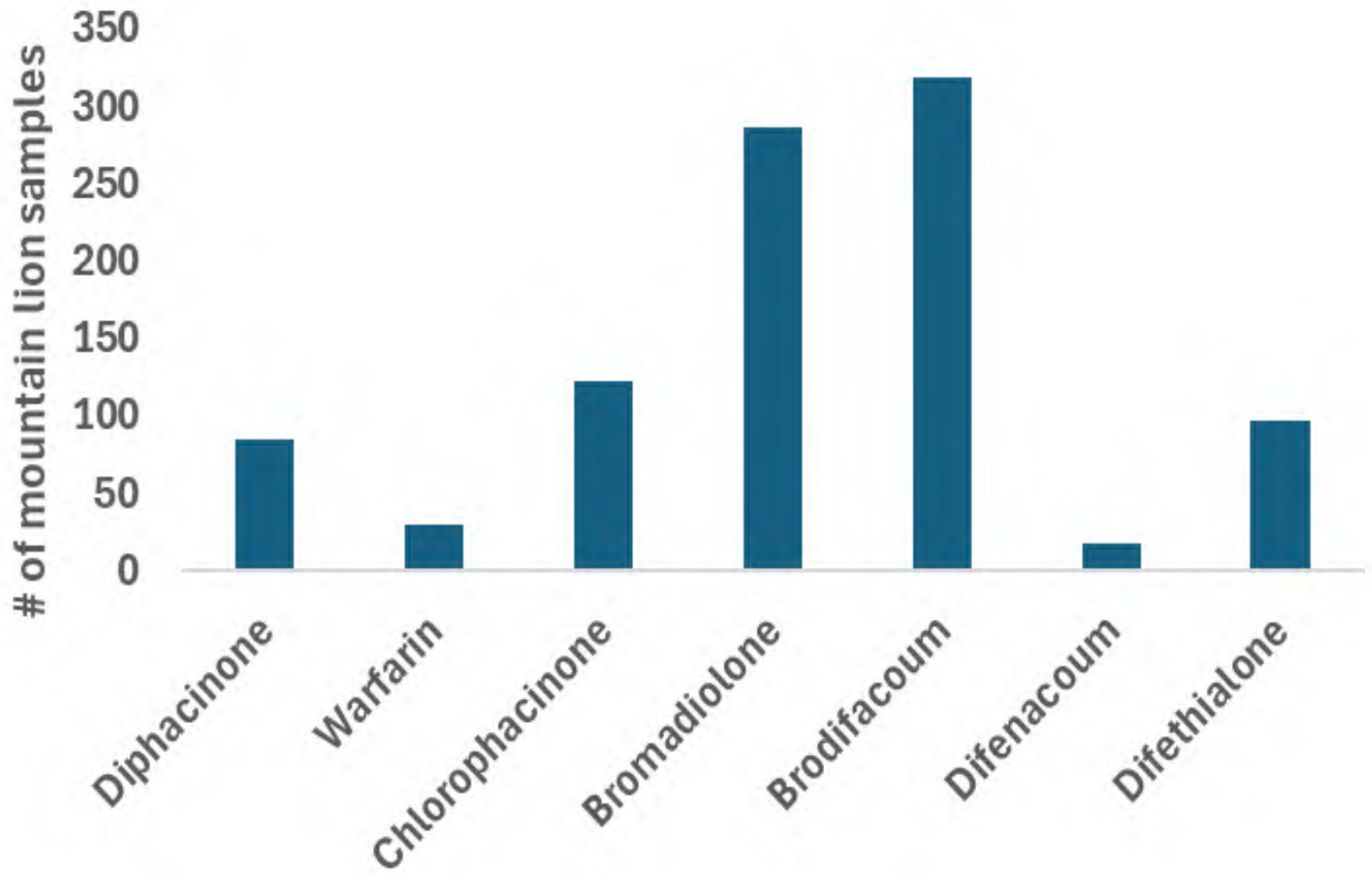
Threats – Diseases



Known mortalities by disease

- Highly Pathogenic Avian Influenza – 6
- Feline Leukemia Virus – 2
- Feline Panleukopenia Virus – 3
- Mange – 1

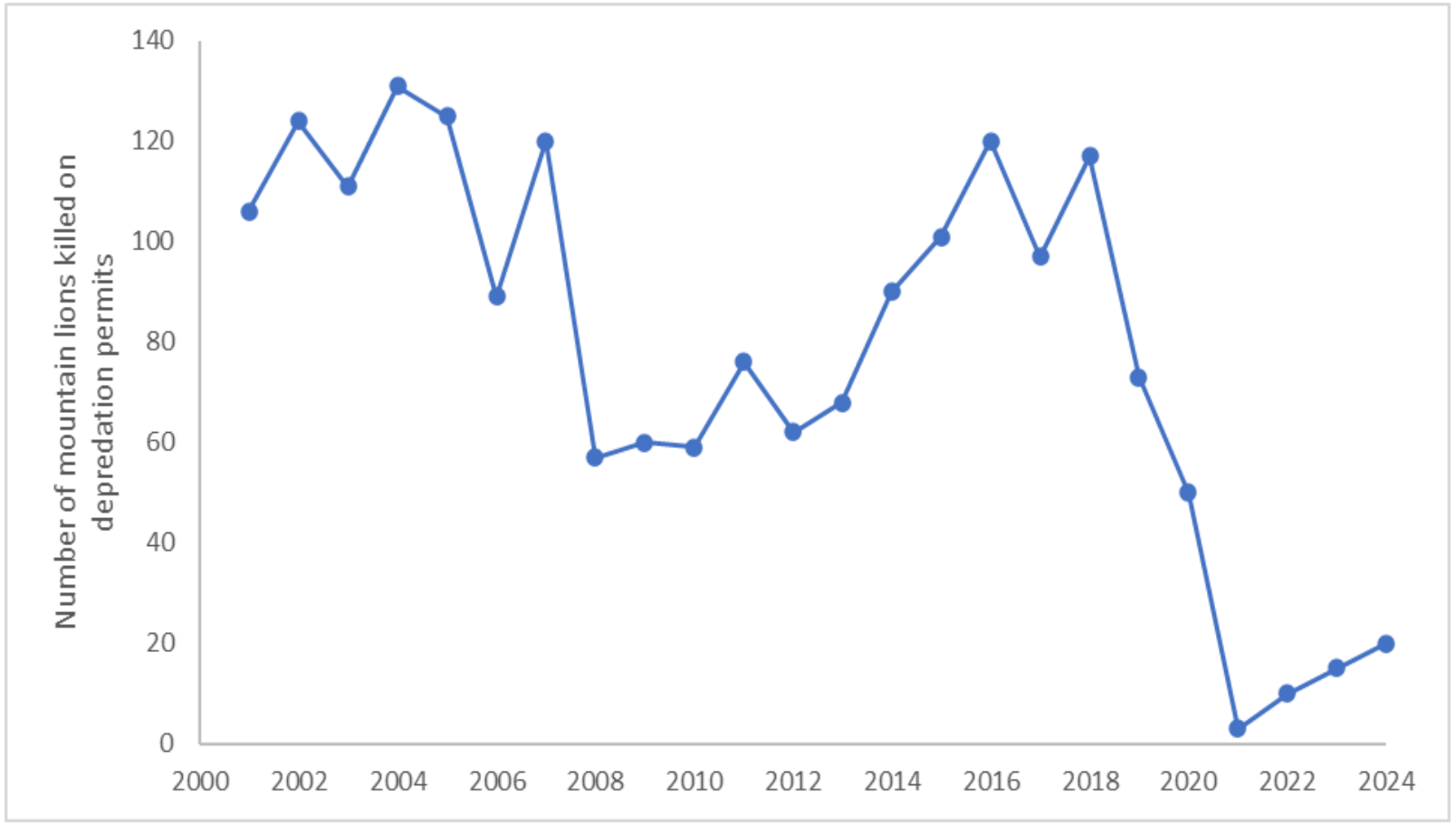
Threats – Toxicants (Rodenticides)



- Anticoagulant rodenticides(ARs) detected in 343 of 364 tested California mountain lions
- May lead to debilitation or death
- May be transferred from mother to fetuses
- At least 7 deaths in CC-S associated with ARs
- AR exposure associated with increased mange mortality

Presence of rodenticide residue in necropsied mountain lions 2016–2022

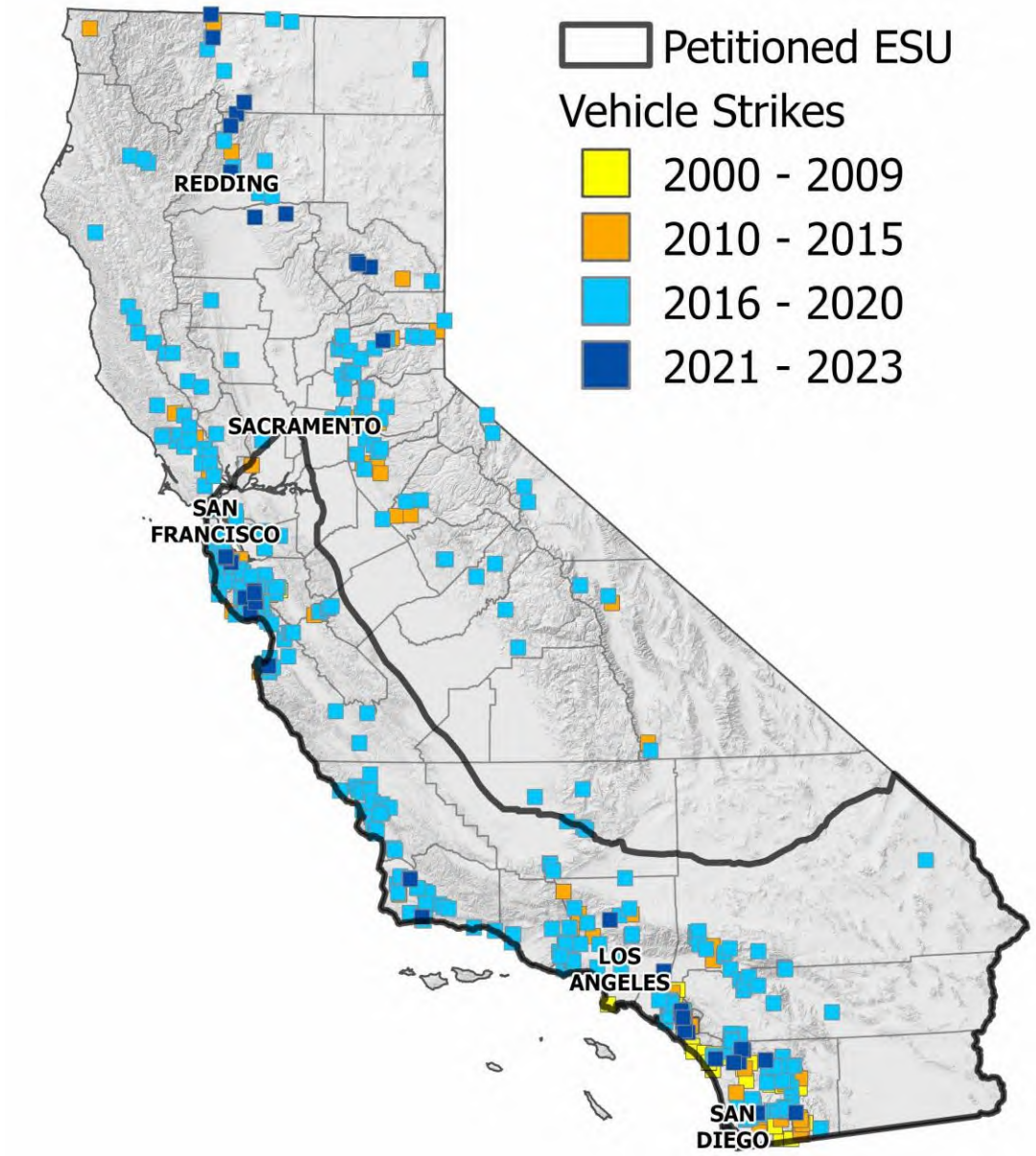
Threats – Legal Removals



Number of mountain lions killed statewide on depredation permits by year

- Leading known cause of mortality statewide 1974–2020
- 2017 CDFW revised depredation response policies to emphasize non-lethal techniques in CC-S and SA
- 2020 expanded policies statewide
- Limited removals to protect threatened and endangered bighorn sheep

Threats – Vehicle Strikes



- Currently account for most known mortalities
- 535 killed 2015–2022
- 53% of known mortalities in Santa Ana Mountains 1981–2013

Threats – Habitat Loss



Historically connected landscape has been divided over last two centuries by:

- Agriculture (yellow)
  - Central Valley
  - Imperial Valley
  - Salinas Valley
  - Oxnard Plain
- Urban (gray)
- Infrastructure – highways, canals, rail

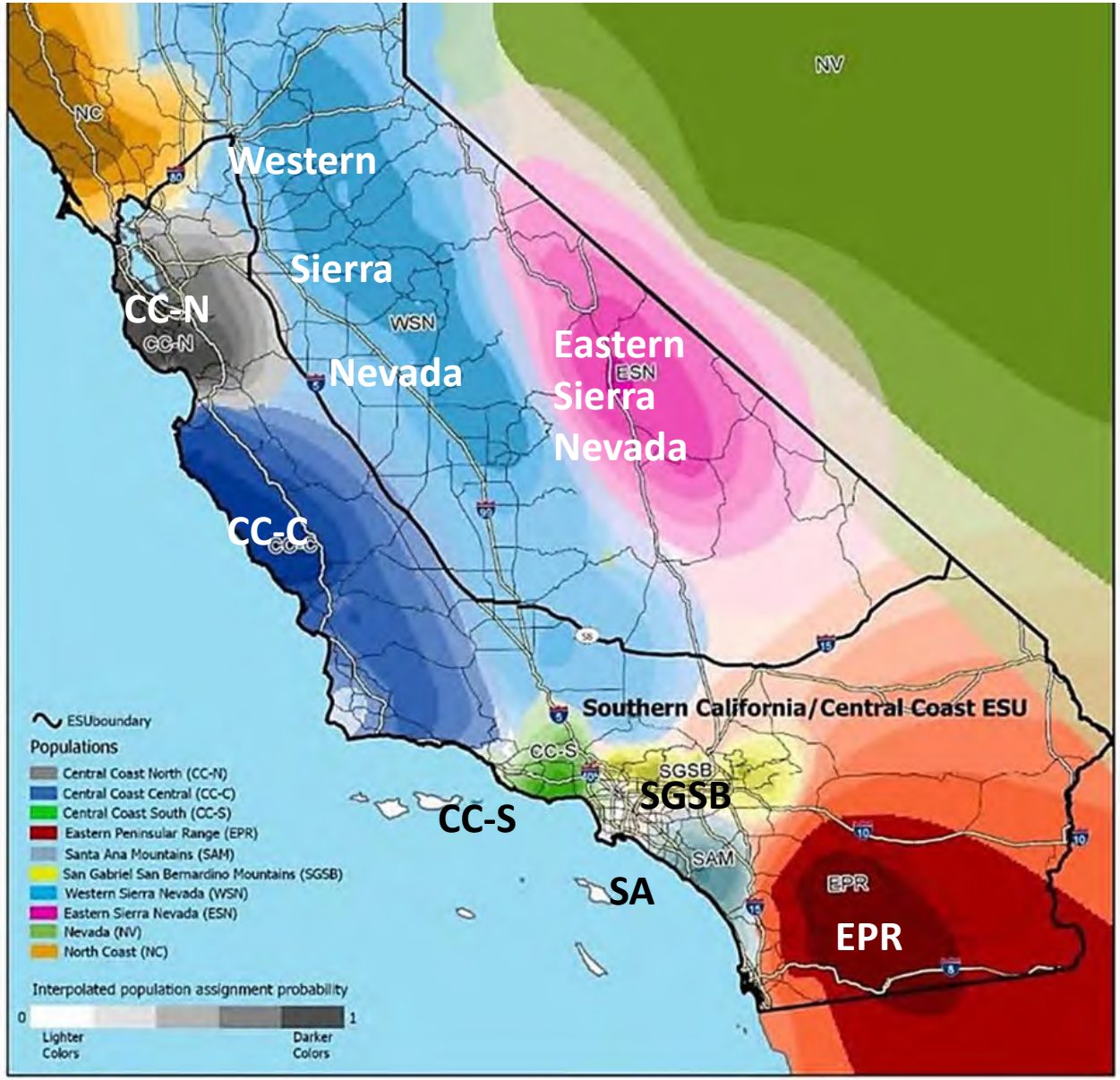
Threats – Habitat Fragmentation

Freeways, dense urban areas, intensively farmed areas, canals, and other anthropogenic infrastructure create barriers to lion movement

- Isolates populations
- Leads to inbreeding effects and reduced fitness



Threats – Habitat Fragmentation (cont.)



- EPR and SA isolated from all other California populations
- CC-N highly isolated, with limited connectivity to CC-C
- Connection to larger Sierra Nevada populations lacking for most populations

Barriers and Fragmentation – Progress

- Progress in key locations
  - Wallis Annenberg, Ventura County, Hwy 101
  - Laurel Curve, Santa Cruz Mountains, Hwy 17
- Positive land use and planning developments
  - Landscape-scale planning
  - Safe Roads and Wildlife Protection Act of 2022
  - Room to Roam Act of 2024



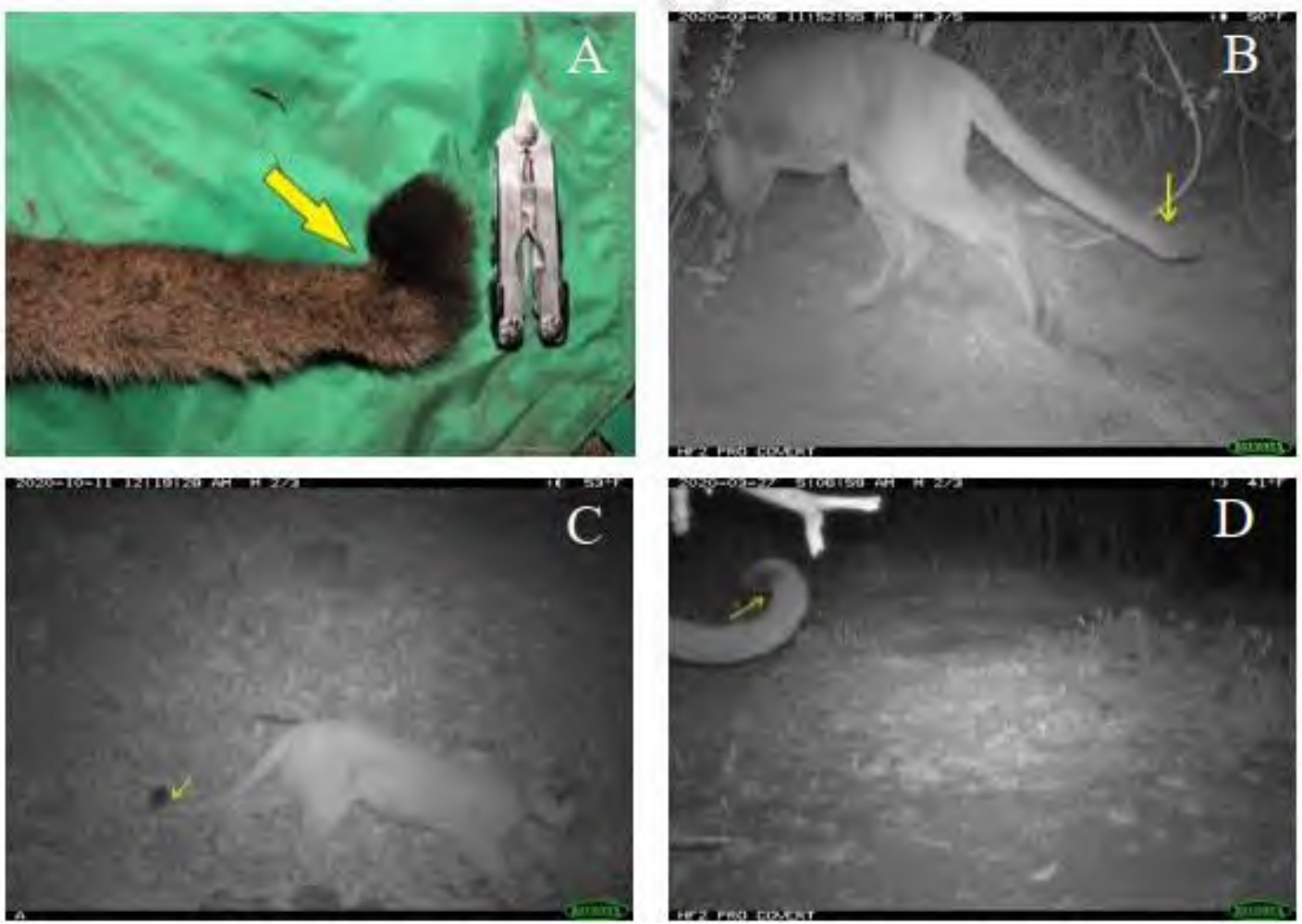
Rendering of Wallis Annenberg Liberty Canyon Wildlife Crossing. Source: Santa Monica Mountains Conservancy

Threats – Small, Isolated Populations



- Demographic stochasticity
- Environmental stochasticity

Threats – Small, Isolated Populations (cont.)



Mountain lions with kinked tails observed in the Santa Monica Mountains. Photos from Huffmeyer et al. 2022

- Genetic Drift & Inbreeding Depression
  - Loss of fitness
  - Extirpation risk
- Connection with larger Sierra Nevada populations critical

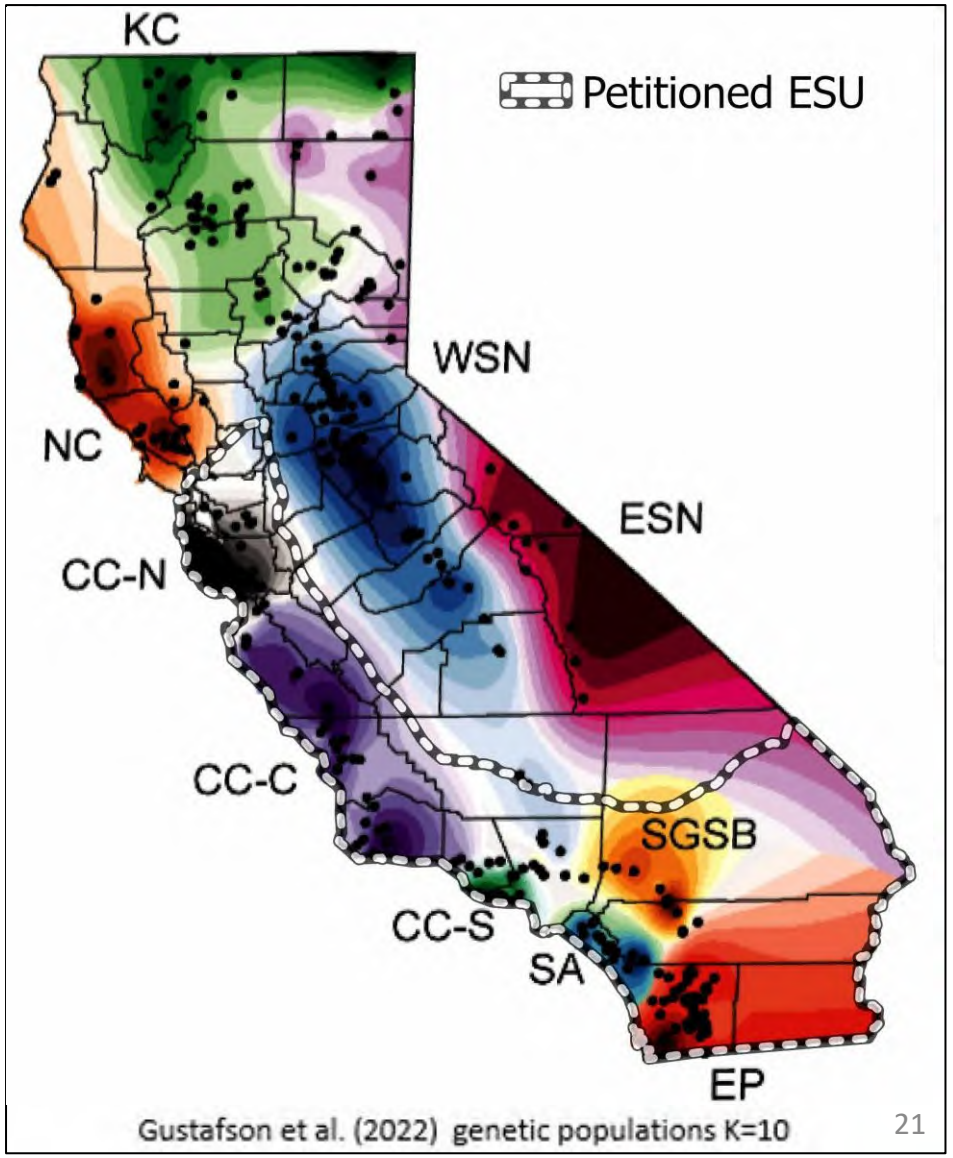
Combined Effects

- Genetic populations are substantially isolated from one another by development and barriers
- Some populations experiencing adverse impacts from inbreeding depression. No population large enough to maintain genetic adaptive capacity
- Other mortality factors such as roadkill, rodenticides, and disease compound these threats

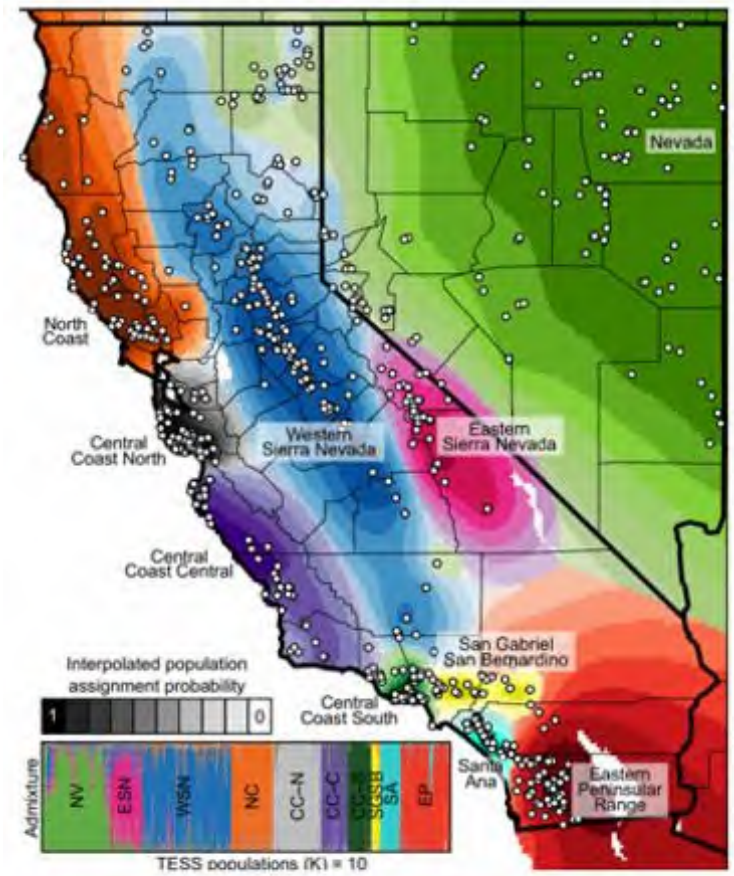


Department Evaluation of Petitioned Action

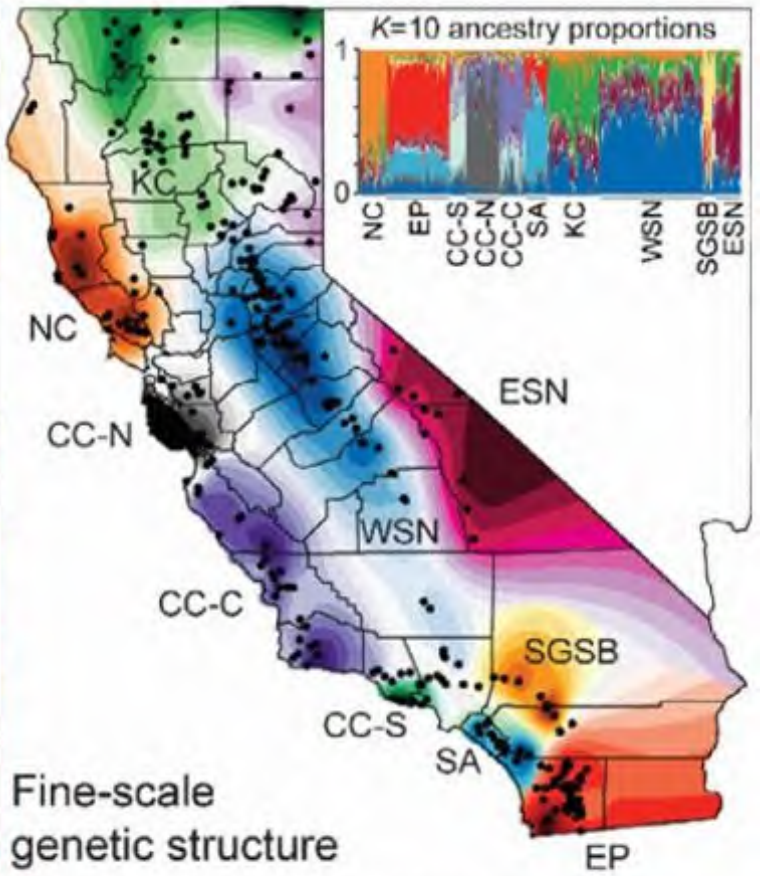
- Petitioned as one or many **Evolutionarily Significant Units (ESUs)**
- Population substantially reproductively isolated from other conspecific populations, and it represents an important component in the evolutionary legacy of the species
- CDFW determined ESU concept does not apply to the petitioned populations



Distinct Population Segment



Gustafson et al. (2019) genetic populations K=10

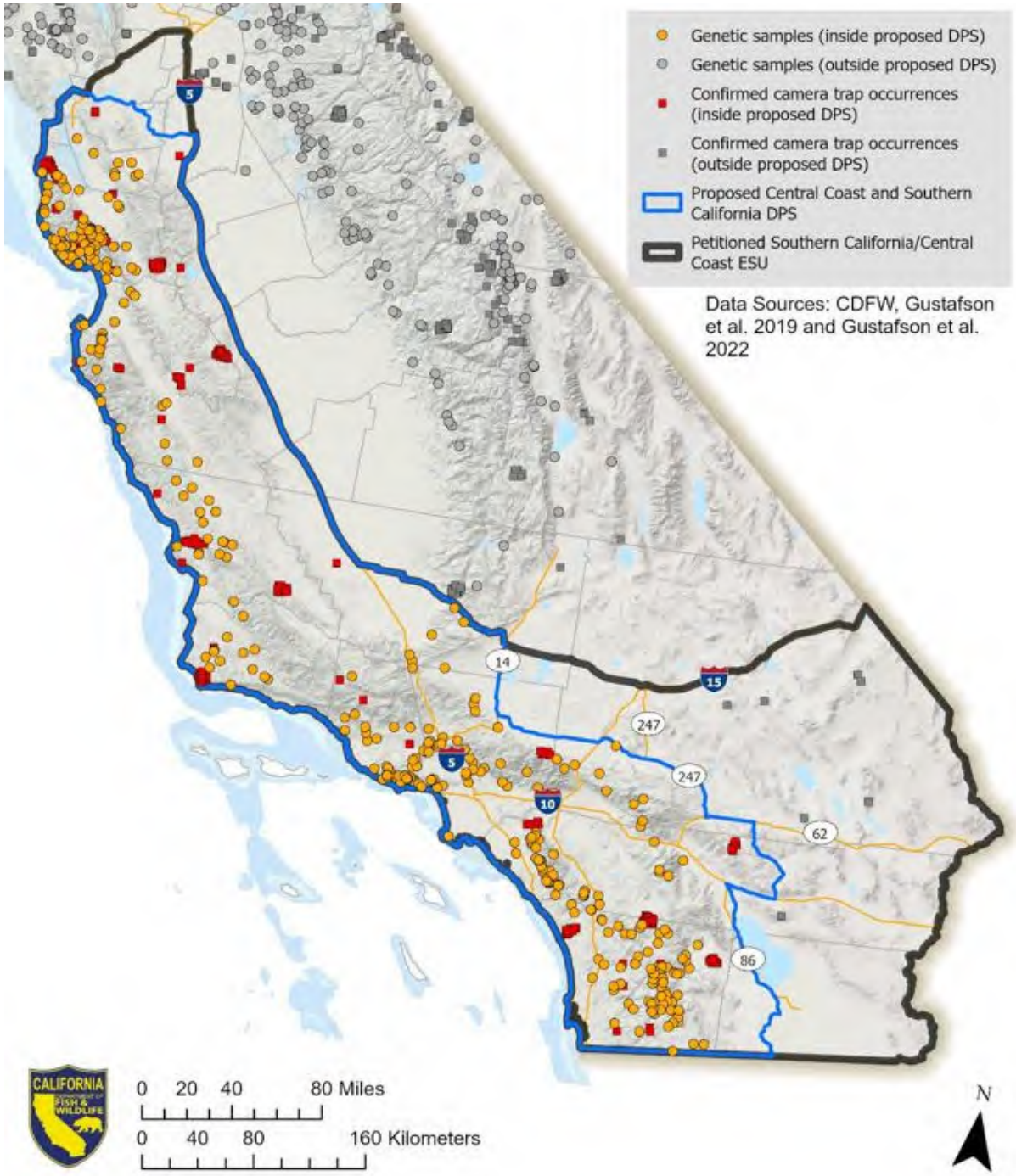


Gustafson et al. (2022) genetic populations K=10

- CDFW also evaluated petitioned populations as **Distinct Population Segments**
  - A vertebrate population or group of populations that is discrete from other populations, and is significant in relation to the remainder of the species
- CDFW concluded the six genetic populations constitute a threatened DPS

Recommended Central Coast and Southern California DPS Boundary

- Unable to assign desert mountain lions to DPS due to lack of samples
- Excluded intensively farmed areas of the Delta with no observations of mountain lions



Department Recommendation



The Department has determined that listing a Central Coast and Southern California Distinct Population Segment of Mountain Lions as threatened under CESA is warranted at this time.

Questions | Contact



Daniel Applebee
Senior Environmental Scientist – Supervisory
Wildlifemgt@wildlife.ca.gov

End of presentation

FGC@FGC

From: Dan Epperson <depperson@amadorcounty.gov>
Sent: Monday, January 5, 2026 11:45 AM
To: FGC
Subject: Mountain Lion Petition Listing Comment

TO whom it may concern,
Mountain Lions are being loved to death. They are slowing losing their fear of humans. Every year we lose a 100+ to reported vehicle strikes and likely many more due to not being noticed, dying outside the view of the public infrastructure. Depredations are at an all-time high for the very same reasons. There are likely many more that are removed for a variety of reasons. They will never be reported, including what would likely be characterized as "poaching." People that live in lion country know the rules and the risks. This is a reality that has not changed. The uptick in highly visible attacks and deaths of both human and pets is not the only driver of these characterizations.

Living in lion country I have seen the results of four reported vehcial strikes involving lions in the past 15 years. I also know of a dozen ranchers, teachers and friends that have lost pets and livestock due the lack of fear and respect for human develepment. We have created a kitchen with no means of repelling their constant wanderings.

Most states utilize the North American Model for conservation. The cats that die currently in California are unceremoniasly dumped and a handful displayed to remind us of the casulties of human interaction. Conservation utilitzes the animal for consumption and the enjoyment of the trophy for educational benefits and respect of the species in total.

Pusuing big cats for consumption on a very limited scale and collecting fees would go a long way to the preservation and managing this iconic species. Quotas could include depredation, rewards for reporting incidental take, vehicle strikes and a zone based pursuit system that would benefit humans and mountain lions alike.

We are already paying the government to do the work that conservationists would gladly pay a fee to participate in. The numbers of mountian lion deaths would not go up. The management and data collection would benefit all concerned parties.

Thank you for entertaining my thoughts,
Dan Epperson
District 2 Supervisor
Amador County
Amador County Fish and Wildlife Commssioner

FGC@FGC

From: Greg Fontana
Sent: Friday, January 9, 2026 6:22 PM
To: FGC
Subject: Mountain Lion

As far as all the data on mountain lion that people are asking about, it has been corruptly covered up. Without traditional hunting, and with this new agenda of not allowing the ranchers to use the depredation policy, SF Bay Area authorities have covered up the paper trail of a major lion problem. All so they can list the big cats as threatened, manipulate the public, receive donation money, then assume no liability as more kids are attacked on SF Bay Area hiking trails. But people are getting more aware that SF Bay Area authorities have failed themselves, their supporters, the CA voters, and taxpayers due to bad management practices.

In the late 2001's to about 2013 the lion problem was about $10,000 in livestock damage for my father in about a 7-8 year time period. Mainly on the Big Dipper in La Honda which is owned by The Mid Peninsula Regional Open Space District. The last year my father had cows there, in just a couple of months, 5 yearlings were confirmed to be killed by lions. Mid Pen had the lions chasing the cattle and eating the cattle on game cameras. When the cattle were finally chased out towards Highway 35, two yearlings were never found, and one yearling was attacked by a neighboring guard dog but survived. Mid Pen did reimburse my father for the 5 confirmed lion kills. But because of the liability issue, my father moved the cows to another smaller location and sold them a month early for another financial loss because the cattle did not gain enough weight. Being forced to abandon the grazing on Big Dipper also created a major fire hazard for the entire La Honda California area in rural San Mateo County.

Then from 2014 to 2016 the problem increased to $20,000 in livestock damage in 3 years with the problem escalating down through San Gregorio and the Purisma/Lobitos Creek Area near Half Moon Bay. At this point local ranchers were warning authorities of the escalating problem, but authorities ignored all warnings. The next year (meaning the fall 2017 and spring 2018 calving season the problem increased to $10,000 in one year with the problem escalating further into the urban communities including San Francisco and The Peninsula.

By the 2020s cougars walking through SF Bay Area neighborhoods have increased to a regular thing. People have them on cameras all the time eating house cats off peoples'

porches, dogs dragged off in broad daylight right in front of their owners, and children being mauled. The lions can no longer branch out any further. They cannot swim The Pacific Ocean or San Francisco Bay which means they are surrounded by water in 3 out of 4 directions. The freeway south near Santa Cruz is a difficult concrete obstacle. The problem will only persist at the fault of SF Bay Area authorities for harassing law-abiding ranchers for using the depredation policy to stabilize the cougar population, feed a nation, and protect our communities from catastrophic wildfires as requested by the CA voters. Under the state law it still remains that, “We The People of The State of California,” are in charge of the great cats. Not this incompetent coalition of dishonest SF Bay Area land management authorities.

January 12, 2026

RE: GREG FONTANA RESPONSE TO: CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE PETITION OF THE MOUNTAIN LION IN CALIFORNA AS EVOLUTIONARILY SIGNIFICANT UNIT [ESU], OR DISTINCT POPULATION SEGMENT [DPS]

California Fish and Game Commission:

Vince Fontana, 4th generation rancher on the San Mateo County Coastal Area for more than 50 years, is my father. I grew up ranching, I saw when the mountain lion first became an issue, and watched the predations progressively increase, and the deer and wildlife decrease.

As far as all the data on current mountain lion population that people are asking about, it has been corruptly covered up. Without traditional hunting, and with this new agenda of making it almost impossible for the ranchers to use lethal depredation, the mountain lion population is devastating livestock operations. SF Bay Area authorities have covered up the paper trail of the major lion problem. All so they can list the big cats as threatened, manipulate the public, receive donation money, then assume no liability as more kids are attacked on SF Bay Area hiking trails. But people are getting more aware that SF Bay Area authorities have failed themselves, their supporters, the CA voters, and taxpayers, due to bad management practices.

From 2007 to 2013 the lion problem was about $10,000 in livestock damage for my father in about a 7-8 year time period. Mainly on the Big Dipper Grazing Ranch in La Honda, which is owned by The Mid Peninsula Regional Open Space District. The last year my father had cows there, in just a couple of months, 5 yearlings were confirmed to be killed by lions. Mid Pen had the lions chasing the cattle and eating the cattle on game cameras. When the cattle were finally chased out towards Highway 35, two yearlings were never found, and one yearling was attacked by a neighboring guard dog but survived. Mid Pen did reimburse my father for the 5 confirmed lion kills. But because of the liability issue, my father moved the cows to another smaller location and sold them a month early for another financial loss because the cattle did not gain enough weight. Being forced to abandon the grazing on Big Dipper also created a major fire hazard for the entire La Honda California area in rural San Mateo County.

Then from 2014 to 2016 the problem increased to $20,000 in livestock damage in 3 years, with the problem escalating down through San Gregorio and the Purisma/Lobitos Creek Area near Half Moon Bay. At this point local ranchers were warning authorities of the escalating problem, but authorities ignored all warnings. The next year (meaning the fall 2017 and spring 2018 calving season) the problem increased to $10,000 in one year with the problem escalating. The mountain lion sightings and various attacks, moved into the urban communities including San Francisco and the Peninsula.

By the 2020s cougars walking through SF Bay Area neighborhoods have increased to a regular thing. People have them on cameras all the time eating house cats off peoples' porches, dogs dragged off in broad daylight right in front of their owners, and children being mauled. The lions can no longer branch out any further. They cannot swim The Pacific Ocean or San Francisco Bay which means they are surrounded by water in 3 out of 4 directions. The problem will only persist at the fault of SF Bay Area authorities for harassing law-abiding ranchers for using the depredation policy to stabilize the cougar population and feed a nation. It is the ranchers who protect our communities from catastrophic wildfires, as requested by the CA voters. Under the state law it still remains that, “We The People of The State of California,” are in charge of the great cats.

The mountain lion is not threatened or endangered. It does not belong to be listed under ESA, ESU, or DPS. The mountain lion population data is far from accurate.

Sincerely,

Greg Fontana

Lucy White

January 22, 2026

RE: LUCY WHITE RESPONSE TO: CALIFORNIA DEPARTMENT OF FISH & WILDLIFE PETITION OF THE MOUNTAIN LION IN CALIFORNA AS EVOLUTIONARILY SIGNIFICANT UNIT [ESU], OR DISTINCT POPULATION SEGMENT [DPS]

California Fish and Game Commission:

This document is a response to "A Status Review of the Petitioned Southern California / Central Coast Evolutionarily Significant Unit (ESU) of Mountain Lion (Puma concolor cougar) in California [Petition ESU]" by State of California Natural Resources Agency Department of Fish and Wildlife [CDFW | Department]. By Charlton H. Bonham, Director | California Department of Fish and Wildlife | December 2025. Report to the California Fish and Game Commission.

The CDFW Report | Petition, for Listing and Areas of mountain lion populations as Evolutionary Significant Unit [ESU] and/or Distinct Population Segment [DPS], included here as extractions in text form.

Lucy White comments will be on the left, out to the margin, bold type, not in italics, blue text. *CDFW report extracts are indented, in italics, black text, emphasis in brown.*
Attachments begin on page 116.

LUCY WHITE INTRODUCTORY STATEMENT

I am Lucy White, a graphic designer, writer, and consultant. My projects have included extensive work regarding land issues. I have worked with Vince Fontana, legacy rancher on the San Mateo County Coast, for nearly a year. First on his Proposal for a new lease on Mid Peninsula Open Space District [Midpen] Lobitos Grazing Unit, then a Protest for Midpen's decision, and several other subsequent documents. Through working with Vince Fontana and on the related projects, I have gotten very familiar with the mountain lion issue, as well as the impacts of agencies and policies on agriculture and rural lands.

The geographical area I am most familiar with, related to the mountain lion issue, is the Coastal Area of San Mateo County [SM Coastal Area], and surrounding counties, as hotbeds of mountain lion activity. The SM Coastal Area agricultural community in recent years has been significantly plagued with mountain lion predations of livestock.

California mountain lion population is exponentially increasing. The population data by CDFW is highly inaccurate and deceitful.

The petitioned Evolutionary Significant Unit [ESU] Area is a massive 38,000,000 acres, as well as the proposed Distinct Population Segment [DPS] Area 25,000,000 acres, California is 100,000,000 acres, this is a land and power grab by CDFW. CDFW trying to relate six different mountain lion populations, from six different areas, into an area and encompass all lands within the combination of the separate populations, to become the ESU Area or DPS Area, to be under the authority of CDFW. This would be destructive to California's sovereignty, integrity and rights of individuals.

This is an attempt to allow and assist an unmanaged population growth of the mountain lion, create corridors and pathways for the mountain lion to expand their territory, and subjugate CDFW regulations and policies over nearly 40% [ESU], or 25% [DPS], of California lands. The CDFW policy, regarding depredation of mountain lions, is failing the farmers, ranchers, the public, and communities across our lands.[1] This is an encroachment into urban, rural, desert areas, and mountain ranges, by mountain lions protected at a level that is designed to increase their population, with disregard for the consequences. This is an infringement on our Constitutional Rights, including that of law enforcement to protect the people.

The mountain lion is affecting our production in food supply. Due to the deer and other wildlife populations diminished from mountain lion predations, livestock are increasingly becoming a mountain lion prey target. There are also mountain lion attacks on farm animals, including llamas and donkeys, which both have long been used to help protect livestock. Sightings of mountain lions are becoming all too commonplace, on trails, in yards, towns, schools, and cities. Attacks by mountain lions on people are increasing across California, and other states. Mountain lion exploding populations have nearly exhausted their wildlife prey, they are hungry. They are destroying agriculture, our culture, communities, and endangering the public.

CDFW has attempted to get the mountain lion on lists related to the Endangered Species Act, for many years. The CDFW report states that the Evolutionary Significant Unit [ESU] has been determined to be inappropriate by the Department, as the six areas together or singularly.[2] The current attempt to get the mountain lion populations designated a Distinct Population Segment [DPS],[3] as the six areas or singularly, should not even be considered. CDFW is seeking the DPS listing through interagency means, as it did with the ESU, with the California Fish and Game Commission, to avoid the federal

standards of California Endangered Species Act [CESA], to manipulate information and data to fit their goal.

The mountain lion population is out of control. CDFW has inaccurately reported the mountain lion population statewide, and for the petitioned six populations, that in itself should discredit the report and requests.[4] Management of the mountain lion population is the answer, not corridors trafficking them, and protecting them over humans, animals, and all other wildlife. There needs to be protection of people, places, agriculture, communities, and recreation areas, above that of the mountain lion. The mountain lion is the most distributed carnivore in the US, abundant, expanding territories, and increasing in population. CDFW has the responsibility to manage all wildlife populations.

The ESU Area and DPS Area are designed to disperse mountain lions across California with massive corridor systems.[5] The Area then can further impose regulations and restrictions on the lands to promote mountain lion protection and proliferation. There is no management plan for the mountain lion population.

[1] "*It is the policy of California to conserve, protect, restore, and enhance any endangered or threatened species and its habitat (Fish & G. Code, § 2052). **If the Commission votes to list mountain lion populations as threatened or endangered under CESA, the act would prohibit take** [17]' - 17 **"Take" is defined as hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill (Fish & G. Code, § 86). except under certain circumstances where both CESA and Fish and Game Code section 4800, et seq. allow CDFW to authorize take.**" CDFW*

[2] *"The **Department has determined**, based upon the best available scientific evidence, that there is **currently insufficient evidence that the mountain lions within the petitioned area and the genetic populations within the petitioned area boundary meet the criteria to be considered ESUs**." … **Nor are the mountain lions within the petitioned area sufficiently genetically or morphologically differentiated from the larger California population to suggest the presence of distinct evolutionary lineages or evolutionarily important differences**. Therefore, the **Department concludes there is insufficient scientific evidence to classify the portions of the California mountain lion population petitioned for listing as one or several ESUs.**" CDFW*

[3] "***Department did not find the petitioned area to meet the federal criteria to be considered a DPS.***" *CDFW*

[4] ***"1989 study estimated 4,100–5,700 mountain lions in the state"*** *CDFW*

"An estimated 4,000 to 6,000 mountain lions call California home, according to the most recent survey by Fish and Wildlife, conducted in 1996. " CDFW in news article

[5] *"The world's largest wildlife crossing is under construction over the 101 freeway in an attempt to reconnect mountain lion habitat." CDFW in news article*

REPORT EXTRACTIONS WITH COMMENTS BY LUCY WHITE FOLLOW:

A Status Review of the Petitioned Southern California / Central Coast Evolutionarily Significant Unit (ESU) of Mountain Lion (Puma concolor cougar) in California" by State of California Natural Resources Agency Department of Fish and Wildlife. Report to the California Fish and Game Commission.

Executive Summary

This status review contains the most current information available on the mountain lion (Puma concolor couguar) in the central coast and southern parts of California and serves as the basis for the California Department of Fish and Wildlife's (Department) recommendation to the California Fish and Game Commission (Commission) on whether to list the species in those areas as threatened or endangered under the California Endangered Species Act (CESA).

*On June 25, **2019**, the Commission received a petition from **the Center for Biological Diversity and the Mountain Lion Foundation that proposed the listing of the mountain lion as threatened or endangered in a portion of the state** identified as the Southern California/Central Coast Evolutionarily Significant Unit (ESU). The **petitioners also requested, in the event the Commission determined that the six populations comprising the identified ESU did not collectively comprise a single ESU or otherwise did not warrant listing**, that the **Commission consider whether any of the six populations, singularly or in combination, comprise an ESU and meet the criteria for listing.** On April 16, 2020, the Commission considered the petition, the Department's petition evaluation and recommendation, and comments received. The Commission found that sufficient information existed to indicate the petitioned action may be warranted and accepted the petition for consideration. The Commission's "may be warranted" decision initiated this status review to inform the Commission's decision on whether listing the petitioned ESU or any portion of the Southern California/Central Coast mountain lion population is warranted. **The term "petitioned ESU" is used throughout this report. When "petitioned ESU" appears, it is intended to encompass the petitioners' proposal to list the petitioned area as a single ESU.***

The premise that the mountain lion in California is threatened or endangered is false. Information provided by CDFW is not the most current or accurate information, in fact the information is absolutely inadequate. There is no relational data and/or information with substantive data. On the Coastal Area of San Mateo County [SM Coastal Area]

studies have been done with collared lions, motion activated cameras in a systematic grid formations,* and various data collection resources including extensive use of satellite technology,* by UC Santa Cruz Puma Project (UC Berkeley…, studies echoed throughout California), Bay Area Puma Project, and CDFW | Department, none of which is included in the Department Report.

* *..grid of motion-activated cameras (camera traps using motion and heat sensors) to study mountain lions and other wildlife, employing internationally recognized "Wildlife Picture Index (WPI) method to understand the species abundance, behavior, habitat use, and connectivity across the Santa Cruz Mountains, supplementing the GPS-collared lions to create population estimates and monitor impacts of human activity. Camera data includes collared and uncollared mountain lions – AI search*

** *the satellites are a key tool, working with GPS and radio telemetry – AI search*

CDFW is deliberately using outdated information and study methods. CDFW is not revealing the current data derived from sophisticated data resources.

*"This status review contains the **most current information available** on the mountain lion (Puma concolor couguar) in the central coast and southern parts of California and **serves as the basis for the California Department of Fish and Wildlife's (Department) recommendation** to the California Fish and Game Commission (Commission) on **whether to list the species in those areas as threatened or endangered under the California Endangered Species Act (CESA)…"*** **CDFW using constant or declining mountain lion population data, "*1989 study estimated 4,100–5,700 mountain lions in the state*", using only scat samples to extrapolate the populations, are deceitful and irresponsible.**

Agriculture, on the SM Coastal Area, is being devasted by mountain lion predations. Mid Peninsula Open Space District, along with and California Department of Fish and Wildlife, have not identified mountain lion predations of cattle, farm animals, and domestic pets, as kills by mountain lion, even though there is evidence to show that they are. The CDFW report is insufficient in accurate information, and lacks the use of sophisticated data.

*"The **petitioners also requested, in the event the Commission determined that the six populations comprising the identified ESU did not collectively comprise a single ESU or otherwise did not warrant listing."*** **CDFW knows that the mountain populations do not qualify for listing as threatened or endangered under the Endangered Species Act. The Commission stated in**

April of 2020, that the populations do not warrant the listing as ESU. The contrivances of bunching six populations, and/or singular or in combination, to structure the ESU, and/or DPS, are far reaching and ludicrous.

▶ **ATTACHMENT A | News Articles Related to Mountain Lions | Page 116**

▶ **ATTACHMENT B | Mountain Lion Sightings Maps | Page 205**

▶ **ATTACHMENT C | California Department of Fish and Wildlife Petition Maps | Page 209**

▶ **ATTACHMENT D | Mountain Lion Camera Captures | Page 211**

▶ **ATTACHMENT E | Mountain Lion Predations | Page 218**

> *2015: CDFW formally established the Mountain Lion Conservation Program to coordinate statewide research, species health, population monitoring, and collaboration with external collaborators.*
>
> ***2020: The Fish and Game Commission listed mountain lions as a candidate species under the California Endangered Species Act within a proposed evolutionarily significant unit (ESU) in the central coast and southern California.*** *CDFW is completing a species status review within the proposed ESU. – document "Mountain Lions in California" / Wildlife Health Lab*
>
> ***Species Description, Biology, and Ecology***
>
> ***Mountain lions are large felids that are primarily solitary, territorial, and occur in low density. In California their primary prey are deer, and they have large home ranges often comprised of multiple vegetation types including riparian, chaparral, oak woodlands, coniferous forests, grasslands, and deserts, and occur from near sea level to high elevations. Mountain lions reach sexual maturity at two to four years, and females care for their young for the first one to two years without help from males.***

On the SM Coastal Area the deer population has been diminished by 80 to 90%. The beautiful rolling hills of the rangelands used to be scenically enhanced with deer and deer herds on a consistent basis. Today, it is rare to see a deer herd, or even sighting few or single deer. The many wildlife creatures that appeared in the forests and roaming hills, or the community, have essentially disappeared. No fox in the meadow, no

raccoon in the garbage, no rabbit in the gardens. Those wildlife populations have been decimated by the mountain lion over population. This unbalanced focus on protecting only the mountain lion, is a dereliction of duty by CDFW. Biodiversity is being replaced by the mountain lion.

Population Structure

Mountain lion populations in California are genetically structured (differentiated) by natural barriers such as mountain ranges, water bodies, and deserts, as well as urbanization and the proliferation of highways and interstates. In combination these barriers to movement have facilitated the creation of six distinct genetic populations within the petitioned ESU. Roughly, these are:

1) Central Coast North (CC-N), including the Santa Cruz Mountains and San Francisco Bay Area counties to the east;

2) Central Coast Central (CC-C), generally the coastal mountains from southern Monterey Bay to Ventura County;

3) Central Coast South (CC-S), including the Santa Monica Mountains, Santa Susana Mountains, Sierra Pelona Mountains, and Simi Hills;

4) San Gabriel and San Bernardino Mountains (SGSB);

5) Santa Ana Mountains (SA); and

6) Eastern Peninsular Range (EPR), including the mountains of San Diego County, extending east possibly as far as the Colorado River and the Arizona border, and bounded on the south by the border with Mexico.

These genetic populations experience varying levels of isolation and gene flow, and physical signs of inbreeding have been documented in the CC-S, SA, and EPR genetic populations. Available genetic information reveals some level of differentiation between these genetic populations.

The proposed - *"Mountain lion populations in California are genetically structured (differentiated) by natural barriers"* - **Those mountain lions should be managed in their separate areas.**

The petitioned ESU and/or DPS are designed land / power grabs which use six areas in California to create an expansive field of influence. "*The mountain lion population within the petitioned area is significant due to its markedly different genetic characteristics, and the very large, geographically diverse area that it occupies,* ***comprising nearly one quarter of California's land area.***" **Lumping these segregated areas into one massive area is a huge abuse of power. There is no consideration to what affects the mountain lion population has on and between these areas, other than to expand the mountain lion territories. Inclusive are urban area, agricultural lands, and other developments, creating conflicts which are harmful and dangerous.**

▶ ATTACHMENT C | California Department of Fish and Wildlife Petition Maps | Page 209

Status and Trends

Significant changes in mountain lion distribution have occurred within the petitioned ESU due to habitat loss and fragmentation from land use changes that began in the late 1700s and continue to the present. ***Agricultural, residential, and industrial development, including the creation of modern transportation and infrastructure networks, has resulted in significant habitat fragmentation and barriers*** *to movement in portions of the petitioned ESU. Mountain lions were historically controlled to protect livestock, and the Department paid a bounty for mountain lions from 1906 to 1963. The size of the California mountain lion population has been estimated periodically. Biologists estimated there were 600 mountain lions in California in the mid-1950s during the bounty period. By 1976, the population was estimated to be 2,400. A* ***1989 study estimated 4,100–5,700 mountain lions in the state.*** *In 1990, the voters of California enacted Proposition 117, known as the California Wildlife Protection Act of 1990 and codified as Fish and Game Code section 4800, et seq., which prohibited take of mountain lions except in certain limited circumstances. The* ***Department's current and most rigorous statewide population estimate to date is 4,172 (95% CI 3,645–4,750) mountain lions, including dependent young. The current estimate should be considered a refinement of earlier estimates and should not be interpreted to mean the actual population*** *has declined since 1989. There are an* ***estimated 1,449 (95% CI 1,272–1,638) mountain lions within the petitioned area.***

Department is dating back to the 1700s to establish habitat loss and fragmentation!!! That is simply preposterous.

The current estimate CDFW is fabricated. The 600 mountain lions in the mid 1950s, became 2,400 in twenty years, in 1976, multiplying 4-fold. Then in thirteen years later, to 1989, essentially doubled to 4,100 - 5,700. Those were years when hunting and depredations were actively used by CDFW, and allowed for the protection and safety of livestock, the people, and other wildlife. Proposition 117, California Wildlife Protection Act, Fish and Game Code section 4800, prohibited take of mountain lions except in certain circumstances. It is entirely illogical, if not impossible, for the mountain lion population to be the same or less than that in 1989. Throughout News Articles in Attachment A, CDFW continues to refer to the 4,000 to 6,000 population of mountain lions in California year after year.

The CDFW report states that there is "*approximately 4,172 (95% CI 3,645–4,750) mountain lions in the state.*" Derived from scat sampling of DNA. "*3. Status and Trends in California 3.2 Population Size The Department recently developed a statistically rigorous estimate of the statewide mountain lion population size using **DNA from the scats of 335 individual mountain lions collected in 2017–2022 from 13 study sites distributed widely across the state**. The detection histories of individually identifiable mountain lions from these samples were used to estimate the statewide population size using a Bayesian Spatial Capture Recapture (SCR) model. SCR includes a spatial scale parameter (e.g., how the probability of detection of a mountain lion varies over its home range) that is critical for accurately scaling estimated abundances to density and population size (Royle et al. 2013**). Using this method, the Department estimates there are approximately 4,172 (95% CI 3,645–4,750) mountain lions in the state.** This population estimate includes all age classes of mountain lions, including dependent young. The estimate represents an average annual number of mountain lions over a recent 5-year period (i.e., 2017–2022)." CDFW is withholding the real data. CDFW works in collaboration with Bay Area Puma Project and UC Santa Cruz Puma Project related to the local area, of course they have statewide sophisticated data resources. CDFW's scat method and results 2017-2022, with approximately 4,172 mountain lions in the state is unacceptable, improbable, and irresponsible.**

▶ **ATTACHMENT A | News Articles Related to Mountain Lions | Page 116**

▶ **ATTACHMENT B | Mountain Lion Sightings Maps | Page 205**

News Articles Follow with CDFW population estimates in mountain lion news.

News Article | SF Gate February 1, 2023

https://www.sfgate.com/bayarea/article/bay-area-mountain-lion-attack-17757602.php

Bay Area boy attacked by mountain lion was 'fighting for his life'

A 5-year-old California boy was discharged from the hospital after surviving a terrifying mountain lion attack …**An estimated 4,000 to 6,000 mountain lions call California home, according to the most recent survey by Fish and Wildlife, conducted in 1996.**

News Article | SF Gate Feb 15, 2023

https://www.sfgate.com/bayarea/article/california-mountain-lion-tears-away-dog-17786091.php

Mountain lion tears dog on leash away from its owner in California neighborhood

Mountain lions are generally shy animals that avoid humans. The size of the state's cougar population is unknown. A **1996 Fish and Wildlife study** found **4,000 to 6,000** mountain lions live in the state. **The agency started a new population count in 2014 and it has not been completed.**

News Article | SF Gate Oct 5, 2022

https://www.sfgate.com/centralcoast/article/california-mountain-lion-population-growing-17486279.php

'They're out there': Why California mountain lion sightings are on the rise

In the Bay Area, a mountain lion strolled through the Bernal Heights neighborhood in San Francisco in 2021, followed by another sighting at a Daly City school in 2022. **There are so many recent sightings that the Bay Area Puma Project, in partnership with the UC Santa Cruz and the Department of Fish and Wildlife, has an active map with the places where mountain lions have been spotted in recent weeks.**

Instead, it's the human inhabitants of California who have been the aggressors. **California shelled out more than half a million dollars in bounties for 12,461 mountain lions, decimating the population for sport from 1907 to 1963, the Los Angeles Times reported**.

Mountain lions are generally shy animals that avoid humans. The size of the state's cougar population is unknown. A **1996 Fish and Wildlife study** found **4,000 to 6,000** mountain lions live in the state. **The agency started a new population count in 2014 and it has not been completed.**

News Article | SF Gate March 21, 2022

https://www.sfgate.com/news/article/Video-shows-mountain-lion-at-pool-17018569.php

Video shows mountain lion wandering around California family's swimming pool

"If you think about it from this perspective, mountain lions have the largest range of any terrestrial mammal in our hemisphere

News Article | SF Gate Jan 10, 2022

https://www.sfgate.com/news/article/Mountain-Lion-seen-near-Bay-Area-school-16765066.php

Mountain lion seen near Bay Area school

SF Gate By **Andrew Chamings**, *Editor-at-Large* Jan 10, 2022

A mountain lion sighting in Daly City on Monday afternoon prompted police to warn people in a residential neighborhood to use caution when leaving

Mountain lions, also known as cougars or pumas, are native to California. **California Fish and Wildlife estimate that 4,000 to 6,000 mountain lions live in the state,** though there have been only 16 verified mountain lion attacks on people in California since 1890, six of them fatal.

News Article | SF Gate May 26, 2021

https://www.sfgate.com/bayarea/article/Mountain-lion-breaks-into-SF-Bay-Area-house-16204370.php

Mountain lion breaks into SF Bay Area house filled with taxidermy trophy heads

Mountain lion sightings aren't uncommon in California. The **Department of Fish and Wildlife estimates 4,000 to 6,000 mountain lions live in the state.**

▶ **ATTACHMENT A | News Articles Related to Mountain Lions | Page 116**

See full articles from above extractions, along with other articles related to mountain lions

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CDFW statement, "*The current estimate should be considered a refinement of earlier estimates and should not be interpreted to mean the actual population* has declined *since 1989…*" This statement is knowingly and deceptively written to avoid stating the true population of the mountain lion. That in itself should disqualify the petition from having any merit. CDFW, along with Mid Peninsula Open Space District, Santa Cruz Puma Project, and other associated agencies, have all suppressed data and information regarding the mountain lion population. Mountain lion predations of livestock, farm animals, and pets have also been suppressed. Most mountain lion predations of livestock, certainly in the SM Coastal Area, are not reported as mountain lion kills.

Santa Cruz Puma Project got an Agreement with Midpen for a five year mountain lion study, for $500,000, the mountain lion population was the first item in the study. The five years came and went, and a population study was not provided. Puma Project got a six month extension and $100,000 [at twice the fee], to produce their first report and management plan. That is $600,000 and the first reports may be available in May 2026. Interestingly all the data and information are being withheld, during the final efforts to classify the mountain lion as threatened or endangered.

Mid Peninsula Regional Open Space District Minutes July 22, 2020 "*Motion: Director Riffle moved, and Director Cyr seconded the motion to authorize the General Manager to enter into* ***an Agreement with the University of California, Santa Cruz for a base contract price of $500,000 to conduct a mountain lion collaring study for five years to assess the lion population and movement,*** *provide annual updates and research findings at public meetings, and develop a site- specific management plan for reducing potential human- mountain lion conflicts in high risk areas.*" **The Minutes state Santa Cruz Puma Project was to develop a management plan to reduce human-mountain lion conflicts. Puma Project is working on mountain lion**

behavior modification to make them fear humans, that is their only method of management.

Mid Peninsula Regional Open Space District Minutes April 9, 2025 "*In year four, the Puma Project treated three individual mountain lions using implementable and humane* ***behavioral modification protocols approved by the California Department of Fish and Wildlife and the Institutional Animal Care and Use Program…*** *To date the* ***Puma Project has treated eight mountain lions using behavioral modification methods. A total of at least ten individuals will need to be treated to determine if this approach effectively alters mountain lion behavior.*** *The improved dataset will allow for greater inferences into the assessment of human-mountain lion interaction factors.* ***The additional 6-month extension*** *will allow for analysis of new data, publication of results, and the* ***development of the final Human-Mountain Lion Interaction Management Plan.***

The results of the study are expected to provide a new source of rigorous science-based data and findings for land managers across the State of California *to utilize in identifying and implementing new, effective* ***strategies for reducing negative human-mountain lion interactions and therefore further protect and sustain regional mountain lion populations.*** *The results of the study are expected to be published in peer-reviewed scientific journals to more broadly contribute toward the current understanding of mountain lion behavior in relation to human activity."*

Attachment 1 | [UC Santa Cruz Puma Project] Annual Report 2024

"Behavioral modification involves exposing an animal involved in an unacceptable behavior to a negative stimulus in an attempt to reduce or eliminate that behavior. For our purposes, mountain lions coming into close proximity or approaching park visitors is the unacceptable behavior. SCPP is using behavioral modification techniques to help mountain lions associate human voices with negative stimuli so as to encourage avoidance of recreationists.

In 2024, SCPP successfully treated three collared mountain lions with behavioral modification techniques following a field protocol that was finalized in year two of the study. ***This protocol includes a combination of trained dogs, human voice playbacks and non-injurious projectiles.*** *We treated male mountain lion 144M on April 16, 2024 in La Honda Creek Open Space Preserve. We treated male mountain lions 130M and 147M off District properties on May 7, 2024 and November 15, 2024, respectively.* ***During each treatment, the mountain lion was pursued by trained hounds into a tree where it was exposed to a human voice recording, played at 80dB and marked with between one to five paintball projectiles.*** *Mountain lion movement behavior*

was monitored before, during and after treatment at five-minute temporal resolution. ***These data are stored on each individual's GPS collar and will be analyzed when all collars are recovered****. To-date, eight individuals have been treated following this protocol and six collars have been recovered."*

"Conclusions and next steps: …*The management plan will provide actionable strategies for minimizing human-mountain lion conflict, such as preserve access modifications, education and outreach, habitat modifications along trails or mountain lion behavioral modifications. The final management plan will aim to reduce potential conflicts between preserve visitors and mountain lions and will contribute to a better understanding of human-mountain lion coexistence in multi-use landscapes."*

CDFW working with Santa Cruz Puma Project and Midpen to create a management plan for the mountain lion, and human-mountain lion interactions, is limited and questionable. "*…behavioral modification protocols approved by the California Department of Fish and Wildlife and the Institutional Animal Care and Use Program… During each treatment, the mountain lion was pursued by trained hounds into a tree where it was exposed to a human voice recording, played at 80dB and marked with between one to five paintball projectiles.*" It's possible that this behavioral modification protocol could make the mountain lion more aggressive toward humans. No two mountain lions are the same, and results from the same protocol will vary from lion to lion. Expecting all lions to change their natural behavior, even if the protocol had some affect – good or bad - there is no way to treat a significant number or all mountain lions. Agency personnel may project a certain type of character that appears to be offensive to the mountain lions from behavioral modification treatments, but people on trails, in parks, on their property, in rural or urban areas, may just seem like a food source to a hungry mountain lion. A treated lion might see the person as their enemy, and prey on them when they are vulnerable.

Midpen is putting trails throughout the grazing lands in the SM Coastal Area, where the hungry mountain killing livestock [due to deer population extremely diminished], and where Midpen is inviting the public. Then add in CDFW depredation policy. The effects on our food supply are significant. People and animals are all more endangered. This is the creation of conflicts from allowing the mountain lion population to get out of control, from focusing only on protecting the mountain lion, and from not protecting other wildlife, farm animals, pets, ranchers and the public. Santa Cruz Puma Project now calls their $600,000 study the Human-Mountain Lion Interaction Study. The current trajectory of these agencies' actions and management are increased conflicts and endangerment.

▶ ATTACHMENT A | News Articles Related to Mountain Lions | Page 116

▶ ATTACHMENT B | Mountain Lion Sightings Maps | Page 205

Threats

Primary threats to mountain lions in the petitioned ESU include continued habitat loss and isolation of small populations due to expanding human infrastructure. Especially in Southern California, distinct genetic populations inhabit mountain ranges that are surrounded by human development or desert, such that dispersal to and from those ranges is significantly constrained by the presence of freeways and urban areas. From 1974 to 2020, the top sources of mortality throughout the state were removal in response to livestock or property damage and vehicle strikes. These mortality sources exceed "natural" causes of mortality. However, in recent years the number of mountain lions killed for depredating livestock or pets has dropped sharply (as a result of the Department's ongoing efforts to balance Proposition 117's conservation purpose and emphasis on the use of nonlethal methods with the need to provide a reasonable approach to depredation). Rodenticides and infectious disease kill relatively few mountain lions outright but can weaken individuals and make them less resilient to other threats. Recent intense wildfires have killed animals in already small, isolated populations (e.g., the Santa Monica Mountains) and may temporarily reduce habitat suitability. Human infrastructure that challenges or prevents gene flow between the genetic populations is a major concern in much of the petitioned ESU. Malformed sperm and/or kinked tails have been recorded in the SA, EPR, and CC-S genetic populations. Isolation and inbreeding increase the chance of extinction and the SA genetic population has a 16–21% chance of extirpation over the next 50 years if current low levels of gene flow continue.

Although the cumulative population estimate for the petitioned area is over 1,400 animals, the population is not continuous. Instead, it is broken into six genetic populations with varying levels of connection to adjacent populations. Each of the genetic populations has a low or very low effective population size (Ne; the estimated number of individuals in a population that participate in producing the next generation, which is smaller than the estimated population size), with estimates ranging from 3 to 57. None of the six genetic populations has an estimated effective population size of 100 or more, which would help avoid negative impacts from inbreeding in the long term at the population level. Improved connectivity is needed to increase gene flow, mitigate

the negative impacts of isolation, and reduce the risk of localized extirpations from a variety of threats.

The following statement is curated to meet the depth of deception. "*However, in recent years* ***the number of mountain lions killed for depredating livestock or pets has dropped* *sharply.*" The reasons mountain lions have not been depredated for their predations of livestock and pets, is due to CDFW not identifying the predations as mountain lion kills – when in fact in most cases they were. CDFW not responding to the kills site - stating it had been too long or some other response. CDFW only going to a predation site if a depredation permit is requested. CDFW permit for depredation policy, the three-phase permits, with the first two being non-lethal, and only the third lethal, basically makes it almost impossible to depredate a mountain lion. CDFW has a law enforcement division which should to be responsive and proactive of depredations based on circumstances. Lack of DNA sampling does not allow for identifying the aggressive lions and/or repeat predators. CDFW keeps information and reports out of the news and public access as much as possible.**

Meanwhile the mountain lion is preying on livestock and pets at an unprecedented rate. Vince Fontana, legacy rancher on the Coast, had a cow killed in June, July and August 2025, basically one every 30 days, on his Midpen Lobitos lease.

CDFW now refuses to inspect Midpen predations. Fontana also had a predation on a private lease in November, Fontana called CDFW, he did get a Hazing Permit [good for 8 days], for a mountain lion predation. Fontana assisted a rancher in Half Moon Bay on a calf predation. CDFW went out, but was refusing to confirm it was predation by mountain lion, until Fontana made the inspection irrefutably predation by mountain by exposing multiple lion multiple kill traits. A Hazing Permit was issued.

The mountain lion in California is neither threatened, nor endangered as a species. The population CDFW states, "*Although the cumulative population estimate for the petitioned area is over 1,400 animals, the population is not continuous.*" This is highly questionable. The populations have been exploding. It seems that CDFW is depending on trafficking mountain lions out of the densely populated areas through corridors, rather than manage the populations.

The petition for EUS and/or DPS broad swaths of area, appear to be an effort to expand the population of the mountain away from the areas where their populations are exploding, and traffic them to other areas, many through urban areas, to other mountain

ranges, and even desert areas. The mountain lion in these California areas do not have a predator. They are the powerful predator which has devastated the wildlife and livestock populations on the SM Coastal Area, see Attachment D and Attachment E related to Vince Fontana's lease of Lobitos Grazing Ranch [Unit], Midpen's property. CDFW and Midpen, have not reported one of the fifteen predations experienced by Vince Fontana as predations by mountain lion. Vince Fontana has the "VINCE FONTANA LEGACY RANCHER CHALLENGE TO MIDPEN," related to the CDFW and Midpen reports and decisions, not reporting the predations by mountain lions. Nearly all information on mountain lion predations has been suppressed. Vince Fontana is the only rancher on the SM Coastal Area who has spoken up about the mountain lion predations. All the other ranchers are fearful of losing their leases and remain silent. Sometimes the ranchers get rent reductions or other benefits, but most of the time they simply bear the expense and damage of the losses. This is oppression on, coercion of, and financial burdens for the ranchers, ultimately harming agriculture. The mountain lion appears to be a tool to expand power and control over California lands.

CDFW has weighted all preferential benefits to the side of the mountain lion, protecting and expanding their population and habitats, to a point that is destroying biodiversity of wildlife, and the Constitutional Rights of the people.

▶ ATTACHMENT A | News Articles Related to Mountain Lions | Page 116

▶ ATTACHMENT B | Mountain Lion Sightings Maps | Page 205

▶ ATTACHMENT C | California Department of Fish and Wildlife Petition Maps | Page 209

▶ ATTACHMENT D | Mountain Lion Camera Captures | Page 211

▶ ATTACHMENT E | Mountain Lion Predations | Page 218

Recommendation

Although Petitioners seek to have these mountain lion populations listed as one or more ESUs, the ***Department concludes they are more appropriately analyzed as a distinct population segment (DPS).1*** ***The Department finds that neither the petitioned ESU nor genetic populations within the petitioned area, singly or in combination, could appropriately be considered an ESU.*** *The genetic populations are not known to be both substantially isolated from other populations and important components of the evolutionary legacy of the mountain lion species.*

However, the ***Department also examined whether the mountain lions comprising the six petitioned genetic populations constitute a DPS****, based on a federal policy that is applied in listing evaluations under the federal Endangered Species Act and which has previously been used by the Department in CESA evaluations.* ***A DPS is a population or group of populations that is discrete from other populations of the species and significant in relation to the entire species*** *(in this case the statewide population). The* ***Department finds that the mountain lion population composed of the six petitioned genetic populations is discrete, significant, and imperiled;*** *therefore, the Department recommends the Commission find a DPS of mountain lions in an area largely coinciding with the petitioned area2 should be listed as threatened. The Department further recommends implementation of the management recommendations and recovery measures described in this status review.*

1] Both DPSs and ESUs are concepts originally developed in the context of the federal Endangered Species Act. ***The Department and the Commission are not required to apply either the federal ESU policy or the federal DPS policy. CESA permits the Commission to list "species or subspecies"*** *(See Fish & G. Code, §§ 2062, 2067, 2068).* ***To the extent the Commission concludes that an ESU or a DPS of a particular species constitutes a "subspecies" within the meaning of CESA****, it may recommend listing of that subspecies as an ESU or DPS (See Cal. Forestry Assn. v. Cal. Fish and G. Com. (2007) 156 Cal.App.4th 1535).*

2] For the DPS assessment, the Department made modifications to the petitioned ESU boundary. Areas of the southeastern deserts were excluded because no genetic samples from the area have been evaluated, making it impossible to assign lions in this area to a genetic population. Additionally, areas of intensive agriculture in the northeastern portion of the petitioned ESU were excluded. See sections 6 and 9 of this report for more details.

▶ **ATTACHMENT C | California Department of Fish and Wildlife Petition Maps | Page 209**

CDFW recognizes that the petitioned mountain lion populations cannot be considered an ESU, and is making a new attempt to use DPS. In their Recommendation, "*Department concludes they are more appropriately analyzed as a distinct population segment (DPS)…* *Department also examined whether the mountain lions comprising the six petitioned genetic populations constitute a DPS… A* ***DPS is a population or group of populations that is discrete from other populations of the species and significant in relation to the entire species…*** *The Department finds that the mountain lion population composed of the six petitioned genetic populations is* ***discrete, significant, and imperiled****; therefore, the Department recommends the Commission find a DPS of mountain lions in an area largely coinciding with the petitioned area2 should be listed as threatened."* **The Distinct Population Segment, DPS, should not apply to any or all of the six petitioned mountain lion populations. "***There are currently two recognized subspecies of mountain lion throughout the Americas (Culver et al. 2000; Kitchener et al. 2017). Mountain lions in North and Central America are classified as P. c. cougar, while most mountain lions in South America are classified as P. c. concolor."* **CDFW basing the DPS listing on it being a subspecies, when the are only two recognized subspecies of mountain lion throughout the Americas. Mountain lions in North and Central America are classified as P.c.cougar. That's it, there are no other subspecies in North America.**

The petitioned mountain lion populations are not genetically "*discrete, significant, and imperiled.*" The mountain lions are thriving, and their population is escalating. The mountain lion populations need to be managed.

▶ **ATTACHMENT A | News Articles Related to Mountain Lions | Page 116**

▶ **ATTACHMENT B | Mountain Lion Sightings Maps | Page 205**

▶ **ATTACHMENT C | California Department of Fish and Wildlife Petition Maps | Page 209**

▶ **ATTACHMENT D | Mountain Lion Camera Captures | Page 211**

▶ **ATTACHMENT E | Mountain Lion Predations | Page 218**

1.1 CESA Petition History

*On June 25, **2019**, the California Fish and Game Commission (Commission) received a petition from the Center for Biological Diversity and the Mountain Lion Foundation (hereafter "the petitioners**") to list the mountain lion** (Puma concolor couguar) **in a portion of the state identified as the Southern California/Central Coast Evolutionarily Significant Unit (ESU) as threatened or endangered under the California Endangered Species Act (CESA).** The petitioners also requested, in the event the Commission determined that the six populations comprising the identified ESU did not collectively comprise a single ESU or otherwise did not warrant listing, that the Commission consider whether any of the six populations, singularly or in combination, comprise an ESU and meet the criteria for listing. Commission staff transmitted the petition to the Department of Fish and Wildlife (Department) pursuant to Fish and Game Code section 2073 on July 5, 2019, and published a formal notice of receipt of the petition on July 26, 2019 (Cal. Reg. Notice Register 2019, No. 30-Z, p. 1086).*

*On **January 31, 2020, the Department provided the Commission with its evaluation of the petition,** "Evaluation of a Petition from the Center for Biological Diversity and the Mountain Lion Foundation to List the Southern California/Central Coast Evolutionarily Significant Unit (ESU) of Mountain Lions as Threatened under the California Endangered Species Act," to assist the Commission in making a determination as to whether the petitioned action may be warranted based on the sufficiency of scientific information in the petition (Fish & G. Code, §§ 2073.5 & 2074.2; Cal. Code Regs., tit. 14, § 670.1, subds. (d) & (e)). Focusing on the information available to the Department relating to each of the relevant categories, the Department recommended to the Commission that the petition be accepted.*

*At its public meeting held via teleconference on **April 16, 2020, the Commission considered the petition,** the Department's petition evaluation and recommendation, and comments received. **The Commission found that sufficient information existed to indicate the petitioned action may be warranted and accepted the petition for consideration.** Upon publication of the Commission's notice of its findings, the Southern California/Central Coast ESU of mountain lions became a CESA candidate species on May 1, 2020 (Cal. Reg. Notice Register 2020, No. 18-Z, p.692).*

The Commission's action designating the mountain lion within the boundary of the petitioned Southern California/Central Coast ESU as a candidate species triggered the

Department's process for conducting a status review to inform the Commission's decision as to whether ***listing the petitioned ESU or any portion of the Southern California/Central Coast mountain lion population as threatened or endangered is warranted****. At its scheduled public meeting on April 14, 2021, the Commission granted the Department a six-month extension to complete the status review and facilitate external peer review.*

1.2 Status Review Overview

This status review serves as the basis for the Department's recommendation to the Commission on whether the petitioned action to list the mountain lion in the petitioned ESU as threatened or endangered under CESA is warranted. It is based upon the best scientific information available to the Department. It is not intended to be an exhaustive review of all published scientific literature on the mountain lion; rather, it is intended to summarize key points relevant to the status of the species and address regulatory report requirements. All the required elements in Fish and Game Code sections 2072.3 and 2074.6, as well as

in California Code of Regulations Title 14 section 670.1, are included and addressed in this status review.

Specifically, this status review addresses each of the required petition components and the listing factors that the Commission must consider in making its determination. A petition to list a species under CESA must include "information regarding the ***population trend, range, distribution, abundance, and life history of a species, the factors affecting the ability of the population to survive and reproduce, the degree and immediacy of the threat, the impact of existing management efforts, suggestions for future management, and the availability and sources of information. The petition shall also include information regarding the kind of habitat necessary for species survival, a detailed distribution map, and any other factors that the petitioner deems relevant"*** *(Fish & G. Code, § 2072.3; see also Cal. Code Regs., tit. 14, § 670.1, subd. (d)(1)). A status review must include a preliminary identification of the habitat that may be essential to the continued existence of the species and recommend management activities and other recommendations for recovery of the species (Fish & G. Code, § 2074.6). Additionally, a species shall be listed as threatened or endangered "if the Commission determines its continued existence is in serious danger or is threatened by any one or any combination of the following factors: present or threatened modification or destruction of its habitat,*

overexploitation, predation, competition, disease, or other natural occurrences or human-related activities" (Cal. Code Regs., tit. 14, § 670.1, subd. (i)(1)(A)).

In addition to addressing each of the petition components and listing factors, the Department must make a recommendation to the Commission as to whether the petitioned action to list the mountain lion as threatened or endangered is warranted. An endangered species is defined under CESA as ***one "which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease"*** *(Fish & G. Code, § 2062). A threatened species under CESA is one that "although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by [CESA]" (Id., § 2067).*

Receipt of this report is to be placed on the agenda for the next available meeting of the Commission after delivery. At that time, the report will be made available to the public for a 30-day public comment period prior to the Commission taking any action on the petition.

1.4 Administrative Status

For much of the 20th Century, mountain lions were ***a bountied predator*** *in California (Young and Goldman* ***1946****; Dellinger and Torres 2020). In* ***1964****, bounties ceased and the mountain lion was* ***classified as a nuisance or vermin species*** *that could be taken without a hunting license and with no limits (Dellinger et al. 2021b). In* ***1969****,* ***mountain lions were classified as a game species that could be hunted by licensed hunters****. From* ***1972–1986****, mountain lions were classified as a* ***non-game mammal*** *with a moratorium on hunting. Their status as a* ***game species was reinstated in 1986****. However, no mountain lions were harvested between this status change and a ballot initiative (Proposition 117) approved in* ***1990 which classified mountain lions as a "specially protected mammal species"*** *(Fish & G. Code, § 4800). That classification continues to this day, and state law prohibits the take, possession, transport, import, or sale of a mountain lion or mountain lion products with limited exceptions. Take is defined as hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill (Fish & G. Code, § 86).* ***Take of mountain lions is allowed*** ***only under specified conditions, including for the protection of public health and safety, the protection of listed or fully***

protected bighorn sheep species *(Ovis canadensis spp.),* ***and in response to livestock or property damage.***

CDFW turns a blind eye to the harm the mountain lion is causing across vast areas, on rural and urban lands. It is illogical and irresponsible to make the taking of aggressive lions nearly impossible. By CDFW not managing the mountain lion population, the other wildlife populations have been devastated. The mountain lions are overabundant and hungry.

▶ **ATTACHMENT A | News Articles Related to Mountain Lions | Page 116**

▶ **ATTACHMENT B | Mountain Lion Sightings Maps | Page 205**

▶ **ATTACHMENT C | California Department of Fish and Wildlife Petition Maps | Page 209**

▶ **ATTACHMENT D | Mountain Lion Camera Captures | Page 211**

▶ **ATTACHMENT E | Mountain Lion Predations | Page 218**

1.5 Summary of Petitioned Action

The Petitioners propose listing mountain lion populations south of San Francisco Bay in the coastal, Transverse, and Peninsular Mountain Ranges, the Sonoran Desert, part of the Central Valley, and part of the Mojave Desert as a single Southern California/Central Coast ESU. Alternatively, the Petitioners propose the Commission determine whether one or more of the six genetic populations in the following areas identified by Gustafson et al. (2019) comprise an ESU and meet the criteria ***for listing as threatened or endangered:***

1) Central Coast North (CC-N), which includes the Santa Cruz Mountains and San Francisco Bay Area counties to the east;

2) Central Coast Central (CC-C), generally from southern Monterey Bay to Ventura County in the coastal mountains;

3) Central Coast South (CC-S), which includes the Santa Monica Mountains, Santa Susana Mountains, Sierra Pelona Mountains, and Simi Hills;

4) San Gabriel and San Bernardino Mountains (SGSB);

5) Santa Ana Mountains (SA); and

6) Eastern Peninsular Range (EPR), which includes the mountains of eastern San Diego County, extending east possibly as far as the Colorado River and the border with Arizona, and is bounded on the south by the border with Mexico.

These populations are six of the 10 genetically discernible populations in California as delineated in Gustafson et al. (2019) (Fig. 1).

Figure 1. Map ESU

The Evolutionary Significant Unit concept was developed primarily for use in salmonids by the National Marine Fisheries Service (NMFS) and has been used to list populations of anadromous salmon under the federal Endangered Species Act such as the Columbia River chum salmon ESU *(64 Fed. Reg 14508–14517 (March 25, 1999)). The use of ESUs by the Department to evaluate the status of species pursuant to CESA is supported by* ***recent listing determinations by the Commission (e.g., Southern Sierra Nevada Fisher ESU; Coho salmon Central California coast ESU) and by the determination of California's Third District Court of Appeal that the term "species or subspecies" as used in CESA*** *(Fish & G. Code, §§ 2062 and 2067) can include ESUs (Cal. Forestry Assn. v. Cal. Fish and G. Com. (2007) 156 Cal.App.4th 1535).*

To be considered an ESU under federal policy, a population must meet two criteria: ***1) it must be substantially reproductively isolated from other conspecific*** *(i.e., same species) population units; and* ***2) it must represent an important component of the evolutionary legacy of the species that contributes to the genetic diversity of the species as a whole*** *(Waples 1991). The genetic isolation "does not have to be absolute, but it must be strong enough to permit evolutionarily important differences to accrue in different population units" (Waples 1991). Although neither the Department nor the Commission is bound by the federal ESU policy or the federal DPS policy, the Department has found these approaches useful for assessing the existence of a subspecies under CESA, has used these criteria in its prior evaluations of ESUs for species such as the Pacific fisher and Coho salmon, and uses them in this status review.*

For brevity, the term "petitioned ESU" is used throughout this report. When "petitioned ESU" appears, it is intended to encompass the petitioners' proposal to list the petitioned area as a single ESU.

▶ ATTACHMENT B | Mountain Lion Sightings Maps | Page 205

▶ ATTACHMENT C | California Department of Fish and Wildlife Petition Maps | Page 209

CDFW is reaching down to the level of relating a mountain lion to salmonids. *"The Evolutionary Significant Unit concept was developed primarily for use in salmonids by the National Marine Fisheries Service…"* The mountain lion is a carnivorous predator, of which there is one subspecies in North America. ESU and DPS are irrelevant to the mountain lion in America.

2. Biology And Ecology

2.1 Species Description and Life History

Mountain lions belong to the mammalian order Carnivora and are members of the cat family Felidae, subfamily Feline, and a part of the puma lineage. They have numerous other common names including puma, cougar, panther, painter, and catamount (Young and Goldman 1946; Hunter 2015). Mountain lions were once widespread in the Americas, but Euro-American settlers extirpated them from most of the U.S. and Canada east of the continental divide by the beginning of the 20th century, with only a small population (< 200 individuals) remaining in Florida and a population of unknown size in western and southern Texas. Populations in Mexico and other countries in Central and South America do not appear to have suffered similar extirpations (Hall and Kelson 1959; Pierce and Bleich 2003). However, since the late 20th century, breeding populations of mountain lions have returned to some areas east of the continental divide, including North and South Dakota and Nebraska (Hunter 2015; Cougar Fund 2023).

There are currently two recognized subspecies of mountain lion throughout the Americas *(Culver et al. 2000; Kitchener et al. 2017).* ***Mountain lions in North and Central America are classified as P. c. cougua****r, while most* ***mountain lions in South America are classified as P. c. concolor.*** *The Department formerly recognized another subspecies, the Yuma puma (P. c. browni) (Williams 1986; Kucera 1998; CDFW 2022a). However, research by McIvor et al. (1995) and Culver et al. (2000) detected little morphological or genetic support for retention of the P. c. browni subspecies. Consequently, the Department no longer Status Review of the petitioned Southern California/Central Coast ESU of Mountain Lion in California California Department of Fish and Wildlife considers mountain lions from the Colorado River valley and adjacent Sonoran Desert uplands to be a distinct taxonomic unit.*

Adult mountain lions are large and slender with muscular limbs and a long, black-tipped tail that is about one third of the animal's total length. Males are typically larger than females. Males generally weigh 55–65 kg (121–143 lbs.) with a length of 2.2–2.3 m (7.2–7.5 ft.) from nose to tail tip, and females generally weigh 35–45 kg (77–99 lbs.) with a length of 2.0–2.1 m (6.6–6.9 ft.) (Currier 1983).

Deer (Odocoileus spp.) are the most common prey of mountain lions in the United States, Canada and parts of Mexico, composing about 70% of their diet *(Ruth and Murphy 2009). The relationship between mountain lions and deer is so strong that lion distribution throughout the Americas has been described as largely a function of deer distribution (Young and Goldman 1946; Pierce et al. 2000). However, mountain lions are opportunistic predators and are known to eat at least 232 different species of mammals, birds, and reptiles across their extensive geographic range.* ***Larger prey are favored*** *in temperate forest, desert, and grassland biomes, whereas smaller prey are more often consumed in tropical forest biomes (Karandikar et al. 2022). Prey species in North America include, elk (Cervus canadensis), feral horses (Equus ferus caballas), feral burros (Equus asinus), wild pigs (Sus scrofa), pronghorn (Antilocapra americana), bighorn sheep, coyotes (Canis latrans), bobcats (Lynx rufus), porcupines (Erethizon dorsatum), fishers (Pekania pennanti), rodents, wild turkeys (Meleagris gallopavo), and livestock (Young and Goldman 1946; Currier 1983; Iriarte et al. 1990; Sweitzer et al. 1997; Wengert et al. 2014; Allen et al. 2015; Vickers and Garcelon 2022).*

Mountain lions reach sexual maturity at two to four years, and females care for their young for the first one to two years (Quigley and Hornocker 2009). Mature females typically breed every other year (Robinette et al. 1961). Males will mate with multiple females and do not contribute to rearing young (Logan and Sweanor 2010). Mates locate each other with auditory and olfactory signals including scrapes—shallow troughs with a small mound of debris at the distal end, made using their hind feet. These forms of communication are also vital for maintaining family cohesion and avoiding competition or direct threats from other mountain lions. Identity, social status, and reproductive condition may all be possible functions of scent markers (Logan and Sweanor 2010). Mountain lion scent marks seem to serve as "bulletin boards" which males and females visit to determine the temporal presence, reproductive status, and possibly even the individual identity of other mountain lions (Currier 1983; Logan and Sweanor 2001; Harmsen et al. 2010; Allen et al. 2014).

Gestation lasts 82–96 days (Young and Goldman 1946; Currier 1983; Hunter 2015). ***Litter size ranges from one to six, though two to four kittens are typical*** *(Pierce and Bleich 2003; Beier et al. 2010; Riley et al. 2014). Reproductive females tend to avoid human disturbances. Wilmers et al. (2013) found that mountain lions exhibiting reproductive behaviors (denning and chemical and vocal communication) avoided human disturbances by distances four times greater than non-reproductive mountain lions. As young reach 12–18 months of age, mothers may come into estrus and become aggressive towards them, encouraging their dispersal (Pierce and Bleich 2003). Adult males are also known to kill kittens, yearlings, subadults, and occasionally other adults (Logan and Sweanor 2010; Riley et al. 2014; Benson et al. 2020). Survivorship of dispersing mountain lions is low relative to adults with established home ranges (Benson et al. 2016; Benson et al. 2020), and* ***dispersing young are more likely than resident mountain lions to be involved in depredation incidents or other conflicts with humans as they try to find prey without the advantage of an established home range*** *(Torres et al. 1996).*

Mountain lions are known to move long distances while dispersing. One subadult male was documenting moving 2,450 km (1,522 mi.) from South Dakota to Connecticut (Hawley et al. 2016). Vickers et al. (2015) documented numerous Southern California study animals dispersing > 80 km (50 mi.), and one young male moved approximately 150 km (93 mi.) from California south into Baja California, Mexico and back. Most long-distance dispersers are thought to be young males in search of available mates (Hawley et al. 2016).

A study of juvenile lion dispersal was conducted by Beier et al. (1995) in the Santa Ana Mountains of Southern California from 1988 to 1992. Juvenile mountain lions dispersed via habitat corridors in a landscape fragmented by urbanization. Each collared male dispersed over several weeks to months, and as many as four temporary home ranges were occupied sequentially. The mean dispersal distance from a sample of eight males was 63 km (39.1 mi.). The one monitored female disperser wandered throughout the northern half of the Santa Ana Mountains, changing directions ≥ 5 times upon encountering the urban-wildland interface and covered ≥ 342 km (212.5 mi.) without establishing a temporary home range. Four months after beginning her dispersal, she returned to the edge of her natal range and bedded near her mother for one day before dying near that location days later of unknown causes. All travel in corridors and habitat peninsulas occurred at night.

***Adult mountain lions are primarily solitary**, territorial, and occur in low density. **They require large areas of habitat with adequate prey abundance** (Quigley and Hornocker 2009). Their home ranges are often comprised of multiple vegetation community types including riparian, chaparral, oak woodlands, coniferous forests, grasslands, and deserts (Grinnell 1914; Grinnell et al. 1937; Williams 1986; Dickson et al. 2005; McClanahan et al. 2017; Dellinger et al. 2019) and occur from near sea level to high mountain elevations (Grinnell et al. 1937; Young and Goldman 1946; Hunter 2015). Average home range size in California varies substantially depending on sex, season, and area of the state. The average male home range size is larger than the average female home range size. Home ranges change size depending on season and tend to be larger in the Sierra Nevada compared to the Coastal Ranges. In the Santa Ana Mountains and the Eastern Peninsular Range, Zeller et al. (2017) found that home range size varied from 41–497 km2 (16–192 mi.2; mean = 231 km2; female mean = 188 km2; male mean = 316 km2). In the Santa Monica Mountains and surrounding areas, Riley et al. (2021) found the average home range size was 134 km2 (52 mi.2) for females and 372 km2 (144 mi.2) for males. In contrast, in the Sierra Nevada Mountains the average home range size for females in summer was 541 km2 (209 mi.2) and 349 km2 (135 mi.2) in winter (Grigione et al. 2002). For males it was 723 km2 (279 mi.2) in summer and 469 km2 (181 mi.2) in winter. While male home ranges can overlap spatially, male mountain lions are territorial, making temporal overlap between males rare (Logan and Sweanor 2001). However, males attempt to overlap their home ranges with multiple female home ranges to enhance breeding opportunities (Logan and Sweanor 2010). Females are less territorial, with their home ranges often including significant overlap, and the degree of home range overlap is typically greater where prey densities are higher (Stoner et al. 2018). Subadult males are generally met with aggression from resident adult males and can disperse long distances (see above). Only about half of subadult females disperse from their natal area (Logan and Sweanor 2010). Due to these behavioral mechanisms, local abundance of male mountain lions is generally limited by available habitat (Maletzke et al. 2014), while female abundance is generally limited by prey availability (Stoner et al. 2018). Given the importance of females to population growth, and because one male can breed with multiple females, mountain lion populations can be primarily limited by prey availability (Pierce et al. 2000; Logan and Sweanor 2001; Logan 2019).*

***Mountain lions have few natural predators in California.** Mountain lions are subordinate to black bears (Ursus americanus) and gray wolves (Canis lupus sp.) across parts of*

their geographic range including California (Elbroch and Kusler 2018). Black bears occasionally kill mountain lion kittens (Elbroch and Kusler 2018), but mainly affect mountain lions through the plundering of kills and cache sites in California (Elbroch et al. 2015a). Where gray wolves and mountain lions coexist in North America, wolves are known to affect adult and kitten survival, resource selection, prey selection, bedding locations, and local abundance (Bartnick et al. 2013; Elbroch et al. 2015b; Kusler et al. 2017; Elbroch and Kusler 2018; Elbroch et al. 2020). In 2021, a GPS-collared wolf dispersed into the petitioned area before being struck and killed by a vehicle on Interstate 5. In the summer of 2023, the Yowlumni wolf pack was identified in southern Tulare County, with an activity center approximately 80 km (50 mi.) north of the petitioned ESU boundary; however, there are currently no resident wolf packs or individuals known within the petitioned ESU area.

CDFW is well aware of the primary prey of mountain lions, and yet with CDFW's focused protection of the mountain lion the deer population has been decimated. Instead of managing the mountain lion population in relation the deer population, CDFW is to move mountain lions to other areas. ***"Deer (Odocoileus spp.) are the most common prey of mountain lions in the United States, Canada and parts of Mexico, composing about 70% of their diet*** **...** ***The relationship between mountain lions and deer is so strong that lion distribution throughout the Americas has been described as largely a function of deer distribution****...However****, mountain lions are opportunistic predators and are known to eat at least 232 different species of mammals, birds, and reptiles across their extensive geographic range. Larger prey are favored*** *in temperate forest, desert, and grassland biomes, whereas smaller prey are more often consumed in tropical forest biomes****...Prey species in North America*** *include, elk ..., feral horses ..., feral burros ..., wild pigs ..., ..., bighorn sheep, coyotes (Canis latrans), bobcats ..., porcupines ..., fishers ..., rodents, wild turkeys ..., and livestock****...*** **The carnivorous mountain lion preys on many wildlife species. The number of smaller wildlife to sustain the mountain lion is numerically increased when deer are not available. The result is a more exasperated diminished wildlife, creating an imbalanced ecosystem due to mountain lion unchecked proliferation. Mountain lions can have their first liter at 20 to 40 months of age.** ***"Litter size ranges from one to six, though two to four kittens are typical..."*** **Mountain lion life-span is 8-14 years in the wild, in captivity 20 years or more. The mountain lion population needs to be managed.**

2.2 Range and Distribution

***A species' range is the general geographic area within which it normally occurs**, while its distribution is the locations it occupies within its range at a given time. For purposes of CESA and this Status Review, the term range refers to the species' California range (Cal. Forestry Assn. v. Cal. Fish and Game Com. (2007) 156 Cal. App. 4th 1535, 1551), though emphasis is on the geographic area of the petitioned ESU. **The current range of the mountain lion includes much of California.** Though **verified mountain lion sightings and encounters have occurred in all counties in the last decade**, they are most commonly reported from the more mountainous areas of the state **... Mountain lions are most likely to establish home ranges in areas with sufficient forest and/or shrub cover which promotes presence of their primary prey, mule deer** (Odocoileus hemionus) and provides cover for stalking (Dellinger et al. 2020a). In California, these areas include the coastal mountain ranges from Southern California north to the Oregon border, the Transverse Ranges, the Sierra Nevada, the southern Cascade Range, the Klamath Mountains, and the Modoc Plateau (Fig. 2).*

*The areas with **the least suitable habitat** (i.e., lowest densities of mountain lions), include **intensively farmed areas of the Central Valley and lowlands of the inland desert regions of the state.** However, resident breeding populations have recently been documented near the Sutter Buttes in the Sacramento Valley and in the Mojave Desert (McClanahan et al. 2017; Dellinger et al. 2019). The distribution of mountain lions in California has changed little from what Grinnell et al. (1937) described in the early 1900s, although they are now absent or uncommon in the large, high density urban areas of the San Francisco Bay Area and the Los Angeles–San Diego coastal plain and inland valleys. They are also absent or uncommon in intensively farmed agricultural areas such as the Salinas Valley and the Central Valley, where historical reports noted mountain lions were not uncommon in riparian areas (Fig. 3) (Newberry 1857). Historically, those riparian corridors likely played an important role in connecting mountain lion populations in the Sierra Nevada with populations in coastal mountain ranges.*

▶ **ATTACHMENT B | Mountain Lion Sightings Maps | Page 205**

▶ **ATTACHMENT C | California Department of Fish and Wildlife Petition Maps | Page 209**

Mountain lions have large range sizes, one of the reasons their populations need to be managed.

Figure 2. *Range and habitat suitability for mountain lions in California. Darker red indicates a higher probability of mountain lion occupancy (Dellinger et al. 2020a). Mountain lions may occasionally occur at low densities outside of this range (most often non-breeding or dispersing individuals).*

Figure 3. *Agricultural and populated areas and major roadways in California.*

2.3 Habitat That May Be Essential to the Continued Existence of the Species

Dellinger et al. (2021b) described general patterns of habitat use and selection3 in California:

*"**Mountain lions are among the most widely distributed carnivore species** (Logan and Sweanor 2001). This **wide distribution is a product of their ability to persist in almost any habitat provided adequate prey is available.** When **establishing a home range, mountain lions select habitat with adequate prey and stalking cover to aid in meeting energetic demands.** After establishing a home range, many things, including human activity, can influence habitat use patterns (Wilmers et al. 2013).*

In California, mountain lion habitat use patterns were found to be seasonal in the more temperate areas of the state (Dellinger et al. 2018) while, in the more Mediterranean areas, mountain lion habitat use patterns are more stable between seasons (Wilmers et al. 2013)."

*Mountain lions in **North America have associations with vegetative and topographic cover, steep slopes, and higher elevations**, while avoiding areas of open agricultural land, sagebrush (Artemesia tridentata) dominated communities, open meadows, and pastures (Fig. 2) (Murphy 1983; Logan and Irwin 1985; Laing 1988; Lindzey et al. 1994; Pierce and Bleich 2003).*

*Zeller et al. (2017) found that in **Southern California, mountain lions preferred to establish home ranges that contained chaparral, scrub, and grasslands**, but within those home ranges, primarily spent their time in relatively rugged terrain, riparian areas, and woodland. Dickson and Beier (2002) noted that riparian areas were selected by mountain lions in all seasons in Southern California and suggested the preference is related to the presence of stalking cover and prey. Riley et al. (2021) found that mountain lions in the Santa Monica Mountains and surrounding areas selected "chaparral, riparian woodland, and coastal sage scrub. The two features of the*

landscape that they consistently avoided were grasslands and altered open areas, which were also the most open portions of the landscape. These results are consistent with previous work showing that mountain lions select areas with dense stalking cover and avoid open areas to facilitate hunting success." However, Burdett et al. (2010) speculated that dense, mature late seral chaparral may be avoided because mule deer prey cannot easily move through such stands and thus may select against them.

3] Habitat selection is the choice by an organism of habitats relative to their availability on the landscape.

The mountain lion is not threatened, endangered, discrete, or underpopulated. Instead, the mountain lion is a predator, with an expanding population – its primary prey is deer has diminished greatly, along with other wildlife. *"Mountain lions are among the most widely distributed carnivore species... This wide distribution is a product of their ability to persist in almost any habitat provided adequate prey is available."* Agriculture on the SM Coastal Area is a victim of the mountain lion overpopulation, which has nearly exhausted its natural prey. As a predator, the mountain lion is seeking out alternate food sources and preying on livestock, farm animals and pets. Biodiversity is endangered under the current trajectory with over protection of the mountain lion.

▶ **ATTACHMENT A | News Articles Related to Mountain Lions | Page 116**

▶ **ATTACHMENT D | Mountain Lion Camera Captures | Page 211**

▶ **ATTACHMENT E | Mountain Lion Predations | Page 218**

2.4 Population Structure

***There are currently two recognized subspecies of mountain lion throughout the Americas (Culver et al. 2000; Kitchener et al. 2017). Mountain lions in North and Central America are classified as P. c. couguar**, while **most mountain lions in South America are classified as P. c. concolor** (the subspecific identity of some mountain lions west of the Andes in South America remains uncertain). This taxonomy is partly based on the finding that the entire North American population is genetically homogenous across several mitochondrial loci (Culver et al. 2000, Caragiulo et al. 2014). Genetic diversity is greater in Central and South American mountain lions, and it is hypothesized that the North American population derived from a relatively recent (i.e., late Pleistocene, circa 10,000 years ago) recolonization by a small number of founders whose ancestors*

originated in eastern South America 200,000–300,000 years ago (Culver et al. 2000, Caragiulo et al. 2014).

Several studies have demonstrated that the complex geography and land use patterns in California have influenced patterns of gene flow and genetic exchange among mountain lions in different areas of the state (Ernest et al. 2003; Ernest et al. 2014; Riley et al. 2014; Gustafson et al. 2019; Gustafson et al. 2022). Two studies are especially relevant to understanding the genetic structure of mountain lions within the petitioned ESU. The first is Gustafson et al. (2019), which the petitioners referenced extensively. Gustafson et al. (2019) collected samples from 992 mountain lions in California and Nevada (obtained from 1992–2016) and examined genetic diversity across 42 microsatellite markers4

4 . The authors identified nine geographic clusters of samples containing similar genetic characteristics in California and one cluster in Nevada (Fig. 1). In addition to the six clusters within the petitioned ESU, the other clusters in California include North Coast (NC), Western Sierra Nevada (WSN) and Eastern Sierra Nevada (ESN) (Fig. 1). In this report, the Department follows Gustafson et al. 2019 in referring to these clusters as genetic populations. Though mountain lions associated with these genetic populations show significant genetic differentiation, the populations are not fully isolated from one another (Fig. 4). The bidirectional migration rates calculated by Gustafson et al. (2019) demonstrate important historical connectivity between the Western Sierra Nevada (WSN) genetic population and the Central Coast populations (CC-S, CC-C, CC-N) and populations to the north and east (North Coast (NC) and Eastern Sierra Nevada (ESN)). Additionally, the SGSB genetic population functions to some extent as a linkage between genetic populations to the south (EPR and SA) and the north (WSN and the Central Coast genetic populations), although gene flow through this linkage appears to be very limited.

CDFW's ESU and DPS populations are classified as P. c. cougar. *"There are currently two recognized subspecies of mountain lion throughout the Americas ... Mountain lions in North and Central America are classified as P. c. couguar*, while *most mountain lions in South America are classified as P. c. concolor"* Listing the mountain lion under ESU and/or DPS is inappropriate and malevolent. Using California Fish and Wildlife Commission to address the listing[s] as an interagency directive is unacceptable.

▶ ATTACHMENT B | Mountain Lion Sightings Maps | Page 205

3. Status and Trends in California

3.1 Historical Distribution and Abundance

Habitat loss and fragmentation resulting from land use changes in the petitioned ESU began in the ***1700s*** *and continues to the present. Those changes have significantly affected mountain lion distribution in some areas.* ***Many areas within the petitioned ESU have been modified by urban and agricultural development, primarily in the San Francisco Bay Area, Southern California, and the Central Valley, making them mostly unsuitable for mountain lions*** *(Fig. 3). Near the coast in Southern California, extensive urbanization from Ventura County to the border with Mexico has supplanted large areas of mountain lion habitat in the coastal valleys and plains and has isolated patches of remaining habitat in the Santa Monica, San Gabriel, San Bernardino, and Santa Ana Mountains (Fig. 3; Vickers et al. 2015; Benson et al. 2016; Benson et al. 2019). The Eastern Peninsular Range is also affected by human development and road networks but to a lesser degree than the aforementioned mountain ranges. Likewise, remaining habitat in the Santa Cruz Mountains and the southern San Francisco Bay Area is increasingly constricted by development and busy highways (Wilmers 2014; Wang et al. 2017). In contrast, the Santa Lucia and other rugged mountains of the central coast have fewer highways and relatively little development and the distribution of lions has likely changed little there from the pre-European era.*

CDFW states, "*Many areas within the petitioned ESU have been modified by urban and agricultural development,… making them mostly unsuitable for mountain lions.*" which should exclude them, and other similar areas from being in the petitioned area[s]. "*Many areas within the petitioned ESU have been modified by urban and agricultural development, primarily in the San Francisco Bay Area, Southern California, and the Central Valley, making them mostly unsuitable for mountain lion.*" These, and other urban areas, need to be protected from the mountain lion encroachment.

3.2 Population Size

Historical estimates of the size of the mountain lion population within the petitioned ESU do not exist. While some historical estimates of the statewide mountain lion population exist, the methods used to derive the estimates, and the statistical rigor of the estimates varied substantially. As such, these estimates are not directly comparable and cannot be used to examine trends in the statewide population over time.

The Department paid a bounty for mountain lions from 1906–1963 (Dellinger and Torres 2020). McLean (1954) presented bounty numbers from 1907-1950 and estimated there were 600 mountain lions in California. Over a decade after the end of the bounty period, Sitton (1977) estimated that there were approximately 2,400 mountain lions in California. A 1989 study estimated 4,100–5,700 mountain lions in the state based on the amount of suitable habitat and adult density estimates from prior studies (Mansfield and Weaver 1989).

The Department recently developed a statistically rigorous estimate of the statewide mountain lion population size using ***DNA from the scats of 335 individual mountain lions collected in 2017–2022 from 13 study sites distributed widely across the state****. The detection histories of individually identifiable mountain lions from these samples were used to estimate the statewide population size using a Bayesian Spatial Capture Recapture (SCR) model. SCR includes a spatial scale parameter (e.g., how the probability of detection of a mountain lion varies over its home range) that is critical for accurately scaling estimated abundances to density and population size (Royle et al. 2013).* ***Using this method, the Department estimates there are approximately 4,172 (95% CI 3,645–4,750) mountain lions in the state.*** *This population estimate includes all age classes of mountain lions, including dependent young. The estimate represents an average annual number of mountain lions over a recent 5-year period (i.e., 2017–2022). An important caveat is that extrapolation from the modeling was limited to only those portions of state that were mapped as mountain lion habitat by Dellinger et al. (2020b). Accordingly, the estimate may be undercounting a small number of mountain lions outside of the mapped range (e.g., Central Valley and some desert areas). These results are preliminary and may change based on peer review when a manuscript is submitted to a scientific journal for publication.*

As part of this analysis, the Department used available California GPS telemetry data from 152 mountain lions to inform the spatial scale parameter in the SCR model. The result of this exercise was that spatial inferences from the telemetry were consistent with those from the scat (e.g., <5% difference) which provides validation that the statewide population estimate is accurate.

The ***Department also generated regional scale current estimates of abundance that roughly correspond to the genetic populations*** *in Gustafson et al. 2019 (Table 3). The boundaries for the regional genetic population estimates come from Figure 1 in Dellinger et al. (2020b). The Department used SCR to create* ***density estimates*** *that vary*

over space depending on relative use of specific habitats within an area of interest. However, the covariates the Department used were more effective for extrapolating a statewide population total than drawing accurate inferences about density in specific areas. For this reason, these local estimates may be less accurate than the statewide estimate. ***The total population estimate within the petitioned ESU is 1,449 mountain lions (95% CI 1,272–1,638).*** *However,* ***each of the genetic populations comprising the petitioned ESU is moderately to considerably isolated from adjacent populations.*** *The petitioned area does not support a single well-connected population and instead effectively consists of several mostly isolated smaller populations. Estimates for the CC-S, SGSB, and SA genetic populations are each lower than 100 individuals. The* ***best currently available data indicate most of the populations within the petitioned ESU have small effective population sizes and low genetic variation*** *(see Section 4.9), which could put them at increased risk of local extirpation (Beier 1993,1995; Dickson et al. 2005; Ernest et al. 2014; Riley et al. 2014; Vickers et al. 2015; Benson et al. 2016; Benson et al. 2019; Gustafson et al. 2019; Gustafson et al. 2022).*

Table 3. *Estimates of total population sizes and 95% confidence intervals for the genetically distinct mountain lion populations identified in Gustafson et al. 2019. The boundaries used to calculate the population sizes come from Dellinger et al. 2020b.*

Note: ***these estimates were derived from modelling at a different geographic scale than the statewide and petitioned area estimates, and consequently, the summed estimates differ from the statewide estimate.***

CDFW has lost credibility to present mountain lion populations accurately. *"The Department paid a bounty for mountain lions from 1906–1963… (1954) estimated there were 600 mountain lions in California. Over a decade after the end of the bounty period … (1977) estimated that there were approximately 2,400 mountain lions in California. A 1989 study estimated 4,100–5,700 mountain lions in the state …" …"Department … generated regional scale current estimates of abundance that roughly correspond to the genetic populations … The total population estimate within the petitioned ESU is 1,449 mountain lions… each of the genetic populations comprising the petitioned ESU is moderately to considerably isolated from adjacent populations… best currently available data indicate most of the populations within the petitioned ESU have small effective population sizes and low genetic variation… these estimates were derived from modelling at a different geographic scale than the statewide and petitioned area estimates, and consequently, the summed estimates differ from the statewide estimate."*
CDFW has failed to produce accurate data and information. CDFW, has repeated 4,000

to 6,000 mountain lions in California since 1989. In the Petition CDFW stating the mountain lion population in California is 4,172, that is highly inaccurate, misleading, and irresponsible.

▶ **ATTACHMENT A | News Articles Related to Mountain Lions | Page 116**

▶ **ATTACHMENT B | Mountain Lion Sightings Maps | Page 205**

Population

Estimated Population Size (95% CI)

Central Coast North (CC-N) 219 (193–247)

Central Coast Central (CC-C) 480 (422–540)

Central Coast South (CC-S) 64 (56–72)

San Gabriel/San Bernardino (SGSB) 94 (82–107)

Santa Ana Mountains (SA) 67 (59–75)

Eastern Peninsular Range (EPR) 459 (383–546)

North Coast (NC) 821 (707–943)

Modoc Plateau (MP) 377 (307–456)

Western Sierra Nevada (WSN) 1,199 (1,050–1,360)

Eastern Sierra Nevada (ESN) 398 (320–489)

3.2.1

3.2.1 Survival and Sources of Mortality

Benson et al. (2023) analyzed ***data from 590 radio collared mountain lions in 24 California study areas from 1974 to 2020 (76% of the study animals were collared after the year 2000).*** *They estimated an annual survival rate of 0.67 for males (95% CI 0.63–0.72, n = 297 males and n = 151 deaths) and 0.80 for females (95% CI 0.77–0.83, n = 293 females and n = 112 deaths). Of the 263 known mortalities, 199 were attributable to a specific cause. Management killing had the highest annual mortality rate at 6%. Management killing includes lethal removal of mountain lions following livestock depredations (75% of the mortalities in this category), lethal removal following bighorn sheep depredations (23% of the category), and lethal removal of lions that posed a public safety threat (2%). After management killing, the*

greatest sources of mortality were vehicle strikes (4%), non-strife natural mortality including starvation and disease (3%), intraspecific strife (3%), poaching (3%), and other human causes including mortalities directly attributable to rodenticide poisoning and wildfire, which combined resulted in a 1% annual mortality rate (Benson et al. 2023).

*The **Department's approach to issuing depredation permits has evolved toward increased emphasis on nonlethal methods of take,** and the relative importance of this mortality factor may have declined (for more detail see section 4.3.2). Benson et al. (2023) found that as human-caused mortality increased in an area, so did natural mortality, though the trend was not significant. This suggests human caused mortality may have been additive during the study period and did not just affect animals that would have otherwise died of natural causes. They also found that human population density influenced mountain lion mortality rates, with human density being a better predictor of mortality risk than the density of sheep and goat farms on the landscape. Both human-caused and natural mortality were highest in areas of the state with intermediate human density, and lower in both high human density areas and remote, low human density areas (Benson et al. 2023).*

CDFW is not allowing warranted depredations by their non-lethal "takings", those are delays, essentially not allowing takings, limiting the rights of those with losses, and putting their livestock, animals, and themselves, in harms way. "*Department's approach to issuing depredation permits has evolved toward increased emphasis on nonlethal methods of take,*" In the case of getting a lethal depredation permit, there are a small percentage of those who have losses or are threatened by the mountain lion, who even have a firearm or means to carry out a depredation. Historically, and some today, depredations were carried out by CDFW. The CDFW Law Enforcement needs to be more responsive to mountain lion attacks and endangerments with depredations.

4.1 Past and Threatened Modification and Destruction of Habitat

4.1.1 Urbanization

Anthropogenic habitat loss and fragmentation have been occurring in California since the arrival of Spanish settlers in the 18th century and increased dramatically with expansion of mining and agriculture in the mid-19th century. Early 20th century naturalists catalogued the flora and fauna throughout the state and noted the loss of formerly abundant prey species of the mountain lion, including elk, mule deer,

pronghorn, and beaver (Castor canadensis) (Stephens 1906; Grinnell 1914; Merriam 1919; Leopold 1966). Successive waves of agricultural and other development, including railroads, canals, roads, and highways resulted in the conversion of natural vegetation and led to further loss and fragmentation of mountain lion habitat. Development impacts have been extensive in the greater San Francisco Bay area, Sacramento and San Joaquin valleys (water diversions, agricultural development, and urban development), and the Los Angeles Basin and adjacent mountain ranges and valleys south to San Diego (urban, agricultural, and industrial uses).

The California State Wildlife Action Plan summarizes existing stressors on wildlife populations and ecosystems in the state and describes recent and ongoing habitat loss, fragmentation, and degradation in California (CDFW 2015). Significant habitat loss continues in many important California ecosystems. For example, over 195,000 ha (480,000 acres) of California rangeland habitats were converted to other uses between 1984 and 2008 (approximately 3% of available rangelands) - primarily due to residential and commercial development and agricultural intensification. Additionally, habitat degradation—resulting from pollution, invasive species, livestock grazing, intensive recreation, soil erosion, drought, flooding, or wildfire—is a widespread stressor to wildlife populations in California (CDFW 2015).

Habitat fragmentation occurs when portions of habitat are lost or degraded such that natural areas are divided into small and isolated remnants (CDFW 2015). This fragmentation can have numerous negative impacts on wildlife including declining biodiversity and impairment of ecosystem functions, isolation of species into small subpopulations susceptible to extinction, and inhibition of movement between populations that leads to reduced genetic variation and inbreeding (Ibid.). ***Species with large home ranges, like mountain lions, require large contiguous areas of habitat or connectivity between multiple diffuse patches of habitat.*** *Habitat loss and fragmentation can eliminate or isolate key habitat elements from home ranges, such as water and prey associated with riparian zones, and can reduce access to breeding and foraging habitat (Ibid.). These effects impact mountain lion populations as well as populations of their prey. When resources are dispersed across a broader area or fragmentation limits access to resources, mountain lions may be required to expend more time and energy to meet their needs, exposing them to more risk.*

In Southern California, human populations are especially dense, and land conversion has been extensive. The significant amount of urban, suburban, and rural development in this

area—resulting from population pressures of the region's 24 million residents (Wikipedia 2024)—has led to substantial habitat loss and fragmentation (CDFW 2015). Currently, ***nearly 40% of the land area in southern coastal California is in urban and suburban use*** *(CDFFP 2010). Sprawling development with residential housing located far from existing urban centers has required new or enlarged roads and infrastructure. These development patterns not only reduce the amount of habitat available but also degrade the quality of adjacent habitat making the remaining natural habitats more vulnerable to the incursion of invasive species, air and water pollution, and altered fire regimes (Ibid.). In addition, the developed areas, roads, and utility corridors fragment the landscape leaving few or no movement corridors between natural areas (Ibid.).*

Historical habitat loss and fragmentation have caused reductions in the geographic distribution of mountain lions in the petitioned ESU. Moreover, in the absence of adequate habitat conservation efforts, including connectivity measures, such reductions are expected to continue. A study of mountain lion habitat in CC-S and EPR showed that nearly half of mountain lion habitat in the study area is on private land, and the authors estimated approximately one-third of the lands that were available habitat in 1970 would be developed by 2030 (Burdett et al. 2010). Additionally, some habitat that is currently adjacent to development may become fragmented, with potential loss of connectivity and increased risk to mountain lions from vehicle strikes and depredation take (Burdett et al. 2010). For example, Development within key connectivity areas such as the Tehachapi Mountains near Interstate 5, if not carefully planned, could further constrain lion movement within a relatively narrow corridor of highly suitable habitat connecting the western Sierra Nevada with the central coast and Southern California (Penrod and Smith 2022).

Additionally, limited habitat connectivity has resulted in highly restricted gene flow in many areas of central and Southern California. For example, connectivity between the EPR and the SA genetic populations is limited due to the barrier effect of Interstate 15 in the Temecula region. Similar connectivity challenges occur due to Interstate 5 and Highway 58 between the CC and SN genetic groups. Recently published information on reproductive and morphological abnormalities in mountain lions in the Santa Monica Mountains, SA, and EPR indicate that habitat loss and fragmentation, and associated dispersal challenges, have led to inbreeding (Huffmeyer et al. 2022). See section 4.9

for more information on the inadequate habitat connectivity and highly impeded gene flow for these populations.

Residential and industrial development is projected to continue within the petitioned ESU, even in the areas that are already highly urbanized *(EPA 2017). Projections of increased housing density through the year 2050 demonstrate that continued development will exacerbate existing barriers to mountain lion movement, effectively rendering existing pathways less permeable, and in some areas may lead to complete isolation of portions of genetic populations (Ibid.). Areas that are projected to become substantially more isolated* ***by the year 2050 due to residential development include the Santa Cruz Mountains of the CC-N, the San Gabriel and San Bernardino Mountains, the Santa Monica and Santa Susana Mountains, and the Sierra Pelona and Tehachapi Mountains*** *near the nexus of the WSN, CC-S, and SGSB genetic populations (Ibid.).*

The cumulative effects of approximately 250 years of habitat loss and fragmentation due to development and road construction, loss of riparian habitat, and the associated reduction and shifting of prey species appear to have contributed to the separation of mountain lions into smaller genetic populations in the central and southern regions of California. See section 4.9 for information on the risks to small and isolated populations.

CDFW's perspective on human use and development is anti-American. This is our country which needs a balance that affords us to exercise our rights of life, liberty and the pursuit of happiness. Basic sanctity and security of our homes, properties, and communities are becoming threatened from the lack of predator management. Life is about progress, opportunity, and development. The mountain lion and wildlife play an important role in the ecosystem, but they must be managed. "…*nearly 40% of the land area in southern coastal California is in urban and suburban use… Residential and industrial development is projected to continue within the petitioned ESU, even in the areas that are already highly urbanized… by the year 2050 due to residential development include the Santa Cruz Mountains of the CC-N, the San Gabriel and San Bernardino Mountains, the Santa Monica and Santa Susana Mountains, and the Sierra Pelona and Tehachapi Mountains*" It is irresponsible for CDFW to increase the mountain lion population in the most attractive and populous areas on the California coast, and in California.

4.1.2 Agriculture and Forestry

The conversion of native habitat to intensively farmed crops and pasture has resulted in large swaths of land that no longer provide foraging and breeding habitat for mountain

lions (Fig. 3). This conversion began as early as the 1700s in coastal California and accelerated rapidly in the 19th and 20th centuries as water storage and delivery systems were developed enabling the irrigation of crops. ***Approximately 43% of California's land area is used for agricultural production (CDFA 2009). In recent years over 9 million acres has been in irrigated agricultural production (DWR 2024). Although the same pattern of conversion of native plant communities to agricultural uses occurred wherever suitable soils and adequate water existed, this change has been most dramatic in the Central Valley, by far the largest contiguous region of intensively farmed land in the state. The Central Valley appears to form a largely semi-impermeable barrier to mountain lion movement between coastal mountain ranges and the Sierra Nevada and Cascade Mountains.*** *Historically, the Central Valley contained extensive riparian forests along the Sacramento and San Joaquin Rivers, their tributaries, and in the Delta which likely provided corridors of suitable cover for mountain lions living in and traveling through the valley. Within the petitioned area, these historical habitats likely facilitated genetic connection between the WSN and NC genetic populations and the Central Coast group. However, it is estimated that 92-97% of such riparian forests have been lost through channelization, altered hydrology, and conversion to agricultural and urban uses, and much of the remaining riparian forest has been modified (CDFW 2014). The loss of Central Valley riparian forests and scrub, in combination with the development of significant highways and other infrastructure, is likely a major driver of contemporary mountain lion population structure.*

Commercial timber harvesting in the petitioned area primarily occurs in the redwood-dominated (Sequoia sempervirens) forests of the CC-N. Although the impacts are less intense and less permanent than commercial agriculture, commercial timber harvesting can modify mountain lion habitat in that region. A study of nine mountain lion home ranges in the redwood forest of northwest California found mountain lions used forest areas with a greater proportion of fragmentation and edge more frequently than areas of more contiguous forest; however, mountain lions generally avoided areas of active timber harvest operations (Meinke 2004). Mountain lion home ranges included different stages of forest succession from freshly harvested stands to late seral forests, perhaps indicating commercial timber management, as regulated by the California Department of Forestry and Fire Protection (CAL FIRE), does not fragment mountain lion habitat or isolate populations. Conversely, Smallwood (1994) found mountain lion use of forest stands of the central coast, north coast, and Sierra Nevada sharply declined within six years following clear cut harvest. The timing and extent of mountain lion use of clearcut

harvest units likely depends on how rapidly shrub and small tree cover develops in the harvested area, which is influenced by the tree and shrub species composition of the harvested stand, the nature and extent of post-harvest site preparation treatments, and the management of young stands.

Agriculture is the backbone of America by design and need to produce food and other products, making America great and sustainable. *"Approximately 43% of California's land area is used for agricultural production (CDFA 2009). In recent years over 9 million acres has been in irrigated agricultural production (DWR 2024). Although the same pattern of conversion of native plant communities to agricultural uses occurred wherever suitable soils and adequate water existed, this change has been most dramatic in the Central Valley, by far the largest contiguous region of intensively farmed land in the state. The Central Valley appears to form a largely semi-impermeable barrier to mountain lion movement between coastal mountain ranges and the Sierra Nevada and Cascade Mountains."* CDFW, seems hostile toward agricultural lands, in preference to mountain lion having free range over California. The mountain lion is devasting agriculture with increasing livestock predations.

▶ **ATTACHMENT B | Mountain Lion Sightings Maps | Page 205**

▶ **ATTACHMENT D | Mountain Lion Camera Captures | Page 211**

▶ **ATTACHMENT E | Mountain Lion Predations | Page 218**

4.2 Vehicle Strikes, Roads, and Rail Lines

Planning for safe wildlife crossings in Southern California has been underway for nearly two decades. *In 2008, the* ***South Coast Missing Linkages Project*** *identified areas in the coastal areas of Southern California where linkages are needed (South Coast Wildlands 2008). The County of Ventura has incorporated these linkages into its General Plan land use zones to help ensure these important wildlife movement corridors remain passable (Ventura County 2019). In 2020, CDFW assessed priority barriers Status Review of the petitioned Southern California/Central Coast ESU of Mountain Lion in California, California Department of Fish and Wildlife to wildlife movement throughout the state, and in 2022, 12 were considered to be top priorities, including several in the petitioned ESU area (Fig. 12, CDFW 2022c).*

Figure 12. *Priority movement barriers within the petitioned area as identified by the Department (CDFW 2022c).*

In general, funding to implement wildlife crossing projects, including land acquisition to preserve natural habitat on both sides to make the crossing more suitable for wildlife, has been limited to date. The lack of wildlife crossings with appropriate fencing, and lack of fencing near existing crossing structures, particularly in highly urbanized areas or across major transportation corridors, contributes to continuing vehicle strikes and to the barrier effects on movement and gene flow. However, several crossings have recently been planned and/or approved. Construction of the ***Wallis Annenberg Wildlife Crossing over Highway 101*** *in the Liberty Canyon area of CC-S (Fig. 13) began in 2022. The crossing, including the approaches and the crossing over adjacent Agoura Road, is expected to be completed in late 2026. The overpass will help facilitate mountain lion movement between the Santa Monica Mountains and the Simi Hills and could ultimately contribute to genetic exchange throughout the CC-S genetic population, between CC-S and CC-C, and ideally between CC-S and WSN. It may also minimize some local vehicle-related mortality on Highway 101.* ***A wildlife undercrossing with associated fencing and habitat conservation was constructed under Highway 17 in the Santa Cruz Mountains in February of 2023****. Another wildlife crossing over Highway 101 in San Benito County is in the planning and fundraising phase. Together,* ***these crossings should help facilitate the movement of mountain lions between the Santa Cruz Mountains in CC-N and the Gabilan Mountains in CC-C.*** *In addition, initial design and environmental studies are being completed for a new crossing structure across I-15 south of Temecula, and improvements to the* ***Temecula Creek passageway*** *are planned. Other connectivity studies are being initiated along I-10 in the Banning Pass area that is critical to mountain lion movement between the EPR and SGSB genetic populations (W. Vickers pers. comm.). Lastly, the* ***Department and the California Department of Transportation (Caltrans) have announced there will be three new wildlife overcrossings along I-15 and the high-speed rail line in San Bernardino County and existing undercrossings and culverts along the corridor will be improved and maintained****, all of which should facilitate the movement of mountain lions and other species (CDFW 2023).*

Figure 13. *Rendering of Wallis Annenberg Liberty Canyon Wildlife Crossing. Source: Santa Monica Mountains Conservancy.*

4.3 Overexploitation

4.3.1 Historical Bounties and Hunting

The management of mountain lions in California has varied widely in the last century. From the early 20th century until 1964, mountain lions were a bountied predator in California (Young and Goldman 1946; Dellinger and Torres 2020). During the bounty period, approximately 12,580 mountain lions were killed across California (Dellinger et al. 2021b). Nearly one-third of the bounties paid in the first few decades were in Humboldt, Trinity, Mendocino, and Lake Counties (Dellinger and Torres 2020). Additionally, the Department employed 1–5 hunters whose only job was to remove mountain lions throughout the state (McLean 1954; Dellinger and Torres 2020). One of those hunters, Jay Bruce, killed 669 mountain lions during his long career (Bruce 1953).

When bounties ended in 1964, mountain lions were classified as a nuisance or vermin species—while there was no longer paid incentive for removal, they could be killed year-round without a hunting license and with no limits (Dellinger et al. 2021b). From 1969–1972, mountain lions were considered a game species and could be hunted with a proper hunting license. Two hunting seasons took place (1970–1971) during which 118 animals were harvested from 4,953 permits issued (Dellinger et al. 2021b). Following the second hunting season, a legislative moratorium ceased further mountain lion hunting (Fitzhugh and Gorenzel 1986). From 1972–1986 mountain lions were classified as a non-game mammal and the hunting moratorium remained in place. Their status as a game species was reinstated from 1986, and the Department began to establish hunting zones and harvest quotas and issue tags. However, no mountain lions were harvested due to this change before a 1990 ballot initiative (Proposition 117) approved by California voters classified mountain lions as a "specially protected mammal species" with significant new protections for the species starting in 1991 (Fish & G. Code, § 4800). That classification continues today (see section 1.4). As a specially protected species, the only allowable take of mountain lions occurs via depredation permits when mountain lions have killed or are encountered attacking or threatening livestock, to protect public safety, and the targeted removal of individuals negatively impacting federally listed bighorn sheep populations (Fish & G. Code, §§ 4801–4809).

California's mountain lion population is out of control. CDFW seems to have lost its moral compass. There should be an annual analysis of the mountain lion population in relation to the deer and other wildlife populations. The number of mountain lions in each particular area need to have a maximum number. We need to learn from earlier times how to control our wildlife populations, to have ecological balance, where the mountain has an adequate food source of their natural prey. Management can include

relocations, sterilization, hunting quotas, depredations, and other means. Predators attacking or killing people, livestock, farm animals, and pets, should be candidates for depredation, by the victim or CDFW Law Enforcement Unit.

Our country was built on solid principes of safety and security. The hierarchy is that human life is protected at the highest level then - livestock, farm animals, pets…then wildlife. Guns were, and are, our protection against harm. We have a Constitutional right to bear arms. CDFW has a depredation policy which used to be a control mechanism for the mountain lion population, many depredations were carried out by CDFW. The change to the three-tier system is a tool used by CDFW to restrict, and nearly eliminate depredations.

4.3.2 Poaching

Poaching and other unpermitted take is rarely reported but has been observed in the CC-S, SA, and EPR (Beier and Barrett 1993; Riley et al. 2014; Vickers et al. 2015) as well as in the CC-N (Yap et al. 2019). Benson et al. (2023) reported 26 out of 199 mortalities from known causes in the years 1974–2020 were due to poaching, translating to a 2%–3% annual rate of mortality. This annual mortality rate is lower than the rate for depredation take (6%), vehicle collisions (4%), natural mortality (3%), and being killed by another mountain lion (3%). However, the fact that mortalities from poaching are unreported and difficult to detect means the actual poaching-related mortality rate may be higher than reported in the literature.

4.4 Depredation and Public Safety Management

The interactions between humans and mountain lions in California have profound impacts on the conservation and management of the species. Human-wildlife conflict occurs "when humans and wild animals interact in an unwanted or unsafe way" *(CDFW 2024a). As the State's Trustee Agency for fish and wildlife resources (Fish & G. Code, § 1802),* ***the Department's responsibilities include serving as the primary state agency charged with helping to resolve human-wildlife conflict and public safety wildlife incidents.***

CDFW has created the increase in human-wildlife conflicts by allowing the mountain lion population to explode, while the deer population diminish. The mountain lion is expanding its range in search of food sources. Santa Cruz Puma Project's study, of mountain lions, is now called Human-Mountain Lion Interactions Study, that is not

preventative objective, it is predictivity. ***"The interactions between humans and mountain lions in California have profound impacts on the conservation and management of the species. Human-wildlife conflict occurs 'when humans and wild animals interact in an unwanted or unsafe way'"***

CDFW has the responsibility to protect the public. ***"…the Department's responsibilities include serving as the primary state agency charged with helping to resolve human-wildlife conflict and public safety wildlife incidents."***

▶ **ATTACHMENT A | News Articles Related to Mountain Lions | Page 116**

4.4.1 Depredation Permits

When mountain lions have attacked or killed domestic animals, depredation permits issued by the Department allow them to be taken, nonlethally and, in some very limited circumstances, lethally *(Fish & G. Code, § 4801.5 and 4802, et seq.). Nonlethal methods of take include, but are not limited to, practices such as hazing with hounds and use of less-than-lethal projectiles. Mountain lions encountered in the act of pursuing, inflicting injury to, or killing livestock or domestic animals may be taken—nonlethally or lethally—by landowners and their agents without prior authorization (Id., § 4807). Additionally,* ***the Department or local public safety agencies may take mountain lions perceived to be an imminent threat to public health and safety*** *(Id., §§ 4801, 4801.5).*

In 2013, the ***Department implemented a situation-specific approach to responding to human-mountain lion conflict, which addressed mountain lions in areas of human habitation, mountain lions depredating pets/livestock, and mountain lion public safety situations*** *(CDFW 2013). The most noteworthy change in management action reflected in this approach was specifying that* ***no more than one mountain lion could be taken under a single depredation permit.*** *In 2017, the Department amended its approach, consistent with Fish and Game Code section 4801.5, to* ***prioritize non-lethal measures*** *for dealing with mountain lion depredation in the Santa Monica and Santa Ana Mountains where research indicated that local mountain lion populations constrained by anthropogenic barriers lacked genetic variation (CDFW 2017). Following the Commission's decision to make mountain lion a candidate species in 2020, the* ***Department expanded the area where non-lethal measures would be prioritized to the entire petitioned ESU*** *(CDFW 2020a), and later to the entire state (CDFW 2020b), consistent with Fish and Game Code section 4801.5.*

From January 2010 through 2020, the Department recorded 3,637 reported mountain lion incidents statewide*. These included depredations, public safety concerns, as well as sightings and nuisance reports [6]* ***There were 2,202 depredation incidents, wherein mountain lions were reported to have attacked pets and/or livestock.***

6] When reporting a nuisance animal, the reporting party can select "There is/are wild animals on or around my property that I would consider pests and I would like more information" or "There is/are wild animals on or around my property that is/are disturbing my garbage, causing noise or creating some other type of disturbance."

Across California from 1972 to 2019, the number of reported depredation events trended upward for large hoofstock (cows and horses), small hoofstock (mostly sheep and goats), and pets (Dellinger et al. 2021a). Sheep and goats accounted for 59.4% of confirmed depredations, while large hoofstock accounted for 13.1%, and pets accounted for 10.4%.

From 1972 to 2020, at least 3,694 mountain lions were removed in depredation incidents *(Dellinger et al. 2021b), and such removal was the leading cause of attributable mortality of collared mountain lions in 1974–2000 (Benson et al. 2023). Between 2001 and 2020, an average of approximately 92 mountain lions were lethally removed pursuant to depredation permits per year statewide (Dellinger et al. 2021b). With recent efforts to prioritize non-lethal measures in response to livestock damage, the number of mountain lions lethally removed pursuant to depredation permits statewide dropped to 3 in 2021, 10 in 2022, and 15 in 2023 (Fig. 14, CDFW 2022b; 2024b; 2025).*

Figure 14. *The number of mountain lions reported killed pursuant to depredation permits in California in 2001–2024. Data from (Dellinger et al. 2021b; CDFW 2022b, 2024b, 2025). The Department's approach to* ***mountain lion depredation and public safety response was modified in 2013, amended in 2017, and amended again in 2020.***

Interestingly, ***researchers have noted that at the county level, mountain lion depredation rates increased by 9% for every lion removed through a depredation permit the prior year*** *(Dellinger et al. 2021a). This general pattern of increased depredations in an area the year after mountain lion removal was also seen in Washington State, though removals were done via sport hunting and therefore less targeted to individual mountain lions that may have been involved in depredations (Peebles et al. 2013). Dellinger et al. (2021a) suggested this pattern could be a result of subadults moving to territories*

vacated when resident adults were removed. Research shows subadults can be more likely to use areas closer to people (Kertson et al. 2013), but evidence that subadults mountain lions have less well-developed hunting skills and are more likely to target easily killed domestic animals is not conclusive (Linnell et al. 1999; Peebles et al. 2013).

Mountain lion removal through depredation permits diminishes the total abundance of mountain lions in an area, and the lions removed are predominantly males (Sweanor et al. 2000). For example, from 1981 to 2013 in the Santa Ana Mountains and the Eastern Peninsular Range, 3.4 times as many males were taken for depredation than females (Vickers et al. 2015). Because males are more likely to disperse than females, depredation removal may thus further inhibit adequate gene flow between mountain lion populations in Southern California by removing the animals most likely to move between genetic populations (Vickers et al. 2017).

To further reduce the number of mountain lions killed for depredation, best practices to minimize livestock predation should be consistently employed. Unfortunately, mountain lions may not adequately interpret human cues and risk levels to substantially modify their behavior and thus reduce the number of conflicts with humans. In the Santa Cruz Mountains, during the day, mountain lions avoided areas of housing where they were most likely to come into conflict with humans (Nisi et al. 2022). However, at night mountain lions were more likely to use areas of intermediate housing density than during the day. Areas of intermediate housing density are where they were also most likely to be killed in response to depredation events. This suggests that improving livestock husbandry to minimize the risk of depredation is vital to further reduce the lethal take of mountain lions.

CDFW instituted a three-tier depredation permit, with one and two being Hazing, with things that should be common use as needed on any ranch – such as playing loud human voices, dogs, rubber bullets... the permit is only good for eight days. Those permits should be for 60 to 90 days. A person applying for a depredation permit should get a lethal permit, if the situation meets the need.

▶ **ATTACHMENT B | Mountain Lion Sightings Maps | Page 205**

▶ **ATTACHMENT D | Mountain Lion Camera Captures | Page 211**

▶ **ATTACHMENT E | Mountain Lion Predations | Page 218**

I, Lucy White, personally sent a PRA to CDFW | Greg Martinelli emailed on 10/29, and later again through the CDFW Portal on 10/29/2025

Message sent through CDFW Portal 10/29/2025 reference number R017901-102925:

RE: REQUEST FOR REPORTS, INFORMATION, REQUESTS, DENIALS, FOR DEPREDATION PERMITS

This is a Request for Data, Reports and Information, regarding all Depredation Actions, Requests, and Permits, including those which were approved, and those which were denied, for depredations of mountain lions, for the years 2020. 2021. 2022, 2023, 2024, 2025 to current date, for San Mateo County.

CDFW Response:

CALIFORNIADFW Support <californiadfw@govqa.us> Thu, Oc

RE: PUBLIC RECORDS ACT REQUEST of October 29, 2025, Reference # R017901-102925

Dear Lucy McCargar-White,

This letter is in response to the above-referenced request you submitted to the Department of Fish and Wildlife (Department) pursuant to the Public Records Act (PRA) (Govt. Code, §7920.000 et seq.) on October 29, 2025.

The Department is initiating a search for records responsive to your request and will make available for inspection or provide copies of all responsive records, if any, that it is able to locate through reasonable efforts and that are not privileged or exempt from disclosure pursuant to the PRA or other applicable law. The Department will seek to make such records available as soon as reasonably possible. In the event the Department will be unable to make the records available within 90 days of your initial request, we will contact you to discuss the matter.

The PRA requires disclosure of existing records in the possession, custody, or control of a

public agency. If the Department locates existing records responsive to your request, Department staff will assemble the disclosable records. You may elect to receive copies of the records or to inspect them in person:

- If you chose to receive copies electronically, documents maintained in electronic format will be transmitted electronically whenever possible through the PRA Records Center.
- If the Department needs to deliver hard copies, you will be charged a copying fee of $.15 per page. The Department will notify you of the total cost prior to mailing the records. Please note the Department cannot waive or reduce these fees and costs for any reason. Once staff are able to return to their offices to make and send the copies, they will be sent to you.
- If you chose to inspect the records in person, you will be notified of the availability of the records for inspection.

If you have any questions or need additional information, please contact us and reference PRA No. R017901-102925. You may also call (916) 654-3821.

Sincerely,
Lacy Bauer

As of 1/22/2026 the documents requested have not been provided, showing "In Progress."

4.4.2 Bighorn Sheep Management

Mountain lions are occasionally removed when predating upon state and federally endangered Sierra Nevada bighorn sheep *(O. canadensis sierrae) or state and federally threatened Peninsular bighorn sheep (O. canadensis nelsoni). The Department is authorized to take such actions by Fish and Game Code section 4801, and such actions are identified in each species' federal recovery plan (USFWS 2000, 2007). Between 1999 and 2019, 26 mountain lions were lethally removed in the Eastern Sierra Nevada Mountains as part of bighorn sheep recovery (CDFW 2021). These lethal removals occurred outside the petitioned ESU boundary and where mountain lion populations are relatively large and well connected.*

4.4.3 Public Safety

*The **Department prioritizes public safety and lethally removes or attempts to remove mountain lions that represent an immediate threat to human safety. Specifically, a threat to public safety is when a mountain lion "exhibits one or more aggressive behaviors directed toward a person that is not reasonably believed to be due to the presence of responders."** (Fish & G. Code, § 4801.5, subd. (b).) From 1986 to April 2024 there were 25 reported mountain lion attacks on humans in California, 4 of them fatal (CDFW 2024c). The Department has records of 10 mountain lions being euthanized following attacks on humans in California between 2000 and 2024 (**reliable records prior to 2000 are unavailable**).*

Collectively, all forms of permitted take are unlikely to negatively influence mountain lion populations and trends at the statewide level or within the relatively large and well-connected NC and SN genetic populations. However, the additive mortality resulting from lethal removals associated with depredations and human conflicts in areas where mountain lion groups are already small and isolated such as California's central and south coasts may result in local population declines (Benson et al. 2023). Importantly, Benson et al. (2023) noted the risk of mortality from management killing declined dramatically from 2001 to 2020, and raised the possibility that the decline may be related to the 2017 changes in CDFW's management policies. The number of management killings decreased sharply after 2020 (Fig. 14), and therefore its relative importance as a source of mortality has decreased.

In April 2025 Santa Cruz Puma Project stated that there were a total of 50 adult lions based on the 2017 CDWF study, from scat analysis. The misleading information, which the public is relying on, could allow them to fall victim to mountain lion attacks on trails, on rural lands, in urban areas, and communities.

In the East Bay Times May 1, 2016 article, *"Zara McDonald, president of the Felidae Conservation Fund, one of the groups in a research consortium dubbed the Bay Area Puma Project. The **current estimate for the Santa Cruz Mountains ranges from 50 to 100 cats.** Numbers for the greater Bay Area simply don't exist.... Other pumas remain untracked, largely because collaring them is quite a feat. To place a collar, researchers must stalk pumas through the woods, using dogs to scare them into trees. If the cats don't climb so high that a fall would be dangerous, the researchers dart them with tranquilizers, fit the collars and then wait with the cats until they recover... The endeavor, which sometimes keeps researchers out overnight, has to*

be repeated every two years when a cat's transmitter runs out of juice. ***Only a few Bay Area cats outside the Santa Cruz Mountains wear collars****…"*

CDFW delays or denies depredations as much as possible, the three-tier system makes depredation almost impossible. CDFW needs to get DNA samples whenever possible, to better track and identify mountain lion interactions. Mountain lion behavior is getting more brazen and aggressive. "…*Department prioritizes public safety and lethally removes or attempts to remove mountain lions that represent an immediate threat to human safety. Specifically, a threat to public safety is when a mountain lion 'exhibits one or more aggressive behaviors directed toward a person that is not reasonably believed to be due to the presence of responders.' "* Mountain lions do not wait for CDFW to arrive on a scene.

▶ **ATTACHMENT A | News Articles Related to Mountain Lions | Page 116**

▶ **ATTACHMENT B | Mountain Lion Sightings Maps | Page 205**

▶ **ATTACHMENT D | Mountain Lion Camera Captures | Page 211**

▶ **ATTACHMENT E | Mountain Lion Predations | Page 218**

4.5 Competition

Mountain lions compete with other large carnivores in most areas of their range. Mountain lions and black bears regularly overlap in space in almost all mountain lion-occupied areas in California except for the Santa Cruz Mountains and the Santa Monica Mountains. In a study in the Mendocino National Forest in Northern California, black bears displaced mountain lions from about 50% their kills (Elbroch et al. 2015a), depriving them of calories, and potentially forcing them to expend additional energy hunting to procure more prey (Allen et al. 2021). Instead of avoiding areas with bears, mountain lions increased their predation rates to compensate for the kills stolen by bears (Elbroch et al. 2015a). It is unknown whether displacement by black bears occurs frequently enough to affect mountain lion survival and reproductive rates (Elbroch and Kusler 2018).

In western North America, gray wolves can affect adult and kitten survival by directly killing individual mountain lions, and can affect habitat and prey selection, bedding locations, and population size (Bartnick et al. 2013; Elbroch et al. 2015b; Kusler et al. 2017; Elbroch and Kusler 2018; Elbroch et al. 2020). Mountain lions can also kill individual wolves. In Washington State, at least four collared wolves were killed by

mountain lions from 2013–2022 (WDFW 2022). However, given the small size and limited distribution of California's current gray wolf population, competition between wolves and mountain lions has not been a significant threat to the persistence of mountain lions in the petitioned ESU. Wolves are currently absent from the petitioned ESU and therefore wolf competition is not considered a current threat; however, wolves are rapidly expanding their range in the state with one pack known to occupy a portion of the southern Sierra Nevada. If wolf distribution continues to expand, competition between wolves and mountain lions in the petitioned area may become a threat in the future. Finally, smaller predators and scavengers such as coyotes are known to opportunistically feed from mountain lions kills (Brunet et al. 2022), although the degree this loss of food resources impacts lions is difficult to quantify.

Intraspecific conflict and aggression (i.e. aggressive interactions between two or more mountain lions) appears to be a significant mortality factor in areas where mountain lions occupy small patches of suitable habitat surrounded by urban and agricultural development and other dispersal barriers (Riley et al. 2014; Vickers et al. 2015; Benson et al. 2020). Intraspecific aggression was identified as the leading cause of mortality for the nearly isolated mountain lions in the Santa Monica Mountains (a portion of the CC-S; Riley et al. 2014), although more recently, vehicles and toxicants have caused similar levels of mortality (Benson et al. 2020). From 2002 to 2018, about 41% of deaths of telemetered mountain lions tracked in the Santa Monica Mountains were determined to have resulted from intraspecific aggression. There were multiple documented cases of adult males killing their siblings, offspring sired by other males (i.e., infanticide), and previous mates (Riley et al. 2014; Benson et al. 2020). Additionally, in the SA, intraspecific predation was documented on two occasions in recent years (W. Vickers, unpublished data). Therefore, this form of competition should be considered a potential threat to mountain lion populations in small, isolated genetic populations such as the CC-S, SA, and the SGSB. While the effect of inter- and intraspecific competitions on mountain lions within the entire petitioned ESU is unknown, in the smaller genetic populations it likely exacerbates the threats associated with small, isolated populations.

4.6 Toxicants

Mountain lions throughout California are exposed to toxic chemicals in their environment. Depending on the extent of exposure, toxicants may cause clinical signs of disease or debilitation, or may lead to Status Review of the petitioned Southern

California/Central Coast ESU of Mountain Lion in California, California Department of Fish and Wildlife toxicosis and death or debilitation. Some ingested toxicants can be transferred in utero to fetuses, and debilitated lions may be more susceptible to other forms of mortality such as starvation and traumatic injuries.

Anticoagulant rodenticide (AR) baits are commonly used to control rodent pests in urban, suburban, and agricultural areas (Litovitz et al. 1998; Maroni et al. 2000). As summarized in Serieys et al. (2015), ARs interrupt the production of vitamin K-dependent blood clotting proteins, leading to the depletion of these proteins over a period of days and inducing mortality by internal hemorrhage. Comprised of two classes of compounds, ARs are the primary chemical method used worldwide for the control of rats and mice. First-generation ARs, including warfarin, diphacinone, and chlorophacinone, are more readily metabolized, have a shorter half-life in liver tissue (two weeks to several months), and must be consumed in multiple feedings to reach a lethal dose. Second-generation ARs include brodifacoum, bromadiolone, difenacoum, and difethialone, and were developed to target rodents with genetic resistance to warfarin. Due to increased toxicity and persistence in animal tissues, with half-lives ranging from 6–12 months, second-generation ARs may persist in liver tissue for more than a year in some species. Both classes of compounds have a delayed onset of action, and death from AR consumption can occur up to 10 days after ingestion. Individual rodents may continue to accumulate the compounds over a period of days, increasing their likelihood of capture by predators as they become weakened by the toxicant. For these reasons, ARs have the potential of creating primary and secondary poisoning risks to non-target wildlife. Predatory animals are at significant risk of secondary poisoning if they consume prey that had previously ingested ARs. AR exposure in wildlife has been positively associated with proximity to urban areas, raising concerns about long-term conservation impacts of AR exposure on non-target wildlife populations on the fringe of urban areas (Hosea 2000; Riley et al. 2007; McMillin et al. 2008; Gabriel et al. 2012; Serieys et al. 2015; Serieys et al. 2018).

Mountain lions can be exposed to ARs in many settings including near human settlements where legal ARs are used to control vertebrate pests (Moss et al. 2016; Smith et al. 2016). However, even in remote locations on public lands, mountain lions can come into contact with prohibited rodenticides as they are often used to protect illicit cannabis plantations (Gabriel et al. 2012). The Department's Wildlife Health Lab detected AR exposure in 94.2% (343/364) of tested mountain lion livers submitted between 2016

and 2022 (Fig.15; Rudd et al. 2020b; Rudd and Rogers 2021; Rudd et al. 2021; Rudd et al. 2022; CDFW unpublished data). Second-generation ARs were more commonly detected than first-generation ARs, despite a 2014 California regulatory change restricting second-generation AR use to certified pesticide applicators (Rudd et al. 2018; Rudd and Rogers 2021). Eighty-five percent of the mountain lion livers (306/364) tested had two or more different ARs present at the time of death, with 52.2% (190/364) of individuals testing positive for three or four different ARs, which indicates multiple exposure events are common (Fig. 16; Rudd et al. 2020b; Rudd and Rogers 2021; Rudd et al. 2021; Rudd et al. 2022; CDFW unpublished data). The 94.2% (343/364) total exposure prevalence recorded between 2016 and 2022 is higher ($X2 = 14.8$, $p < 0.001$) than the 82.4% (103/125) exposure prevalence found in mountain lion livers analyzed from across the state between 2003 and 2015 (Poppenga et al. unpublished data). In samples from 2003–2015, 67.2% (84/125) of livers indicated exposure to multiple AR compounds, which was lower than the exposure prevalence rate in livers tested between 2016 and 2022 ($X2 = 15.4$, $p < 0.001$).

Figure 15. *Anticoagulant rodenticide residues detected in 364 livers of mountain lions submitted to the Wildlife Health Laboratory for postmortem examination 2016–2022 (Rudd et al. 2020b; Rudd and Rogers 2021; Rudd et al. 2021; Rudd et al. 2022, CDFW unpublished data). Numbers on top of the bars are the number of livers that the specific residue was found in.*

Figure 16. *Number of different anticoagulant rodenticide analytes detected in 364 individual mountain lion livers analyzed from 2016–2022 (Rudd et al. 2020b; Rudd and Rogers 2021; Rudd et al. 2021; Rudd et al. 2022; CDFW unpublished data).*

Fetal AR exposure occurs in mountain lions, as exposure was detected in four of eight (50%) instances where both pregnant female mountain lions and fetal or placental tissues were tested (Table 4; CDFW unpublished data; National Park Service (NPS) unpublished data). Many toxic substances, including ARs, can adversely affect fetal development and survival at doses that may not produce toxic effects in the mother (Gupta 2012). Fetuses are also typically more susceptible to AR toxicity because the placenta is the only source of vitamin K for the fetus (Gupta 2012). AR-related coagulopathy and toxicity was not observed in any of the examined fetuses with AR exposure (Rudd et al. 2020, CDFW and NPS unpublished data).

Table 4. *Anticoagulant rodenticide test results for liver samples from 8 pregnant mountain lions and their fetuses, pooled fetal tissue, or placenta (CDFW and NPS unpublished data). BRD: brodifacoum, BRM: bromadiolone, CHL: chlorophacinone, DIF: difethialone, DIPH: diphacinone. An asterisk (*) indicates that the samples were pooled together for qualitative and quantitative analyses (i.e., samples too small to be evaluated individually).*

In the Santa Monica Mountains National Recreation Area (CC-S), the deaths of seven mountain lions since 2004 have been associated with AR exposure and toxicosis (Riley et al. 2007; NPS 2021). Between 2002 and 2019, out of 26 known deaths of adults and subadults in that population, 5 were from AR toxicosis (Benson et al. 2020). Two mountain lions that died from AR toxicosis in 2004 in CC-S also had infestations of notoedric mange (Riley et al. 2007; Uzal et al. 2007). Notoedric mange, typically caused in felids by the parasitic mite Notoedres cati, may cause fatal disease in bobcats and mountain lions (Foley et al. 2016). Exposure to higher doses of ARs or to more than one AR was associated with greater likelihood of dying due to severe mange (Serieys et al. 2015).

In addition to ARs, risk of pesticide exposure may also come from neurotoxic rodenticides, such as bromethalin, which have become more widely used as restrictions on ARs have increased (McMillin et al. 2016). Bromethalin is a single-feed neurotoxic rodenticide which once ingested is absorbed and processed in the liver to form its highly toxic metabolite, desmethylbromethalin (DMB). Both bromethalin and DMB accumulate in fat and brain tissues. Lethal intoxication leads to a death via respiratory failure, while sublethal intoxication can cause neurological dysfunctions that may resolve, or result in death (McMillin et al. 2016).

Bromethalin was thought to have low risk of secondary exposure, yet in recent years has been documented in nontarget wildlife in California (McMillin et al. 2016; Rudd et al. 2021; Rudd et al. 2022). Because exposure was documented in probable mountain lion prey species, CDFW and the California Animal Health and Food Safety Laboratory tested fat or brain tissue from 49 mountain lions for the metabolite DMB over two years. In 2021 and 2022, four of 32 (12.5%) and six of 17 (35.3%) mountain lions tested positive for DMB exposure, respectively (Rudd et al. 2021, 2022). Continued surveillance for bromethalin exposure is warranted and more research is needed on exposure pathways and the sublethal effects on mountain lions due to bromethalin products entering the food web.

The Petition cited Rudd et al. (2019) to state that mountain lions in California are exposed to dangerously high levels of illegal pesticides, such as carbofuran. However, this citation is incorrect; the Department has not documented any cases of carbofuran toxicity in mountain lions to date. Further research is needed to investigate the lethal and sub-lethal effects of anticoagulants and other toxicants on wildlife in terrestrial environments (Riley et al. 2007; Gabriel et al. 2015; Rudd et al. 2018).

4.7 Infectious Diseases

Mountain lions are afflicted by various viral, bacterial, and parasitic pathogens. It is not known if these pathogens and their respective diseases alone could imperil the species in California…

4.8 Wildland Fire and Fire Management

Fire is a natural disturbance in many California ecosystems. However, intense, high-severity burns can significantly modify ecosystems by changing plant and animal community compositions temporarily or long term (Williams et al. 2023). Wildfires in California can cause direct mortality to mountain lions and can result in temporary adverse modification of their habitats. However, after wildfires, deer populations typically respond favorably to the resulting plant regrowth (Lewis et al. 2022)….

Figure 17. *Wildfire perimeters in California by fire year, 1990–2022.*

4.9 Climate Change

Weather.

4.10 Risks to Small, Isolated Populations

Small, isolated mountain lion populations—such as those in the Santa Monica Mountain portion of CC-S, and the SA and SGSB genetic populations, which are each estimated to number less than 75 individuals (Table 3)—are inherently vulnerable to extinction due to multiple factors. These factors may include demographic stochasticity8, genetic drift9, lack of immigration, and inbreeding, which can eventually lead to inbreeding depression10. Genetic drift and inbreeding both reduce genetic variation which can diminish the ability of a population to adapt to changes in the environment (Primack 1993; Reed and Frankham 2003). Each of these effects can amplify the impact of the

other effects, further reducing population size and accelerating local extinction in what has been termed an extinction vortex (Primack 1993).

4.10.1 Demographic and Environmental Stochasticity

Reproduction and survival rates vary among individuals and between years in wildlife populations. This variation leads to demographic stochasticity, which tends to average out in large populations but has a much greater effect on the rate of growth or decline in small populations. If a small population declines, subsequent generations become even more susceptible to demographic stochasticity. Additionally, unpredictable changes in the natural environment can cause the size of small populations to vary dramatically while larger, more widely distributed populations would remain more stable because these changes normally occur only in localized areas of the entire population's geographic range (Primack 1993). For example, changes in vegetation, abundance of resources, or disease and parasite exposure can cause the size of small, isolated wildlife populations to fluctuate wildly, possibly leading to local extinction (Primack 1993). Additionally, natural disasters such as droughts, fires, and severe storms can lead to dramatic population changes when populations are small and isolated to one location.

While the statewide population of mountain lions is large enough that demographic and environmental stochasticity is unlikely to be an issue, the smaller and more isolated populations (those in the Santa Monica Mountains portion of CC-S, and the SA and SGSB genetic populations) are potentially vulnerable to those impacts. Of specific concern are the increasingly large and severe fires leading to direct death or injury or significant habitat changes (see section 4.7). For example, the Woolsey Fire in 2018 burned about 39,235 ha (96,949 acres) in the center and western part of the Santa Monica Mountains National Recreation Area. According to the National Park Service, two of the 11 mountain lions with working radio-collars in and around the Santa Monica Mountains at the time of the Woolsey Fire succumbed to the fire or its impacts (Blakey et al. 2022). In such a small population (Table 3), the impact of just one event like the Woolsey Fire on the population could be substantial, especially if the animals killed or adversely affected were breeding adults.

4.10.2 Inbreeding and Genetic Drift

Inbreeding and genetic drift can both result in decreased genetic variation in wildlife populations. Deleterious alleles (maladaptive genes) can be present at low frequency even in large, healthy populations. But as populations become smaller, these

maladaptive genes can increase in relative frequency, and populations may suffer the effects of inbreeding depression, resulting in offspring with a reduced ability to survive and reproduce (Frankham 2005; Harding et al. 2016). Genetic drift may also lead to the loss of beneficial alleles or the fixation of deleterious alleles in a small population due to a limited breeding pool (Hedrick and Kalinowski 2000). Deleterious fixed alleles can result in decreased fitness for all individuals and lead to population declines (Hedrick and Kalinowski 2000; Frankham 2005).

Multiple genetic studies have shown that certain mountain lion genetic populations along the southern coast of California have particularly low genetic variation (Ernest et al. 2003; Ernest et al. 2014; Riley et al. 2014; Gustafson et al. 2019; Gustafson et al. 2022) which may be the result of habitat fragmentation and genetic isolation. Linkage decay analysis by Gustafson et al. (2022) showed evidence of inbreeding between closely related11

11 "A common ancestor less than three generations ago" (Saremi et al. 2019) (i.e., first-cousins or closer). individuals in at least four of the fine scale genetic populations (see details in section 4.9.4 below). Saremi et al. (2019) investigated mountain lion genomes and found additional evidence of recent inbreeding among closely related individuals (i.e., long runs of homozygosity) in the Santa Monica and Santa Cruz Mountains.

However, the results of Gustafson et al. (2022) suggest the problems of inbreeding and homozygosity do not occur in all California populations. Several larger California populations (e.g., Sierra Nevada) display little evidence of inbreeding (see section 4.9.4 below for details). Additionally, genetic variation in the broad-scale genetic populations may minimize the impacts of inbreeding depression in many of the fine-scale populations if gene flow can be enhanced (Gustafson et al. 2022). This conclusion is consistent with the results of Saremi et al. (2019) that indicated even though inbreeding had reduced variation in the genomes of many individual mountain lions, these low-heterozygosity genome regions were generally not shared between populations. These studies suggest genetic restoration is possible even among genetically depauperate populations. When considering that genetic variation is high in the WSN and ESN genetic populations (Gustafson et al. 2022), there is potential for long-term persistence of mountain lions throughout much of the state if adequate habitat can be protected and habitat connectivity can be restored and/or enhanced to facilitate increased genetic exchange

between the genetic populations in the Sierra Nevada and those within the petitioned area (see Section 10.1 for more detail).

4.10.3 Loss of Genetic Variation

High levels of genetic variation have been shown to be positively correlated with survival and reproduction rates and decreased extinction risk (Hedrick and Kalinowski 2000; Reed and Frankham 2003). The concept of effective population size12

12 The number of individuals in a population that are contributing to the next generation (i.e., reproducing and passing on their genes). (Ne) is useful for understanding the likelihood that a population will lose genetic variation through genetic drift or inbreeding. Ne is the size of an ideal population that would result in the same level of inbreeding or genetic drift as that of the population under study (Palstra and Ruzzante 2008). Ne is determined by several factors and its value is generally significantly smaller than the census population (i.e., the number of animals actually breeding in a population is usually significantly fewer than the total number of animals in the population; Palstra and Ruzzante 2008).

Both Franklin (1980) and Soulé (1980) reviewed the genetic considerations fundamental to species conservation. They proposed two primary considerations related to population viability: 1) an immediate danger in small populations due to inbreeding (i.e., inbreeding depression), and 2) the longer-term loss of additive genetic variation that would limit future evolutionary change (i.e., evolutionary potential). Their work led to the common adoption of what is now referred to as the 50/500 rule in conservation biology. Under this framework, in the absence of gene flow, a Ne of at least 50 should be maintained to avoid inbreeding depression in the short term for large mammal species (Harmon and Braude 2010). Franklin (1980) suggested that with a Ne below 500, genetic variance for complex traits would be lost significantly faster than it could be renewed by mutation. Soulé (1980) added that this size (500) was required to maintain sufficient genetic variation for populations to evolve to changing environments in the longer term (evolutionary potential).

Since then, the importance of conserving quantitative genetic variation has gained recognition, although there is disagreement about the appropriate value for Ne. Frankham et al. (2014) suggested that Ne = 50 would be raised to at least Ne = 100 to prevent inbreeding depression over short time scales (~5 generations). Frankham et al. (2014) also summarized several independent lines of theoretical and empirical

evidence suggesting that at least Ne = 1000 is required to maintain evolutionary potential in perpetuity.

Regardless of whether Ne = 50 or Ne = 100 is used as a benchmark, nearly all the genetic populations within the petitioned area are below the population size needed to avoid inbreeding depression in the short term (Table 6). True extinction risk is often the result of the complicated interaction of both genetic and demographic factors. Recent analyses reveal that a minimum of 7,923 km2 (3,059 mi2) of protected suitable habitat [13] or 14,591 km2 (5.633 mi2) of overall suitable habitat is needed to allow mountain lions to maintain an Ne ≥ 50 (Dellinger et al. 2020b). According to Dellinger et al. (2020b), the Central Coast (roughly equivalent to CC-C) is the only area where the mountain lions within the petitioned area occupy an area larger than this suitable habitat threshold; however, because of potential future development pressures, it is unknown whether the threshold will continue to be met over the long term. Dellinger et. al.'s conclusions (2020b) suggest that the long-term viability of mountain lions in the other genetic populations may be reduced unless suitable habitat and/or connectivity to other genetic populations is increased (Benson et al. 2016; Benson et al. 2019). While there are examples of small wild populations that persist below the suggested threshold, at least in the short term, it is not known whether the genetic populations within the petitioned area, facing increasing isolation and with low genetic variation, will ultimately maintain long-term viability (see examples in Harding et al. 2016)

13] Dellinger et al. (2020b) considered all public lands and private lands overlain with conservation easements "protected".

***Table 6.** Estimated population (CDFW unpublished data) and effective population sizes of genetically distinct mountain lion populations identified in Gustafson et al. (2019). The boundaries used to calculate the population sizes come from Dellinger et al. (2020b). Estimates from Gustafson et al. (2019) are adapted from Table 3 and include parametric 95% confidence intervals. Estimates from Gustafson et al. (2022) are adapted from their Table 1 and confidence intervals were not reported.*

An important metric of genetic variation is expected heterozygosity (HE)14

14 Heterozygosity refers to having inherited two different alleles for a particular trait compared to homozygosity, in which the inherited alleles are identical at a given location of the genome. . Adequate genetic variation is important for maintaining evolutionary potential, as variation is the raw material that allows populations to adapt

to changing conditions over generations. The amount of heterozygosity in California mountain lion genetic populations is highly variable (Gustafson et al. 2019; range of HE = 0.33–0.53; based on microsatellite loci), but lower on average than other western states, including Wyoming, Nevada, Arizona, Utah, Colorado, and New Mexico (range of HE = 0.49–0.59; (Anderson et al. 2004; McRae et al. 2005; Andreasen et al. 2012)). Compared to California, mountain lion populations in these states show less population genetic structure due to higher rates of gene flow, which in turn counteracts the effect of genetic drift in reducing heterozygosity (Anderson et al. 2004; McRae et al. 2005). The lower overall heterozygosity, as well as the large variance in heterozygosity among local genetic populations, observed in California is most likely driven by barriers to dispersal such as mountain ranges and contemporary patterns of urban and transportation development (Ernest et al. 2003; Gustafson et al. 2019; Gustafson et al. 2022).

Assessing heterogeneity among the four broad-scale mountain lion groups in California, Gustafson et al. (2022) found they have retained substantial heterozygosity, particularly in the Sierra Nevada region with its large stretches of undeveloped contiguous habitat (Dellinger et al. 2020b). Multiple genetic investigations have now demonstrated the importance of the Sierra Nevada region as a reservoir of genetic variation (Ernest et al. 2003; Gustafson et al. 2019; Gustafson et al. 2022). Bi-directional migration rate models based on genetic data indicated the WSN genetic population has served as a significant source of migrants into other regions of California, importantly the EPR, CC-N, and SGSB (Fig. 4; Gustafson et al. 2019).

Isolated populations can also become structured through natural selection as locally adaptive genes become more prevalent in the population. However, mountain lions are long-distance dispersers and inhabit all major mountain ranges in California (Dellinger et al. 2020b), suggesting local adaptation may be unlikely, despite current connectivity challenges. Gustafson et al. (2022) found no evidence for local adaptive differences among the four broad-scale geographic mountain lion groups, or among the 10 fine-scale genetic populations. Though the appropriateness of using reduced representation genome sequencing data (in this case, restriction site-associated DNA sequencing data) to detect local adaptation has been questioned within the scientific literature (Lowry et al. 2017), this approach has been employed successfully in other studies (Catchen et al. 2017). The results of Gustafson et al. (2022) found no evidence for local adaptive traits warranting specific conservation status, nor risk of outbreeding depression

resulting from the mixing of genetic groups as a result of active management (e.g., translocations) (Frankham et al. 2011). However, the South Coast group contained some private alleles which were not found in other genetic groups and which should be conserved to help preserve statewide genetic variation (Gustafson et al. 2022).

While genetic risks may significantly increase a small population's risk of extinction, implementation of a well-planned conservation strategy can substantially mitigate risks associated with small populations. A comprehensive plan for long term viability should include the principles of representation, resiliency, and redundancy (Shaffer and Stein 2000; Wolf et al. 2015).

4.10.4 Genetic Impacts on the Populations Within the Petitioned ESU

Heterozygosity within the genetic populations of petitioned ESU is highly variable. Of the broad-scale groups, SC and CC have relatively low genetic variation while SN and NC have retained sufficient variation to be capable of serving as sources of genetic rescue under various management scenarios (e.g., improved connectivity, assisted gene flow). Maintaining and enhancing connectivity within and among broad-scale groups has the potential to counteract the effects of genetic drift and inbreeding to at-risk coastal genetic populations.

Sierra Nevada Group. *Gustafson et al. 2019 and 2022 consider the Sierra Nevada region to be a major source of genetic diversity for mountain lions in California. This group is of critical importance to sustaining statewide gene flow as the Tehachapi range at its southern end is the only known area where there is current gene flow from outside the petitioned area into the CC and SC groups. Enhancing connectivity through the Transverse Ranges, including the Tehachapi, Sierra Pelona, San Gabriel, and San Bernardino Mountains, represents a critical conservation priority (Gustafson et al. 2019)*

Central Coast Group. *The three fine-scale genetic populations in the Central Coast Group differ significantly in their levels of genetic variation. The CC-C has the highest diversity with the Central Coast Group and the largest Ne estimates, though neither Ne estimate exceeds 100. The CC-N and CC-S genetic populations have low estimated Ne and represent areas of genetic management concern because the area they inhabit contains insufficient suitable habitat to sustain a mountain lion population with Ne ≥ 50 (Gustafson et al. 2019; Dellinger et al. 2020b; Gustafson et al. 2022).*

Central Coast-North. *Lack of connectivity and inbreeding are concerns in CC-N. Gustafson et al. (2022) found evidence of close inbreeding in CC-N, which is consistent with the whole genome sequencing results of Saremi et al. (2019) from the Santa Cruz Mountains which suggested close and recent inbreeding led to runs of homozygosity in the lion genomes. A long-term research project in the Santa Cruz Mountains has collared 147 adult and juvenile mountain lions with GPS and/or VHF collars over the past 15 years. During that time no collared animal has left the Santa Cruz Mountains to the east across the Coyote Valley to the Diablo Range or to the south across Highway 101 to the Gabilan Range (pers. comm C. Wilmers 2024). This suggests that there is very limited current connectivity between the major mountain ranges in CC-N, and further inbreeding is a concern.*

Central Coast-Central. *The CC-C population is currently the largest and most genetically robust of the genetic populations within the petitioned ESU, with Ne estimates of 57 (Gustafson et al. 2019) and 27 (Gustafson et al. 2022; Table 6). However, the amount of suitable habitat in the area that is currently conserved (6,780 km2; 2,618 mi.2) is more than 1,000 km2 below the threshold Dellinger et al. (2020b) considered necessary to support an Ne ≥ 50 and long-term population stability. Additionally, bi-directional migration rate models indicate CC-C serves as the most significant source of migrants to CC-S, and along with WSN, is one of only two occasional sources of migrants to CC-N and SGSB (Gustafson et al. 2019). This suggests protecting CC-C is key to maintaining the entire Central Coast Group and for maintaining what little genetic connectivity remains between the Central Coast Group and the South Coast Group (Figs. 4, 9, 10). Thus, maintaining or expanding this genetic population and its connectivity to adjacent genetic populations is critical for the long-term viability of the entire petitioned ESU.*

Central Coast-South. *As with CC-N, Gustafson et al. (2022) and Saremi et al. (2019) found evidence of close inbreeding in CC-S. Within CC-S, the Santa Monica Mountains in particular appear to have very low genetic variation and are exhibiting both genetic and phenotypic evidence of inbreeding (Ernest et al. 2014; Riley et al. 2014; Benson et al. 2019; Gustafson et al. 2019; Gustafson et al. 2022; Huffmeyer et al. 2022). This population is one of two in the petitioned ESU (see SA below) to have the lowest genetic variation observed for the species globally, apart from the endangered Florida panther (Riley et al. 2014). There are multiple known cases of close inbreeding, for example a male that had kittens with daughters, granddaughters, and great granddaughters (Riley et al. 2018a, S. Riley pers. comm. 2024). Phenotypic evidence of inbreeding depression*

in the form of kinked tails, failed descension of the testes, and abnormal sperm morphology have been observed. These irregularities have also been observed in Florida panthers (Roelke et al. 1993; Ernest et al. 2014; Huffmeyer et al. 2022). Freeway traffic and urban development have largely isolated the Santa Monica Mountains from animals in the rest of CC-S and therefore from the rest of the Central Coast and from the Sierra Nevada groups, severely limiting contemporary gene flow (Riley et al. 2014). For example, 2009 was the last time a mountain lion was documented crossing U.S. 101 and entering the Santa Monica Mountains (Benson et al. 2016). That male bred successfully and increased the genetic diversity of the Santa Monica Mountain population (Riley et al. 2014). Similarly, very few animals have been documented dispersing from the main body of the Santa Monica Mountains. A male lion, identified as P-22, which established a territory in Griffith Park in 2012 after migrating from the western Santa Monica Mountains, almost certainly crossing U.S. 101 and I-405 along the way, was the most famous of these. He died in 2023 without fathering cubs; however, in 2024, another mountain lion of unknown origin was sighted in Griffith Park (Gammon 2024). Models predict a 16–28% probability of the extirpation of the Santa Monica Mountains population within 50 years if immigration levels remain the same or are reduced, in part due the impacts of inbreeding depression (Benson et al. 2016; Benson et al. 2019). In contrast, in the CC-S genetic population north of U. S. 101, two radio collared males dispersed from their natal range, crossed highways, and established home ranges as adults in the area of the Santa Susana Mountains, Simi Hills, and Los Padres National Forest (Riley et al. 2014). Therefore, the threat of isolation and potential inbreeding depression is more acute in the Santa Monica Mountains than in the CC-S genetic cluster as a whole.

South Coast Group. *The South Coast Group is comprised of 3 genetic populations: Santa Ana Mountains (SA), Eastern Peninsular Range (EPR), and the San Gabriel/San Bernardino Ranges (SGSB).*

San Gabriel/San Bernardino. *The SGSB genetic population has low observed genetic variation, a very small estimated Ne (2.3–5; Table 6), and exhibits evidence of inbreeding (Gustafson et al. 2019; Gustafson et al. 2022). Additionally, the SGSB area is comprised of two discreet mountain ranges that area separated by roads and largely surrounded by urbanized areas and desert containing little shrub or tree cover. This isolation increases the genetic population's risk of inbreeding depression (Gustafson et al. 2019).*

Santa Ana Mountains. *The SA genetic population has an estimated Ne of 3.5–15 and concerningly low genetic variation (Gustafson et al. 2019; Gustafson et al. 2022) and available suitable habitat (Dellinger et al. 2020b). Along with the Santa Monica Mountains population, the SA has the lowest genetic variation of any known mountain lion population other than Florida panthers (Ernest et al. 2014; Riley et al. 2014; Gustafson et al. 2019). Like the Santa Monica Mountains, genetic and phenotypic evidence of inbreeding depression in the form of kinked tails and teratospermia (> 60% abnormal sperm production) has been observed in the SA (Ernest et al. 2014; Huffmeyer et al. 2022). As with the Santa Monica Mountains, the main barriers to movement appear to be freeways and adjacent urban/developed areas, which have limited gene flow in recent decades (Ernest et al. 2014; Riley et al. 2014; Vickers et al. 2015; Huffmeyer et al. 2022). While there is genetic evidence that individual animals from EPR historically were able to successfully move into the SA and breed (see the full red and half red samples in the Santa Ana Mountains in Fig. 10), that connectivity may no longer be viable due to the strength of I-15 as a barrier between the populations as traffic and nearby development have increased in recent years (Vickers et al. 2015). For example, a thirteen-year study (2001–2013) that collared 74 mountain lions in the SA and EPR observed only one animal move between the populations, and that individual was killed for depredating sheep before it could breed and introduce genetic material to the group (Vickers et al. 2015). The impact of this isolation and inbreeding has led to an estimated "16–21% probability of local extinction in the (Santa Ana Mountains) due purely to demographic processes over 50 years with current low levels or no immigration" (Benson et al. 2019).*

Eastern Peninsular Range. *The EPR genetic population has an estimated Ne of 15–32 and shows little evidence of inbreeding (Gustafson et al. 2019), although there has been a report of teratospermia (Huffmeyer et al. 2022). The EPR appears to have retained sufficient variation to be capable of serving as a source of genetic rescue for other genetic populations (Gustafson et al. 2019; Gustafson et al. 2022), and could perform an important role in increasing connectivity and gene flow within the broad-scale SC group if connectivity is improved (Figs. 4, 10). The EPR is the only genetic population known to exchange migrants with the Santa Ana Mountains, and management actions which enhance gene flow between these areas are critical to SA's population viability. Gene flow between EPR and the adjacent SGSB genetic population appears limited. The degree of dispersal from Arizona, Nevada, and Mexico into EPR remains unknown (Gustafson et al. 2019). Connectivity between EPR and adjacent populations in Mexico*

and Arizona may be curtailed by physical barriers along the border and the damming and major channelization of the Colorado River. Immigration and emigration patterns of mountain lions in the eastern area of EPR have not been studied, and mountain lion density may be low in that area. Some gene flow may occur across the Colorado River from the Kofa National Wildlife Refuge into California, and one mountain lion has been documented moving between EPR and Mexico, suggesting genetic connection to Mexico may exist (Vickers et al. 2015; W. Vickers, unpublished data).

In summary, multiple genetic populations in the petitioned area are at risk from genetic factors associated with small, isolated populations. However, these genetic populations identified in Gustafson et al. (2019) are nested within two broader-scale genetic groups identified by Gustafson et al. (2022) that each contain more robust, but still less than ideal levels of genetic diversity. This suggests that if connectivity can be improved among the smaller, nested genetic populations and between CC, SC, and SN, low genetic variation in the at-risk populations can still be mitigated with intentional management.

5. Existing Management

5.1 Land Ownership within the Petitioned Southern California/Central Coast ESU

The area of the petitioned ESU is approximately 15,273,700 ha (37,742,134 acres) (Table 7). Approximately 52% of the area is public land and 48% is private. The Bureau of Land Management (BLM) manages the largest amount of land at 21%, followed by the U.S. Forest Service (9%), the National Park Service (6%), the Department of Defense (5%), and the California Department of Parks and Recreation (3%). Local (city or county) and nonprofit special districts combined represent 5% of the public land. Tribal lands total 167,700 ha (414,396 acres), which is 1% of the non-private land within the petitioned ESU *(Table 7, Fig. 20).*

Public (and private) lands are managed for many different purposes including recreation, extractive uses (timber harvest and mining), grazing, and wildlife habitat. Thus, while some specific projects on public lands may not benefit mountain lions, most public lands in California are managed for multiple uses including wildlife conservation and sustainability.

Table 7. *Land ownership within the petitioned Southern California/Central Coast ESU, percentage of total ESU area by manager, and percentage of public land area by manager in the petitioned ESU.*

Figure 20. *Public and tribal lands within the petitioned Southern California/Central Coast mountain lion ESU.*

California is 100,000,000 total acres, the third largest state, with 40-43 million acres used for agriculture. CDFW's proposed ESU Area is nearly 38 million acres [38% of California], which would traffic the mountain in multiple directions, with no management plan for the mountain lion, but oppressive policies for the people and lands within the boundaries. ***The area of the petitioned ESU is approximately 15,273,700 ha (37,742,134 acres) (Table 7). Approximately 52% of the area is public land and 48% is private.*** *The Bureau of Land Management (BLM) manages the largest amount of land at 21%, followed by the U.S. Forest Service (9%), the National Park Service (6%), the Department of Defense (5%), and the California Department of Parks and Recreation (3%). Local (city or county) and nonprofit special districts combined represent 5% of the public land. Tribal lands total 167,700 ha (414,396 acres), which is 1% of the non-private land within the petitioned ESU.* **The only benefit the mountain lion has in California, is in the balance of our ecosystem. They are majestic**

▶ **ATTACHMENT B | Mountain Lion Sightings Maps | Page 205**

▶ **ATTACHMENT C | California Department of Fish and Wildlife Petition Maps | Page 209**

5.2 California Wildlife Protection Act

California voters through Proposition 117 adopted the California Wildlife Protection Act of 1990 (Act), codified in part as Fish and Game Code section 4800, et seq. Among other things, ***the Act specifically called out the loss of deer, mountain lion, and other wildlife habitat*** *within California's mountain ranges and foothills, including the Simi Hills, and the Santa Lucia, Santa Susana, Santa Monica, San Gabriel, San Bernardino, San Jacinto, and Santa Ana Mountains in Southern California as well as the need to preserve habitat corridors to maintain the genetic integrity of California's wildlife.* ***The Act, through the establishment of the Habitat Conservation Fund, included an ongoing annual appropriation of $14,500,000 for the acquisitions of deer and lion habitat in those areas.*** *More generally, the Act emphasized the use of funds to acquire habitat needed to maintain connectivity between isolated or fragmented habitats to promote the genetic*

integrity of wildlife populations. ***To date, the Act's Habitat Conservation Fund has protected nearly 405,000 ha (1,000,000 ac.) of habitat across the state, including over 76,890 ha (190,000 ac.) of habitat within the petitioned ESU (California Wildlife Conservation Board unpublished data).*** *The Act also designated mountain lions as specially protected mammals and prohibited their taking, injury, possession, or sale, except for instances where a lion represents an imminent threat to public safety or has damaged livestock or other property damage.*

5.3 State and Federal Land Use Laws

The laws and regulations governing actions within the mountain lion's range vary by ownership. Several state and federal environmental laws apply to activities undertaken in California, and while they may not specifically address mountain lions, they may indirectly provide some level of protection for the species and its habitat. The primary environmental laws are summarized below.

5.3.1 California Environmental Quality Act (CEQA)

The California Environmental Quality Act (CEQA) requires state and local agencies to identify, analyze, and consider alternatives to, and to publicly disclose environmental impacts from, projects over which they have discretionary authority (Pub. Resources Code, § 21000 et seq.). CEQA requires an agency find that projects may have a significant adverse effect on the environment if they have the potential to substantially reduce the habitat, decrease the number, or restrict the range of any rare, threatened, or endangered species (Cal. Code Regs., tit. 14, §§ 15065(a)(1), 15380). ***CEQA establishes a duty for public agencies to avoid or minimize such potentially significant adverse effects where feasible*** *(Cal. Code Regs., tit. 14, § 15021), and it differs substantially from the National Environmental Protection Act in requiring potentially significant adverse effects be mitigated to a less than significant level unless the lead agency adopts a statement of overriding considerations. In practice, implementation of CEQA by state and local governing bodies typically results in projects incorporating impact avoidance, minimization, and mitigation measures into project design and construction. A lead agency is not required to make a mandatory finding of significance conclusion for a project unless it determines on a project-specific basis that the project has the potential to: substantially reduce the habitat of a fish or wildlife species; cause a fish or wildlife population to drop below self-sustaining levels; threaten to eliminate a plant or animal community; or substantially reduce the number or restrict the range of an*

endangered, rare or threatened species. Under CEQA, a lead agency should identify and evaluate potential impacts to mountain lions, and if the impacts are found to be significant, mitigate them under the Biological Resources section of an environmental document prepared pursuant to CEQA or adopt a statement of overriding considerations.

Another important component of CEQA is the requirement that governing bodies disclose and consider project-related impacts that when considered alone may not be significant, but when viewed in concert with other past, present, and foreseeable related projects cumulatively result in a significant impact to the environment (i.e., cumulative impacts; Cal. Code Regs., tit. 14, § 15355). This requirement often results in the incorporation of wildlife movement corridors into local development and infrastructure projects (e.g., open space setbacks along stream corridors and property lines) which can provide opportunities for mountain lions to pass through urban and suburban landscape, although such corridors are not always wide enough or vegetated with adequate shrub and tree cover to encourage use by mountain lions.

Section 21080.5 of the Public Resources Code provides that a regulatory program of a state agency shall be certified by the Secretary for Resources as being exempt from the CEQA requirements for preparing EIRs, negative declarations, and initial studies if the Secretary finds that the program meets the same criteria as CEQA. A certified regulatory program (CRP) remains subject to other provisions in CEQA such as the policy of avoiding significant adverse effects on the environment where feasible. These CRPs include the regulation of timber harvest by CAL FIRE and the State Board of Forestry through the Forest Practice Act; the regulation of coastal development permits by the California Coastal Commission through the California Coastal Act of 1976, Division 20 (commencing with Section 30000) of the Public Resources Code and the preparation, approval, and certification of local coastal programs as provided in Sections 30500 through 30522 of the Public Resources Code; and the pesticide regulatory program administered by the Department of Pesticide Regulation and county Agricultural Commissioners. While these CRPs are exempt from some of the procedural requirements of CEQA, courts have consistently held that they remain subject to the broad policy goals and substantive standards of CEQA, including requirements to consider feasible alternatives and cumulative impacts and to recirculate environmental review documents in certain circumstances.

5.3.2 Z'Berg–Nejedley Forest Practice Act

The Z'Berg–Nejedley Forest Practice Act was originally enacted in 1973 to ensure that forest practices, including timber harvesting, are undertaken in a manner that will also preserve and protect California's fish, wildlife, forests, and streams. The Forest Practice Rules are regulations that implement the provisions of the Z'Berg–Nejedley Forest

Practice Act in a manner consistent with other laws, including CEQA, Porter-Cologne, CESA, and the Timberland Productivity Act of 1982. CAL FIRE enforces these laws and regulations governing timber harvesting and other forest practices on state and private land. ***The only area within the petitioned ESU where commercial timber harvest commonly occurs is the redwood forest zone of Santa Cruz County and nearby minor areas of San Mateo and Santa Clara Counties (CDTFA 2021). The CC-N genetic population occurs in these areas.***

5.3.3 Natural Community Conservation Plans and Habitat Conservation Plans

Habitat Conservation Plans (HCPs) and Natural Community Conservation Plans (NCCPs) are federally and state authorized conservation plans that permit incidental take of species listed under the federal Endangered Species Act (ESA) or CESA, respectively. Take authorization may be applied to species not currently listed but which may become listed as threatened or endangered over the term of the plan, which is typically 25–75 years. Non-federal entities can obtain authorization for take of federally threatened and endangered species incidental to otherwise lawful activities through development and implementation of an HCP pursuant to Section 10 of the ESA. California's companion law, the Natural Community Conservation Planning Act of 1991, takes a broader approach than either CESA or ESA. An NCCP identifies and provides for the protection of plants, animals, and their habitats, while allowing compatible and appropriate economic activity. There are currently four HCPs in California that include mountain lions as a covered species; all four are also NCCPs, but only three of those NCCPs include mountain lion as a covered species.

The 1998 San Diego Multiple Species Conservation Program (MSCP) is a 50-year NCCP/HCP that covers 233,099 ha (576,000 acres) in the southwestern portion of

San Diego County and includes mountain lion as a covered species. The Program includes coverage for mountain lions as 81% of the core areas (± 42,492 ha, ± 105,000 acres) that will be conserved contain lion habitat, and the core areas have multiple connections

to help maintain ecosystem balance. *While the MSCP generally notes linkage areas were designed to accommodate "large animal movement," it does not identify linkages designed for mountain lions or contain specific measures designed to protect them.*

While the MSCP addresses specific design criteria for linkages, and road crossings/under crossings are included in subarea plans, not all subarea plans are complete.

The San Diego Water Authority NCCP/HCP also includes mountain lion as a covered species. The Plan Area encompasses 401,448 ha (992,000 acres) in western San Diego and southwestern Riverside Counties*. The plan includes general conditions to avoid and minimize impacts to habitat linkages and wildlife movement corridors and includes habitat-based mitigation for unavoidable impacts. The plan estimates that approximately 139 ha (344 acres) of potential mountain lion habitat could be impacted over the 55-year permit term with approximately 284 ha (702 acres) of potentially suitable habitat provided within the existing Preserve Area.*

The Orange County Transportation Authority NCCP/HCP (OCTA Plan) lists the mountain lion as a covered species for purposes of the federal HCP, but not for purposes of the NCCP permit. The Plan covers all of Orange County (2,070 km2; 800 mi.2). The OCTA Plan contains four "Species Goals" intended to offset impacts to mountain lions, including: (1) acquiring 410 ha (1,013 acres) of suitable habitat; (2) realigning fencing near the Highway 241 toll road; (3) funding for the North Coal Canyon Restoration Project; and (4) a "wildlife crossing policy" requiring pre-construction surveys to ensure existing crossings "maintain or improve functionality" if modified by new freeway projects. *However, the OCTA Plan does not require the construction of specific wildlife crossings.*

The Western Riverside County Multiple Species HCP/NCCP, which covers approximately 510,227 ha (1,260,800 acres) in western Riverside County and proposes to set aside 202,343 ha (500,000 acres) for habitat*, also lists the mountain lion as a covered species. Plan implementation is expected to result in the loss of 53,418 ha (132,000 acres) of suitable mountain lion habitat and includes three biological objectives* ***to mitigate these impacts related to the Conservation Area, Conservation Area Linkages, and maintaining or improving dispersal route functionality.***

5.4 Local Ordinances

There are three local ordinances within the petitioned ESU that are relevant to mountain lions.

5.4.1 Ventura County Habitat Connectivity and Wildlife Movement Ordinance

***Ventura County's Wildlife Connectivity Ordinances were adopted by the Ventura County Board of Supervisors in 2019 to facilitate wildlife connectivity and minimize habitat fragmentation for mountain lions**, mule deer, California gnatcatchers (Polioptila californica), bobcats, least Bell's vireos (Vireo bellii pusillus), California red-legged frogs (Rana draytonii), and other species. **Two of the linkages targeted in the Connectivity Ordinances are the Santa Monica Mountains—Sierra Madre Mountains connection and the Sierra Madre Mountains—Castaic Connection, which together connect wildlife habitat in the Santa Monica Mountains, Santa Susana Mountains, Simi Hills, and Los Padres National Forest**. While implementation of the Connectivity Ordinances should help wildlife to move more easily through private lands between core habitat areas, it would not address connectivity across major roads and highways, which is outside its jurisdiction (Country of Ventura Resource Management Agency 2024).*

5.4.2 Los Angeles County Significant Ecological Areas Ordinance

***The Los Angeles County Significant Ecological Areas Program recently updated its Significant Ecological Areas (SEAs) Ordinance**. The ordinance is intended to protect biodiversity in SEAs from **incompatible development** and ensure that projects reduce habitat fragmentation and edge effects by providing technical review of impacts and requiring mitigation. Like Ventura County's Connectivity Ordinance, **the SEAs designations can lead to compact development and allow wildlife to move across private lands more easily between core habitat areas**. However, the SEA ordinance is not specifically designed to protect mountain lions (Los Angeles County Planning (LACP) 2023).*

5.4.3 City of Los Angeles Draft Wildlife Ordinance

The City of Los Angeles Department of City Planning has developed draft regulations for the protection of wildlife within the city limits, including the promotion of wildlife movement corridors. One stated goal of the draft regulations is to improve wildlife mobility and connectivity opportunities along waterways, ridgelines, and natural open spaces. The Wildlife Pilot Study is intended to result in regulations that will help to preserve wildlife and promote

habitat connectivity on small to medium size residential developments in a pilot study area in the Santa Monica Mountains between the 405 and 101 freeways (Los Angeles County Planning (LACP) 2024).

5.5 Management on Federal Lands

5.5.1 National Environmental Policy Act

Most federal land management actions must undergo National Environmental Policy Act of 1969 (NEPA; 42 U.S.C. § 4321, et seq.) analysis. NEPA requires federal agencies to document, consider alternatives, and disclose to the public the impacts of major federal actions and decisions that may significantly impact the environment. The ***Department is not aware that the mountain lion is afforded any federal special status, and as such, impacts to the species are not required to be considered during NEPA analysis.*** *The law directs federal agencies to adopt all practical means to minimize or mitigate adverse effects when selecting preferred alternatives or justify not doing so.*

5.5.2 National Forest Service and Bureau of Land Management

The U.S. Department of Agriculture's Forest Service is responsible for developing forest management plans consistent with the National Forest Management Act requirements. These plans guide land use and development within national forests and grasslands in a way that balances use and protection of natural resources to support ecological, social, and economic sustainability. Within the petitioned Southern California/Central Coast ESU, the USFS has adopted Forest Management Plans for the Los Padres, Angeles, San Bernardino, and Cleveland National Forests. These plans identify conservation strategies for mountain lion related to land acquisition, preventing habitat fragmentation, monitoring, and fire management. The Forest Service also manages several Wilderness Areas in the major National Forests within the petitioned area. Wilderness Areas are the most protected public lands in the US. Extractive uses are prohibited, as well as building roads or structures. The Angeles National Forest has five Wilderness Areas, the Cleveland National Forest has four Wilderness Areas, the Los Padres National Forest has 10 Wilderness Areas, the San Bernardino NF has eight Wilderness Areas. ***National Forest Wilderness in the petitioned ESU area totals approximately 485,000 ha (1.2 million acres).***

The U.S. Department of Interior's Bureau of Land Management prepares Resource Management Plans to provide broad-scale direction for managing public lands in accordance

with the principles of multiple use and sustained yield, as mandated by the Federal Land Policy and Management Act. These plans establish goals, objectives, and decisions for air quality, biological resources, cultural resources, lands with wilderness characteristics, paleontological resources, visual resources, water resources, fire ecology and management, trail and travel management, lands and realty, land use authorizations, livestock grazing, minerals management, recreation and visitor services, and areas of critical environmental concern. Within the petitioned Southern California/Central Coast ESU, adopted BLM plans include the Southern Diablo Mountain Range RMP, the Central Coast of California RMP, the Carrizo Plain National Monument RMP, the Clear Creek RMP, the South Coast RMP, the West Mojave RMP, the Eastern San Diego County RMP, the Santa Rosa and San Jacinto Mountains National Monument RMP, the Northern and Eastern Colorado Desert Coordinated Management Plan, and the Desert Renewable Energy Conservation Plan. While these plans may not specifically address mountain lions, they generally provide some level of protection for wildlife habitat. The BLM manages several Wilderness Areas within the petitioned area totally approximately 117,000 ha (290,000 acres), especially in the desert regions between the San Bernardino Mountains and the Arizona border.

5.5.3 Military Bases

The Sikes Act was established in 1960 to ensure conservation and protection of natural resources used by certain federal agencies, including the Department of Defense. The U.S. Congress amended the Sikes Act in 1997 requiring the Department of Defense to develop and implement Integrated Natural Resources Management Plans. These plans outline how each military installation will manage its significant natural resources holistically while maintaining military readiness. Since these lands are often protected from access and use by the public, they may contain large tracts of undeveloped land and thus be an important tool for species conservation and habitat connectivity especially in the desert regions. Military bases within the petitioned Southern California/Central Coast ESU include Fort Hunter Liggett, Camp Roberts, Camp San Luis Obispo, Vandenberg Space Force Base, Marine Corps Base Camp Pendleton, Naval Weapons Station Seal Beach, March Air Reserve Base, Marine Corps Air Station Miramar, Naval Air Facility El Centro, Chocolate Mountain Aerial Gunnery Range, and other installations.

5.5.4 National Parklands

The guiding principles for managing biological resources on the U.S. Department of the Interior's National Park Service lands include maintenance of animal populations native to park ecosystems (NPS 2006). The NPS also commits to work with other land managers on regional scientific and planning efforts. NPS management plans provide direction and guidance on a variety of issues including resource preservation, visitor use, development, and boundary management. These plans generally specify management objectives and may vary in the type of plan, ranging from a general management plan to wilderness plans to strategic facility investment plans. For example, the Santa Monica Mountains National Recreation Area General Management Plan (GMP) provides a framework for the area's management, administered by the National Park Service, California State Parks, and the Santa Monica Mountains Conservancy. The GMP includes mountain lions as a "park species of concern" and includes construction best management practices, facility siting, fire management, vegetation, and habitat connectivity strategies intended to mitigate project impacts. However, the GMP does not include specific actions for mountain lions. Extensive mountain lion research has been carried out by The Santa Monica Mountains National Recreation Area under the leadership of Dr. Seth Riley.

Other NPS lands within the petitioned areas, such as Carrizo Plains National Monument, Fort Ord National Monument, Pinnacles National Park, Mojave National Preserve, and Golden Gate National Recreational Area, ***provide habitat and important habitat corridors for mountain lions.***

5.6 Management on State Lands

5.6.1 California Department of Fish and Wildlife

The ***Department is responsible for over 445,000 ha (1,100,000 acres) of fish and wildlife habitat, managed through 749 properties throughout the state, including 111,462 ha (275,428 acres) within the petitioned ESU.*** *These properties provide habitat for a rich diversity of fish, wildlife, and plant species and include representatives of most major ecosystems in the state.*

Most Department lands are classified as either Wildlife Areas or Ecological Reserves. *Wildlife Areas are acquired for the conservation of wildlife and the habitats on which they depend, and to provide opportunities for recreational uses that are compatible with those conservation*

goals (Fish & G. Code, §§ 1525–1530, 1745). Ecological Reserves are acquired primarily for the purpose of protecting rare and endangered native species and specialized habitat types (Id., § 1580). Certain public uses, deemed compatible with those goals, are authorized for ecological reserves—typically this includes hiking on established trails to observe native plants and wildlife (Id., § 1584). The Department prepares land management plans for Wildlife Areas and Ecological Reserves which are subject to public review under CEQA prior to being finalized.

The 167 Department properties within the petitioned Southern California/Central Coast ESU range from a fishing access property of less than 1 acre to the 117,197-acre Santa Rosa Wildlife Area in Riverside County. Of particular interest are Department properties in the coastal mountains of San Diego County, including Rancho Jamul Ecological Reserve, Sycuan Peak, Crestridge Ecological Reserve, and Hollenbeck Canyon Wildlife Area. ***Mountain lion densities appear to be high in these areas*** *as indicated by the concentration of vehicle strikes (Fig. 11). The Santa Margarita River Ecological Reserve was rated as the* ***best potential site*** *for a* ***wildlife crossing over I-15 to help link the Santa Ana Mountains to the Palomar Mountains in the Eastern Peninsular Range*** *(Riley et al. 2018b). Other significant Department properties within the petitioned ESU include the Cottonwood Creek, Cañada de Los Osos and San Luis Reservoir Wildlife Areas in Merced and Santa Clara Counties; the Chorro Creek Ecological Reserve in San Luis Obispo County; the Burton Mesa Ecological Reserve in Santa Barbara County; and San Jacinto Wildlife Area in Riverside County.*

5.6.2 California State Parks

California's State Park System encompasses more than 607,000 ha (1.5 million acres) in approximately 280 parks. *These parks are managed for public use and enjoyment and species and habitat protection through an integrated program of planning, restoration projects and evaluation, ongoing maintenance, and long-term monitoring.*

A state park must have an approved general plan before major park facilities can be developed. These general plans direct the long-term management of the park. Some parks may also develop a more specific resource management plan. Big Basin Redwoods State Park in Santa Cruz County designates mountain lions as a species of special management concern, and the Park's Management Guidelines call for the protection of known wildlife habitat linkages to permit movement of wildlife, increase ***species abundance*** *and diversity, and monitor the functionality of core wildlife habitat areas and wildlife linkages (California State*

Parks (CSP) 2013). Big Basin Redwoods State Park and surrounding parks including The Forest of Nisene Marks, Año Nuevo, Henry Cowell Redwoods, Wilder Ranch, Portola Redwoods, and Castle Rock State Park encompass over 22,250 ha (55,000 acres) of the Santa Cruz Mountains in the CC-N. Anza-Borrego Desert State Park in the EPR is the largest park in the state system at over 240,000 ha (600,000 acres) and contains over 161,000 ha (400,000 acres) of land managed as wilderness. Park system-wide management goals include being proactive in biological conservation and managing for subspecies, evolutionary units, ecologically functional units, populations, or other levels of biological organization to conserve biodiversity; and management that encourages natural ecological process such as hydrologic processes, wildfire, and biotic community interactions to continue. Other wildlife-related goals and guidelines include species inventory and monitoring programs, protection of special status plants and animals, control of non-native plants and animals, and the protection of habitat buffers and movement corridors (CA Parks 2005). Other notable parks within the petitioned Southern California/Central Coast ESU boundary include Butano, Garapata, Andrew Molera, Julia Pfeifer Burns, Portola, Henry W. Coe, Henry Cowell, Castle Rock complex, Montaña de Oro, Point Mugu, Malibu Creek, Topanga, Chino Hills, Lake Perris, and Cuyamaca Rancho.

5.6.3 Management on County and City Lands

Although generally smaller in size than conserved state and federal land units, city and county owned and managed lands conserve many key linkage areas or expand and buffer adjacent conservation lands. For example, a series of properties owned by the City of Los Angeles—including Runyon Canyon Park, Franklin Canyon Park and Stone Canyon and Encino Reservoirs—conserve portions of the easternmost extent of the CC-S and provide partial linkage to Griffith Park (also owned by the City of Los Angeles).

And Ventura County's Happy Camp Canyon Regional Park conserves an important part of the southern Santa Susana Mountains that may serve as a key piece of future linkages between the Santa Monica Mountains/Simi Hills and the Santa Susanas. In the Santa Anas, parks and preserves owned and managed by Orange County serve as linkages and buffers to larger conserved areas in the Sana Ana Mountains. Important units include Whiting Ranch and Irvine Ranch Open Space Preserves and the Ronald Casper Wilderness Park. In the coastal EPR of San Diego County, the County's open space preserves in the Otay area and mitigation bank in Marron Valley complement the Department's Rancho Jamul Ecological

Reserve and the BLM's Otay Wildlife Management Area to create a large block of contiguous conserved lands in the San Ysidro Mountains adjacent to the Mexican border.

5.7 Management in Neighboring States and Nations

5.7.1 Arizona

Mountain lions are found throughout Arizona in desert and forested mountain habitat. They are not considered endangered or threatened in Arizona and are classified as a big game species by the Arizona Game and Fish Department (AGFD), with regulated hunting zones throughout the state. The population was recently estimated at 1,166 to 1,175 (95% CI = 622-2,558) adults and subadults statewide exclusive of the 28% of the state that is tribal land (Howard et al. 2020). Mountain lions have recently expanded into previously unoccupied areas in western Arizona near the California border where they were previously thought to be transient including the Kofa, Castle Dome, New Water, Palomas, and Eagle Tail Mountains where no evidence of mountain lions was detected during 1987 surveys (Thompson et al. 2008; Naidu et al. 2011).

The AGFD collects age and sex information and genetic material from harvested mountain lions to monitor populations and to evaluate metapopulations, connectivity and dispersal. Mountain lions are regulated by several statutes and Arizona Game and Fish Commission Orders. It is unlawful to harvest a female lion with kittens or to harvest a spotted kitten in Arizona. AGFD has established several mountain lion management zones in the state with harvest thresholds that require closing the season when the threshold is reached. Five different zones exist on the western border of Arizona abutting the California boundary, with a total of eight separate harvest units within those zones. For the 2022–2023 harvest season, the threshold quota for each of these units ranged from 3–17 mountain lions. AGFD has analyzed harvest data and considers the mountain lion population to be stable to increasing in many parts of the state.

5.7.2 Nevada

Mountain lions are classified as a game mammal in Nevada and both sexes can be hunted under special regulations. Hunting is allowed statewide, except for on the Sheldon National Antelope Refuge and within specific hunt zones in the Las Vegas area. There was a limit of 247 mountain lions in 2023–2024. From 1987 to 2015 the estimated mean population size statewide was 3,000–4,000, with the population generally found to be stable (Mahoney and

Benson 2021). Andreasen et al. (2012) found that mountain lion populations in western Nevada commonly interbreed with individuals in the Sierra Nevada of California, and those populations are somewhat isolated from other Nevada populations by inhospitable playas in the Lahontan Basin. The authors also found that the Sierra Nevada population appears to receive more mountain lions from central and eastern Nevada than it contributes in return. In contrast, Gustafson et al. (2019) found evidence of more movement from the Sierra Nevada to Nevada than vice versa.

5.7.3 Mexico

Mountain lions are distributed throughout Mexico in many areas and habitats including mountains, deserts, sub-tropical and tropical forests, and deciduous dry, conifer, and oak forests (Valdez and Ortega-Santos 2019). Populations are found in most states except in urban areas with large human populations and areas of intensive agricultural production, including central Mexico and much of the Mexican Altiplano (Chávez and Ceballos 2014).

Threats to mountain lion survival in Mexico include habitat fragmentation, prey depletion, and illegal hunting (Valdez 1999; Rosas-Rosas et al. 2003; Rosas-Rosas et al. 2008). Additionally, widespread cattle ranching, agriculture expansion, and unlawful human settlement in protected natural areas threaten their survival in the long term (Galindo et al. 2016). Ranchers often resort to predator control without following a scientific management plan due to a lack of federal and state conservation intervention programs (Rosas-Rosas et al. 2003; Rosas-Rosas et al. 2008; Rosas-Rosas and Valdez 2010; Chávez and Ceballos 2014).

Despite the international border wall, some contemporary connectivity is known to exist between EPR and the contiguous Mexican lion populations where there is not a US Border fence (Vickers et al. 2015). While the 226 km (140 mi.) border is largely fenced, significant areas, primarily in more rugged mountainous terrain occupied by mountain lions, remain unfenced. In 2009, a radio collared male from EPR crossed into Mexico at an unfenced section (Fig. 21). However, it is unknown if he fathered cubs in Mexico, and genetic exchange between lion populations on either side of the border has not been examined in close detail. Genetic contributions from Mexico to EPR in the absence of concerted mountain lion conservation efforts in northern Mexico are not ensured, and cooperative international wildlife conservation efforts should be explored to ensure the persistence of this linkage.

Figure 21. *US/Mexico border showing locations of GPS-collared mountain lions within 15 miles of the border, including M53, the only tracked mountain lion to have crossed the border (W. Vickers data used with permission). Locations of border fences are also shown. The sections marked pedestrian are made of materials designed to stop the movement of people which would likely present a significant barrier to mountain lions. The vehicle fence likely does not create a significant barrier to mountain lions.*

▶ **ATTACHMENT C | California Department of Fish and Wildlife Petition Maps | Page 209**

6. Assessment of Listable Groups

6.1 Assessment of Evolutionary Significant Units

The petitioners propose listing the petitioned area, which includes the approximate area occupied by six genetic populations, as a single ESU. Alternatively, they request the Commission consider whether any of the six genetic populations, individually or in combination, comprise one or more ESUs and meet the criteria for listing under CESA (see Fig. 1).

To determine whether a population could be considered an ESU under CESA, the Department has typically followed the general approach used by the federal government for the ESA (Waples 1991) which consists of two main criteria:

1) The population must be substantially reproductively isolated from other conspecific population units.

2) It must represent an important component in the evolutionary legacy of the species.

For criterion 1, isolation does not have to be absolute, but it must be strong enough to permit evolutionarily important differences to accrue in the different population units. It must also be of substantial ecological/genetic importance to the species as a whole (criterion 2). To make the determination for criterion 2, the following questions are relevant:

Is the population genetically distinct from other conspecific populations?
Does the population occupy unusual or distinctive habitat?
Does the population show evidence of unusual or distinctive adaptation to its environment?

Waples (1991) highlights the following types of information as useful for answering the above questions15

15 Waples's examples are written to be specifically relevant to Pacific salmon, so the Department has altered the language to make them more applicable to terrestrial organisms.

1) Genetic traits. Examples include presumably neutral characters detected by protein electrophoresis or DNA analyses as well as other genetically based traits that are more difficult to quantify.

2) Phenotypic traits. Examples include morphological and meristic characters, occurrence of parasites, and disease and parasite resistance.

3) Life-history traits. Examples include time, size, and age at reproduction; reproductive behavior; fecundity; migration patterns; and timing of emergence and outmigration.

4) Habitat characteristics. This category includes such physical characteristics of habitat encountered during the entire life cycle.

Waples (1991) notes:

"The existence of substantial genetic differences from other conspecific populations based on protein electrophoresis or DNA analyses would strongly suggest that evolutionarily important, adaptive differences also exist. The failure to find such differences (or the absence of genetic Status Review of the petitioned Southern California/Central Coast ESU of Mountain Lion in California, California Department of Fish and Wildlife data) would not rule out the possibility that such adaptive differences exist, but it would place a greater burden of proof on data for other characters. Data for habitat characteristics should be interpreted in a similar fashion: habitat differences suggest (but do not prove) the possibility of adaptive differences, whereas the inability to detect habitat differences constrains the scope of possible local adaptations but does not prove they do not exist. In evaluating data for phenotypic and life-history traits, every effort should be made to account for environmental effects that are manifested in periods shorter than one generation (and therefore do not reflect adaptations)."

When evaluating the petition, CDFW's first consideration was whether the petitioned ESU meets the criteria for being considered an ESU. The second consideration was whether any of

the populations within the petitioned ESU area meet the definition of an ESU, singly or in combination.

It is important to understand the adaptive differences described in the ESU criteria are unlikely to develop when populations are isolated over short time scales (i.e., decades, or even hundreds of years). Mountain lions occupy much of California, except for heavily urbanized areas, intensively farmed areas of the Central Valley, and low elevation areas of the southern deserts. As noted earlier, when the landscape is permeable, they can disperse over long-distances (Sweanor et al. 2000; Hawley et al. 2016) and they inhabit all major mountain ranges in California (Dellinger et al. 2020b). This widespread distribution and dispersal potential suggest local adaptation is unlikely to develop, and there is little evidence of morphological, mitochondrial, or adaptive genomic differences between mountain lions within the petitioned ESU or any of the genetic populations and the broader statewide population to suggest the presence of distinct evolutionary lineages (Gustafson et al. 2022). While gene flow between the petitioned ESU and the NC and SN groups is limited, it does still occur (Gustafson et al. 2019; Gustafson et al. 2022). Several of the fine-scale genetic populations are small and somewhat isolated as connectivity to the statewide population has been drastically reduced in the last 50–100 years due to expanding human development. However, based on current scientific information there are no groups of mountain lions within the petitioned ESU boundary that have been isolated for much longer periods such that they represent important portions of the evolutionary legacy of the mountain lion species.

The Department used several lines of genetic and ecological evidence to evaluate the potential ESU, however, taken as a whole, the genetic evidence does not support applying the ESU concept to the overall petitioned area nor to any of the genetic populations individually, as a subspecies or ESU for the following reasons:

1) There is only one recognized subspecies of mountain lion in North America (P. c. cougar) based on mitochondrial DNA data (Culver et al. 2000; Caragiulo et al. 2014; Kitchener et al. 2017), suggesting a reduced potential for adaptive localized genetic variation among North American mountain lion populations.

2) Genetic investigations conducted by Gustafson et al. (2022) failed to detect local adaptation, suggesting that the identified California genetic populations do not represent an important component of the evolutionary legacy of the species. 3) Genetic data indicate habitat fragmentation and dispersal barriers have recently limited the ability of mountain

lions to move freely between certain geographic areas and local populations in Southern California and the central coast area (Gustafson et al. 2019). However, this fragmentation has mostly occurred within the last 200 years and has not yet resulted in genetic differentiation sufficient to represent an important component of the evolutionary legacy of the species. Gustafson et al. (2022) found no outlier loci, which, when present, suggest local adaptation (Ibid.). The same study used SNPs to characterize variation across more of the genome, which suggests many of these local genetic populations separated by barriers have considerable shared ancestry (Figs. 7, 8) and are more genetically similar than was suggested by the result of Gustafson et al. (2019).

While the Department concludes that the mountain lion populations within the petitioned area do not comprise one or more listable ESUs, the Department recognizes that several of those populations are imperiled due primarily to small population sizes and isolation. In the sections below the Department uses other criteria to further evaluate whether mountain lions within the petitioned area warrant potential listing under CESA.

▶ ATTACHMENT C | California Department of Fish and Wildlife Petition Maps | Page 209

6.2 Assessment of Distinct Population Segments

While the petition is focused on ESUs and the Department has recommended listing ESUs in the past, the ***Department has also previously recommended listing other sub-species entities, such as DPSs*** *(e.g., Southern California steelhead) and clades (e.g., foothill yellow-legged frog). The U.S. Fish and Wildlife Service (USFWS) and NMFS (the Services) have also identified and listed DPSs pursuant to the ESA and have developed a policy for evaluating DPSs pursuant to the ESA (61 Fed Reg. 4722-4725 (February 7, 1996)). Per that policy, a DPS is a vertebrate population or group of populations that is* ***discrete from other populations of the species and significant in relation to the entire species. DPSs have been used 137 times by USFWS to list imperiled populations*** *rather than listing a species across its full range. Examples from California include the Southern Sierra Nevada fisher (85 Fed. Reg. 29532-29589 (May 15, 2020)), the Peninsular bighorn sheep (63 Fed. Reg. 13134-13150 (March 18, 1998)), and the Sierra Nevada bighorn sheep (64 Fed. Reg. 19300-19309 (April 20, 1999)). While the ESU designation and supporting policy has primarily been applied to fish populations, the DPS designation has been more widely applied to, and policy is more relevant for, terrestrial species.16*

16 The Department has previously found DPSs to be a helpful approach for assessing certain populations and concludes it is an appropriate approach to consider for mountain lion.

To guide its evaluation of whether a possible DPS might warrant listing as threatened or endangered, the Services first evaluate two elements to determine if the population segment should be considered a DPS:

1) Discreteness of the population segment in relation to the remainder of the species.

2) Significance of the population segment in relation to the remainder of the species.

If the population segment being considered is a DPS, then the Services then evaluate its conservation status (i.e., is the population segment, if treated as if it were a species, endangered or threatened?) (61 Fed. Reg. 4722-4725 (February 7, 1996)).

The elements are interpreted as follows:

***Discreteness**: A population segment may be considered discrete if it meets either of two conditions:*

It is markedly separated from other populations of the same taxon because of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation.

It is delimited by an international government boundary, and there are significant differences between the countries in control of exploitation, management of habitat, conservation status, or regulatory mechanisms.

***Significance:** If a population segment is found to be discrete under one or more of the above conditions, its biological and ecological significance will then be considered. This consideration may include, but is not limited to, the following:*

Persistence of the discrete population segment in an ecological setting unusual or unique for the taxon.

Evidence that loss of the discrete population segment would result in a significant gap in the range of a taxon.

Evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range.

Evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.

Imperiled Status: *If a population segment is found to be both Discrete and Significant, and if treated as a species, could it be found to be threatened or endangered based on the listing factors established in the ESA?*

Adopting this approach, the Department evaluated the petitioned area to determine if it should be considered a DPS.

6.2.1 Boundary Assessment

Considering the petitioned area as a potential DPS is consistent with the Petitioners' interest in examining the status and viability of major genetic groupings of mountain lions in California and is also consistent with prior Department evaluations of portions of widely distributed species' ranges. The Department has previously recommended listing the Southern California steelhead DPS for listing, as well as several clades (groups descended from a common ancestor) of foothill yellow-legged frog (Rana boylii). As a first step in the DPS assessment, the Department considered the boundary of the petitioned ESU. The boundary must be supported by the best available science and be demarcated unambiguously. After consideration, the ***Department developed a potential DPS boundary that is modified from the ESU boundary proposed in the petition.***

The petitioned ESU boundary includes extensive areas of California's southeastern deserts in eastern San Bernardino, Riverside, and Imperial Counties where mountain lion detections are few*. Although Gustafson et al. (2019) and Gustafson et al. (2022) include this area in the EPR, the authors did not examine genetic material from mountain lions east of the Eastern Peninsular Mountains (see sample locations in Fig. 6). Mountain lions are known to occur in the desert regions of California and in Death Valley National Park (Lundgren et al. 2022), but camera trap data suggest they exist at low densities (Dellinger et al. 2019). Genetic material from the eastern deserts has not been systematically collected, and, consequently, mountain lions in those areas have not been assigned to a genetic population nor has local gene flow been characterized.*

The next nearest location from which genetic samples have been analyzed is the Mojave Desert region of southern Nevada (Andreasen et al. 2012). In a statewide genetic study of mountain lion population structure, Andreasen et al. (2012) found that animals from southern Nevada were genetically similar to individuals from the Great Basin and the Sierra Nevada region of California. However, the analysis did not include samples from the EPR or other genetic populations within the petitioned area, so it did not shed light on the genetic relationships between the mountain lions of EPR and Nevada. Another study compared samples from the coastal areas of the SC group (including EPR) and southwest Arizona (Naidu 2015). There was minimal evidence of gene flow between the mountain lions in the coastal area of the SC group and those along the border or in Arizona. In fact, the individuals sampled in south coastal California were found to be more genetically similar to those sampled from the North Rim of the Grand Canyon than those directly across the desert in southwest Arizona (Naidu 2015). However, the study had a small sample size, and did not include samples from the inland desert regions of California. Therefore, the results provide little information regarding the genetic assignment of mountain lions in the desert regions of California.

Due to this limited information, it is not currently possible to assign the mountain lions occupying the deserts of southeastern California to one of the genetic populations *described by Gustafson et al. (2019). Since mountain lions in this region cannot be assigned to the petitioned genetic populations,* ***the Petitioners' boundary which included the deserts east of the Peninsular Ranges would not meet the DPS criteria for discreteness as mountain lions in those deserts may belong to other genetic populations.*** *The* ***Department, therefore, does not find it appropriate to include large portions of the Mojave and Sonoran deserts within the area to be assessed as a DPS.*** *When considering where to bound the proposed DPS, the Department also evaluated the distribution of suitable mountain lion habitat in the Mojave and Sonoran Deserts (Dellinger et al. 2020) as well as the distribution of verified mountain lion camera trap detections from recent Department monitoring projects related to drought impact monitoring and bobcat management. The petitioned ESU boundary extended from the Tehachapi Mountains east along I-15 to the Nevada border and then south along the Colorado River to Mexico, while our proposed Central Coast and Southern California DPS boundary instead runs south from the Tehachapi Mountains and then closely follows the eastern bases of the San Gabriel, San Bernardino, and Little San Bernardino Mountains before extending south along the western edge of the Salton Sea (Fig. 22).*

*The **petitioned ESU boundary also includes an area of intensively farmed agricultural land in San Joaquin, Sacramento, and Solano Counties.** This area contains little native vegetation and little cover for mountain lions, and **while there are few contemporary records of mountain lions occurring there**, they are likely transient individuals. Therefore, this area is **not included in the proposed DPS** (Fig. 22). For a more detailed description of the proposed Central Coast and Southern California DPS boundary see section 9 (Listing Recommendation).*

CDFW boundaries for the ESU Area and the DPS Area are arbitrary in order to encompass the largest area in the petitioned listing. Neither Area is appropriate, and would be detrimental to California's integrity and sovereignty. ***"Department developed a potential DPS boundary that is modified from the ESU boundary proposed in the petition… The petitioned ESU boundary includes extensive areas of California's southeastern deserts in eastern San Bernardino, Riverside, and Imperial Counties where mountain lion detections are few… Due to this limited information, it is not currently possible to assign the mountain lions occupying the deserts of southeastern California to one of the genetic populations*** *… Since mountain lions in this region cannot be assigned to the petitioned genetic populations, **the Petitioners' boundary which included the deserts east of the Peninsular Ranges would not meet the DPS criteria for discreteness as mountain lions in those deserts may belong to other genetic populations**. The **Department, therefore, does not find it appropriate to include large portions of the Mojave and Sonoran deserts within the area to be assessed as a DPS**…. The **petitioned ESU boundary also includes an area of intensively farmed agricultural land in San Joaquin, Sacramento, and Solano Counties.** This area contains little native vegetation and little cover for mountain lions, and **while there are few contemporary records of mountain lions occurring there**, they are likely transient individuals. Therefore, this area is **not included in the proposed DPS.***

▶ ATTACHMENT C | California Department of Fish and Wildlife Petition Maps | Page 209

Figure 22. *Proposed boundary of Central Coast and Southern California Distinct Population Segment.*

6.2.2 Assessment of Proposed DPS Discreteness

The first test of whether a portion of a species' range constitutes a DPS is whether the population segment is discrete or markedly separate from the remainder of the species range. The Department concluded the proposed DPS is a discrete population based upon the evidence below.

Physical, physiological, ecological, or behavioral factors:

Physical boundaries separating mountain lion populations within the evaluated DPS from other lion populations include the San Francisco Bay and Sacramento-San Joaquin Delta, the intensive agriculture in the Central Valley, large areas of unsuitable habitat in portions of the inland deserts in the east, high density urban areas, the wall along parts of the southern border with Mexico, and significant highways such as Interstates 5, 10, and 15. These are not absolute barriers but, in combination with existing geographic and habitat features, represent sufficient hindrance to gene flow that the mountain lions within the potential DPS represent two of the four broad-scale distinct genetic groups in California identified by Gustafson et al. (2022). These two broad-scale groups (SC and CC) are moderately genetically differentiated from the other broad-scale groups in California as measured by FST values (see section 2.4). This points to separation and isolation of the populations over time due to the barriers discussed above. There is evidence of historical gene flow between the genetic populations in the evaluated DPS and the Western Sierra Nevada (which is in turn connected with the Eastern Sierra Nevada and North Coast) in the ancestry assignment data using SNPs (see section 2.4). The Tehachapi Mountains and surrounding areas are considered the only area where contemporary gene flow is known to occur between the evaluated DPS and the other genetic populations in California (via the western Sierra Nevada Mountains; Fig. 10). Current substantial barriers to mountain lion movement in that area include I-5 and Highway 58, the latter of which is identified by the Department as an area of top priority for connectivity for mountain lions (Fig. 12, Vickers unpublished data).
Connectivity between mountain lions in the EPR and those in Baja California, Mexico and Arizona is poorly understood. Although most of the 226 km (140 mi.) border with Mexico is fenced, portions in the rugged San Ysidro and Jacumba Mountains remain unfenced. Mountain lions have been observed on the California–Baja California border (J. Dellinger pers. comm.), and in 2009, one GPS-collared study animal was documented crossing the border multiple times in the vicinity of Jacumba, California, indicating the opportunity for the cross-border exchange of individuals still exists (Fig. 21, Vickers et al. 2015). In the Mojave and Sonoran deserts, sporadic detections of individuals suggest at least the potential for genetic exchange between mountain lions in the EPR and those living along the Colorado River in California and Arizona. However, such movement has not been studied or confirmed to date.

International Border: The assessment of discreteness in the federal DPS policy includes the criterion of the presence of an international border. However, the jurisdiction of CESA is the

State of California, and considerations of differences in management or regulatory mechanisms across borders are not usually a major part of the listing decision process. In this case, however, the border between California and Mexico is relevant to the EPR genetic group. While portions of the international border are marked by walls and fences that attempt to manage human migration, significant sections of the border, including a large section of the Eastern Peninsular Mountains, remain unfenced (Fig. 21). However, the status of the mountain lion population in Baja California, Mexico, and the frequency of lion movement across the border is unknown. One collared mountain lion is known to have crossed from the Eastern Peninsular Range into Mexico and back in 2009. While the frequency of genetic exchange between Californian and Mexican mountain lion populations is unstudied and unknown, it is likely that the border wall serves as a semi-permeable obstacle to lion movements. However, without more information about gene flow, California should not make assumptions about Mexican mountain lions' contribution to genetic diversity in the EPR and South Coast populations.

6.2.3 Assessment of Proposed DPS Significance

Having established that the proposed DPS is a discrete population, the Department next evaluated the biological and ecological significance of the segment in consideration using the following factors.

Unique Ecological Setting: While there are diverse environments including many unique plants and vegetation types within the proposed DPS, the relevance of these unique areas to the mountain lion—an adaptable, wide-ranging, habitat generalist—is unclear. The mountain lion's primary prey (deer) occurs across the many habitats of the potential DPS and there is little evidence that mountain lions have adapted their general behaviors or occupied different ecological niches to exploit specific habitat types. Mountain lions typically have large home ranges that may include many habitat types, and an individual lion may disperse and establish a home range dominated by a habitat type other than the one that dominated its home range when it was a juvenile. Mountain lions within the proposed DPS largely make use of habitats that are compositionally and structurally similar to habitats outside the evaluated DPS, and they tend to exhibit the same hunting, feeding, breeding, and denning behaviors both within and beyond the proposed DPS boundary, including making use of the interface between natural habitats and cities by occasionally occupying urban and suburban areas.

Gap in Range: The evaluated DPS represents 97,230 km2 (37,541 mi2), which is 23.7% of the state of California. *The loss of the mountain lions from this area would be a significant overall loss in range in California and would further limit the statewide population's connectivity with populations in Mexico and Arizona. Within the petitioned area, mountain lions occur in many mountain ranges, valleys, deserts, parks, and Wilderness areas, and the loss of the largest carnivore from these areas would fundamentally change wildlife community dynamics across a large portion of the state.*

Only Surviving Natural Occurrence: Mountain lions within the proposed DPS are not the only surviving natural occurrence of the species in the state.

Markedly Different Genetic Characteristics: The petitioned area consists of two of the four broad genetic groups identified in Gustafson et al. (2022), which are "moderately differentiated from each other based on FST estimates." Those two broad groups can be further divided into six smaller genetic populations. While there are multiple lines of evidence that these genetic groups have different characteristics from each other and from the groups outside of the petitioned area, to date there is no evidence that these discernible genetic differences are evidence of adaptations to local conditions (see section 2.4 Genetic Structure).

Conclusion: The mountain lions in the petitioned area are markedly separated from other populations in the state due to natural and human-created barriers. There are six distinct genetic populations in the petitioned area that broadly nest into two broad-scale genetic groups that are discernible from those in the rest of the state. The mountain lion population within the petitioned area is significant due to its markedly different genetic characteristics, and the very large, geographically diverse area that it occupies, comprising nearly one quarter of California's land area. Therefore, the petitioned area meets the criteria to be considered a Distinct Population Segment and treated as a subspecies for CESA listing purposes.

6.2.4 Assessment of Whether Proposed DPS is Imperiled

The ***final test for determining if listing a population segment as a DPS is warranted is assessing whether the population segment, if treated as species, could be found to be threatened or endangered.*** *The Department estimates the total population of the six genetic populations within* ***the proposed DPS to be 947 mountain lions (95% CI: 777–1,123).*** *Each of the genetic*

*populations has some degree of isolation from, and limited genetic exchange with neighboring populations. Thus, mountain lions within the proposed DPS are not a single, well-mixed population. For long-term conservation planning, effective population size (Ne) is a better metric for evaluating the risks of isolation and inbreeding than census population size. The estimated total effective population size of these six genetic populations combined has been estimated in two studies: Ne = 70.6 (Gustafson et al. 2022), and Ne = 128 (Gustafson et al. 2019). However, **the petitioned area is not a single intermixed population, instead it is a collection of smaller, somewhat isolated genetic populations which each have effective population sizes** that are too low to prevent the risks of inbreeding over the long-term. This fact, coupled with the other threats to the genetic populations such as vehicle strikes, management killing, diseases, and the interrelated effects of fire and climate change has led the Department to conclude that the proposed DPS is imperiled.*

See Section 7 for a more detailed discussion of threats.

6.3 Assessment of Significant Portion of Range

***CESA provides that the Department and the Commission must consider whether a species is endangered or threatened "throughout all, or a significant portion, of its range."** (Fish & G. Code, §§ 2062, 2067.) If the Commission ultimately determines a species is endangered or threatened throughout all of its range, the Commission need not analyze whether the species warrants listing throughout a significant portion of its range, an area subsumed within the entire range. For purposes of this analysis, the "range" to be assessed depends on the level at which listing is being analyzed by the Department and the Commission (i.e., the entire species, an ESU, a DPS, or another subspecies unit). Petitioners submitted a petition requesting the listing of one or more ESUs of mountain lions located in areas of the Southern California and the Central Coast. The Department has considered the petitioned unit(s) and determined that the correct subspecies unit for mountain lions in this area of California is a DPS, not an ESU.*

CDFW is not following the CESA guidelines in consideration of whether the species are endangered or threatened. Through the use of the Commission, as an interagency review, CDFW eliminates the requirement that a species is endangered or threatened, must apply throughout, or a significant portion, or its range. *CESA provides that the Department and the Commission must consider whether a species is endangered or threatened "throughout all, or a significant portion, of its range." …* The *Department recommends that the Commission list the entirety of the proposed DPS described in Sections 6 and 9 and shown in Figure 22. Therefore, an analysis of*

whether a significant portion of the species' range within the described DPS warrants listing is not required.

7. Summary of Listing Factors

CESA's implementing regulations identify key factors relevant to the Department's analysis and the Commission's decision on whether listing a species as threatened or endangered is warranted. A species will be listed as endangered or threatened if the Commission determines that the species' continued existence is in serious danger or is threatened by any one or any combination of the following factors: (1) present or threatened modification or destruction of its habitat; (2) overexploitation; (3) predation; (4) competition; (5) disease; or (6) other natural occurrences or human-related activities (Cal. Code Regs., tit. 14, § 670.1, subd. (i)).

This section provides summaries of information from the foregoing sections of this status review, arranged under each of the factors to be considered by the Commission in determining whether listing is warranted.

7.1 Present or Threatened Modification or Destruction of Habitat

*The **main threats affecting mountain lions in the proposed DPS are habitat loss and fragmentation** from historical and ongoing transportation infrastructure development (including residential and commercial structures, intensive agriculture, highways and freeways, high-speed rail lines, canals, and reservoirs), and lack of sufficient connectivity between remaining habitat patches, which has resulted in isolated populations with reduced genetic exchange. **The amount of suitable habitat available to mountain lion populations has been significantly reduced in and adjacent to areas such as the Central Valley, San Francisco Bay area, and the greater Los Angeles and San Diego urban areas.** Over time significant barriers have developed which impede mountain lion movement and isolate populations, and ongoing residential and commercial development is projected to exacerbate isolation. The lack of sufficient gene flow between isolated populations has resulted in inbreeding in some smaller populations which may reduce survival and reproductive fitness, as evidenced by physical abnormalities in some mountain lions in the small and isolated Santa Ana and Santa Monica Mountains populations.*

Long-term maintenance of genetic variation within the genetic populations in the proposed DPS is reliant on habitat conservation and connectivity. Maintenance and enhancement of gene flow between the proposed DPS and the larger, more genetically diverse mountain lion

populations in the Sierra Nevada through the Tehachapi Mountains is required to maintain viable populations in the proposed DPS. Additionally, there needs to be increased connectivity between and within the fine-scale genetic populations in the proposed DPS to counteract or prevent the negative impacts of inbreeding.

As noted earlier in this report, some smaller genetic populations have well-documented significant risk factors at this time. In the most isolated habitat patches (e.g., Santa Monica Mountains, Santa Ana Mountains), it is estimated that there is a substantial probability of local extirpations within less than 50 years in the absence of efforts to improve habitat connectivity and remove barriers to movement. Developing broad wildlife crossing infrastructure will require adequate funding and concerted and sustained commitment by many parties to ensure proper design, placement, maintenance and monitoring of crossing structures for effectiveness.

CDFW has lost any perspective on reality. "*The* ***main threats affecting mountain lions in the proposed DPS are habitat loss and fragmentation… The amount of suitable habitat available to mountain lion populations has been significantly reduced in and adjacent to areas such as the Central Valley, San Francisco Bay area, and the greater Los Angeles and San Diego urban areas.***" **Yes that is true, and those should not be mountain lion territories. The mountain lion populations need to be managed in relation to available prey, appropriate habitats, and in safe proximity to urban and rural communities.**

7.2 Overexploitation

From the early 20th century until ***1964, mountain lions were a bountied predator in California. During the bounty period approximately 12,580 mountain lions were killed*** *across California. When California bounties ended in* ***1964, mountain lions were classified as a nuisance or vermin species and mountain lions could be killed year-round*** *without a hunting license and with no limits, but there was no longer paid incentive for removal. Lions were classified as game and two legal hunting seasons were held in 1970 and 1971 before a legislative moratorium on hunting was enacted. In 1986, mountain lions were reinstated as a game species, but before a hunting season was held a ballot initiative (Proposition 117) approved by California voters classified mountain lions as a "specially protected mammal species" in 1991 (Fish & G. Code, § 4800). That classification continues today.*

Poaching and other unpermitted take is rarely reported but has been observed in the CC-S, SA, and EPR as well as in the CC-N. 26 out of 199 mortalities from known causes in the years 1974–2020 were due to poaching, a 2%-3% annual rate of mortality. Overexploitation alone likely poses little threat to the statewide population or to any of the genetic populations, although additive mortality from poaching may exacerbate the inherent threats faced by small, isolated populations.

Mountain Lion management is essential. History has shown that depredations and hunting are tools of managing mountain lion populations. They can create a healthier mountain lion population, where older and/or more aggressive lions can be taken, and the young can takeover those areas, which otherwise they are pushed out of. *"From the early 20th century until* ***1964, mountain lions were a bountied predator in California. During the bounty period approximately 12,580 mountain lions were killed*** *across California. When California bounties ended in* ***1964, mountain lions were classified as a nuisance or vermin species and mountain lions could be killed year-round*** *without a hunting license and with no limits, but there was no longer paid incentive for removal.* ***Lions were classified as game and two legal hunting seasons were held in 1970 and 1971*** *before a legislative moratorium on hunting was enacted.* ***In 1986, mountain lions were reinstated as a game species****, but before a hunting season was held a ballot initiative* ***(Proposition 117) approved by California voters classified mountain lions as a "specially protected mammal species" in 1991."*** **Time and change are constant, what was appropriate in 1991, and what CDFW is petitioning, may not be appropriate now. The mountain lion has a place in the ecosystem, which needs to stay in balance with of other wildlife. CDFW should be the keeper of the gate to keep mountain lions in habitats with abundant natural prey, and out of populated and developed areas.**

7.3 Predation

As large-bodied predators, adult mountain lions in California are subject to little predation pressure. *Gray wolves sometimes kill both adult and juvenile mountain lions, and black bears are known to occasionally kill mountain lion kittens but rarely adults. However, predation by wolves and black bears is not known to be a significant cause of California mountain lion mortality nor is it known to threaten the persistence of lion populations. Therefore, and given the current absence of gray wolves within the proposed DPS, predation is not currently considered to present a significant threat to California mountain lion populations, although*

this topic may need to be revisited if wolf packs establish within the proposed DPS in the future.

The mountain lion is the predator of primarily deer, also many species of wildlife. The mountain lion in the proposed area does not have a predator, it is the predator. Livestock, farm animals, and pets are becoming victims of hungry mountain lions.

7.4 Competition

Black bears and gray wolves are known to sometimes displace mountain lions from their kills, which potentially forces mountain lions to expend additional energy hunting to procure more prey. Given the current absence of wolves in the proposed DPS, wolf competition currently has no effect on central coast or Southern California lion populations. The potential impact of black bears in these areas remains unknown and warrants further study. Within the proposed DPS, intraspecific competition between mountain lions is likely the chief source of competition. In the Santa Monica Mountains within the CC-S, intraspecific conflict has been identified as the leading cause of mortality for the nearly isolated population. Statewide, there is a 3% risk of annual mortality attributable to intraspecific strife resulting from competition. Intraspecific aggression appears to be a significant mortality factor where individual mountain lions occupy small patches of suitable habitat within habitat-limited landscapes, and therefore, this form of competition should be considered a threat to lion populations in the Santa Monica and Santa Ana Mountains.

7.5 Disease

Mountain lions are susceptible to various viral, bacterial and parasitic pathogens. While there are documented lion mortalities and sickness from multiple pathogens, mortalities from disease alone are not likely to threaten the genetic populations in the proposed DPS. Diseases pose a less than 1% annual mortality risk to California mountain lions. The Department does not consider disease, in isolation, a significant threat to the species in California. However, pathogens may be harmful to individuals and small populations, and, when combined with other threats (e.g., habitat loss and fragmentation, climate change, wildfires, inbreeding and genetic drift, etc.), their impacts potentially further reduce the likelihood of long-term persistence for small, isolated mountain lion populations.

7.6 Other Natural Occurrences or Human-related Activities

7.6.1 Vehicle-Related Mortality

Vehicle-related mortality is the second most frequent cause of known death for mountain lions in California. It is difficult to accurately assess the actual magnitude of the problem due to lack of systematic data collection. One estimate is that 100 mountain lions are killed every year by vehicle strikes, while a more recent report puts that number at 70 per year during the period from 2015 to 2022. Between 2001-2013 vehicle strikes were the leading known cause of death for radio collared mountain lions in SA, and the second leading known cause of death in EPR. In the Bay Area (CC-N), vehicle strikes are also a significant source of mortality. California State Routes (SR)-12, SR-17, SR-1, and especially Interstate-280 have high numbers of mountain lion mortalities. The 20 mile stretch of I-280 northwest of San Jose was the deadliest highway in California for mountain lions from 2015-2022 with 20 reported deaths. Well-designed wildlife crossing structures in association with fencing to funnel animals to the crossing can reduce vehicle-related mortalities. While such structures are costly and require careful planning, an undercrossing on Highway 17 in the Santa Cruz Mountains (CC-N) has been completed, construction of the Wallis Annenberg Wildlife Crossing is underway in the CC-S, and several other structures are being planned in the EPR. If wildlife crossing structures and fencing become widespread within the proposed DPS, mortality from vehicle strikes may be substantially reduced.

7.6.2 Permitted Take

***From 1974 to 2020, permitted take of mountain lions** was the leading known cause of death for radio collared mountain lions statewide. **Permitted take is primarily composed of lethal lion removals in response to depredation of livestock and pets,** although lethal removals to protect endangered bighorn sheep populations and lethal removals for human safety are also included in the category. However, changes in 2017 and 2020 to the Department's approach to issuing mountain lion depredation permits have significantly reduced the number of animals killed statewide in recent years. Under current management, occasional lethal take of individual mountain lions due to repeated depredations on a single property or for public safety in the proposed DPS is foreseeable and may exacerbate the detrimental effects associated with habitat loss, small population size and limited genetic exchange, and other threats in isolated mountain lion populations such as the Santa Monica Mountains, SGSB and SA.*

CDFW's current three-tier depredation is next to worthless, it makes it almost impossible to take a mountain lion by lethal means. There are coordinated tracking systems of mountain lions, but the data and information is not used to protect the rancher or the public.

7.6.3 Toxicants

Mountain lions throughout California are exposed to toxic chemicals in their environment which can be lethal, debilitating, or have no clinical effect, depending on the quantities ingested. Lions with toxicant-impaired functions may be more susceptible to other forms of mortality such as starvation and vehicle strikes. Lions can encounter ARs used to control vertebrate pests throughout the state, including remote locations where legally prohibited rodenticides are used to protect illicit cannabis plantations. Necropsies have verified that nearly all tested mountain lions in California have been exposed to ARs. While toxicants are not known to directly cause significant mortality statewide, their effects may be additive to other sources of mortality. In the relatively small population in the Santa Monica Mountains National Recreation Area, AR toxicosis was the third leading cause of death after vehicles strikes and intraspecific strife.

7.6.4 Wildland Fire and Fire Management

The effect of wildfire on mountain lions is complex. Fire is a regular ecological process in many California vegetation types, and many native plants display adaptations to fire such as thick fire-resistant bark, post-fire crown-sprouting, and smoke-induced seed germination. Many native plants grow vigorously after wildfires, which can improve forage for deer, the main prey of mountain lions. Mountain lion response to recently burned areas appears variable with one study showing use of burned landscapes more frequently than expected based on availability during the first nine years following a wildfire, and others showing less use during the first few years post fire, then more use as vegetation recovers over time. Wildfires can also cause mountain lion injury and direct mortality, which is likely additive to other sources of mortality. Fires are projected to become more frequent and severe as the climate changes, potentially resulting in the conversion of some preferred mountain lion woodland and shrubland habitat to grasslands, which are documented to be largely avoided by lions. The impact of wildfire on the statewide mountain lion population or on individual genetic populations is difficult to predict; however, small lion populations in some relatively small mountain ranges (e.g., the Santa Monica and Santa Ana Mountains) may be vulnerable to large, severe fires (e.g., the Woolsey Fire Los Angeles and Ventura Counties in 2018) that

could substantially modify large areas of extant lion habitat rapidly, and large fires in key connectivity zones such as the Tehachapi Mountains may temporarily ,reduce the probability of genetic exchange between populations.

Mountain lion predations on livestock increase wildland fire potential. Ranchers are devasted by mountain lion kills, it affects the herd, and is more than an animal loss. Ranchers sometimes pull their stock off the lands that are subjected to multiple predations, therefore making those lands more susceptible to fires.

7.6.5 Climate Change

Projections indicate the California climate will continue to warm, and precipitation events will become less predictable and droughts more frequent. These changes will influence the condition and distribution of vegetation types and the animal communities that depend upon them. For example, warming temperatures and/or changing precipitation patterns could affect the quality and density of forage plants relied on by deer in certain areas, thereby potentially affecting mountain lion density. However, the Department is not aware of any bioclimatic modeling studies investigating projected changes in the geographic range of the mountain lion nor their main prey species (mule deer) based on climate variables. As large-bodied mammals, it may be that both mountain lions and mule deer are sufficiently large enough not to be adversely affected directly by moderate increases or decreases in environmental temperature, which more drastically affect small-bodied mammals with higher surface area to volume ratios. The generally nocturnal habits of mountain lions and their prey also help alleviate impacts from warmer environments. Mountain lions are known to occur across a wide variety of ecoregions ranging from deserts to temperate and coastal rainforests in California demonstrating their ability to tolerate a wide range of climates. The mountain lion's body size, foraging habits, and climatic breadth suggests the direct effects of climate change are unlikely to lead to near-term shifts in distribution of the species or population declines.

7.6.6 Risks to Small, Isolated Populations

Small, isolated populations are inherently vulnerable to extinction due to demographic stochasticity, inbreeding depression, and genetic drift. In small populations, these factors, individually or collectively, can result in a loss of genetic variability and a reduced genetic capacity for the population to adapt to changes in the environment. A lack of immigration

can also prevent isolated populations from recovering from stochastic extinctions or population declines, independent of genetic effects. In wildlife populations, genetic variation has been shown to be strongly correlated with high survival and reproduction rates, as well as decreased extinction risk. Genetic effects can amplify the impact of the other identified threats and random environmental effects to further reduce population sizes and accelerate populations towards extirpation in what has been termed an extinction vortex.

There are an estimated 947 mountain lions (95% CI: 777–1,123) in the proposed DPS area, with some of the areas like the CC-C and EPR estimated to contain hundreds of mountain lions. However, the smaller and more isolated areas like CC-S, SA, and SGSB each have estimated populations of fewer than 75 individuals each. These genetic populations have effective population sizes less than 50 and may already be adversely affected by inbreeding. In contrast CC-C, and EPR genetic populations show little evidence of inbreeding. Enhancing gene flow between the genetic populations in the proposed DPS and the Sierra Nevada broad-scale group would enhance the potential of long-term persistence of mountain lions throughout the proposed DPS, but until connectivity is significantly improved, the risks associated with small populations will threaten the long-term persistence of mountain lions in the proposed DPS.

8. Protection Afforded by Listing

It is the policy of California to conserve, protect, restore, and enhance any endangered or threatened species and its habitat (Fish & G. Code, § 2052). If the Commission votes to list mountain lion populations as threatened or endangered under CESA, the act would prohibit take *[17]*

17 "Take" is defined as hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill (Fish & G. Code, § 86). except under certain circumstances where both CESA and Fish and Game Code section 4800, et seq. allow CDFW to authorize take.

Additional protection of mountain lions following listing would also occur during required state and local agency environmental review under the California Environmental Quality Act (CEQA). ***CEQA requires affected public agencies to avoid or substantially reduce project related environmental effects and contains specific requirements for analyzing and mitigating impacts to listed species. Where significant impacts are identified under CEQA, the Department***

expects the required avoidance, minimization, and mitigation measures included in approved projects will afford additional protections that would be absent if mountain lions are not listed.

CESA listing may also result in ***increased priority for limited conservation funds such as those administered by the Wildlife Conservation Board, Local Assistance, and State Wildlife Grants, along with land acquisition assistance from non-governmental organizations (NGOs) such as The Nature Conservancy.***

CDFW attempt to get a thriving predator listed as endangered or threatened is duplicitous.

9. Listing Recommendation

CESA directs the Department to prepare this report regarding the status of the mountain lion in the petitioned Southern California/Central Coast ESU based upon the best scientific information available (Fish & G. Code, § 2074.6). CESA also directs the Department, based on its analysis, to indicate in the status report whether the petitioned action (i.e., listing as threatened) is warranted (Id., § 2074.6; Cal. Code Regs., tit. 14, § 670.1, subd. (f)).

Under CESA, an endangered species is defined as "a native species or subspecies…which is in serious danger of becoming extinct throughout all, or a significant portion, of its range due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease" (Fish & G. Code, § 2062). A threatened species is defined as "a native species or subspecies…that, although not presently threatened with extinction, is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by [CESA]" (Id., § 2067).

The Legislature left to the Department and the Commission, which are responsible for providing the best scientific information and for making listing decisions, respectively, the interpretation of what constitutes a "species or subspecies" under CESA (Cal. Forestry Assn. v. Cal. Fish and G. Com. (2007) 156 Cal.App.4th 1535, 1548-49; Central Coast Forest Assn. v. Fish & G. Com. (2018) 18 Cal. App. 5th 1191, 1198-99). The Commission's authority to list necessarily includes discretion to determine what constitutes a species or subspecies (Id. at p. 1237).

The Department has determined, based upon the best available scientific evidence, that there is currently insufficient evidence that the mountain lions within the petitioned area and the genetic populations within the petitioned area boundary meet the criteria to be considered

ESUs. *The* ***petitioned ESU, or any combination of its genetic populations, cannot be considered ESUs because they are not both substantially isolated from other populations and important components of the evolutionary legacy of the mountain lion species.*** *Although movement of individuals beyond the petitioned area is increasingly restricted, there has been some gene flow between the petitioned ESU and other mountain lion populations, and neither the petitioned ESU nor the genetic populations within it are totally reproductively isolated. Nor are the mountain lions within the petitioned area sufficiently genetically or morphologically differentiated from the larger California population to suggest the presence of distinct evolutionary lineages or evolutionarily important differences.* ***Therefore, the Department concludes there is insufficient scientific evidence to classify the portions of the California mountain lion population petitioned for listing as one or several ESUs.***

The ***Department also examined the petitioned ESU area and population through the lens of federal DPS policy. While the Department did not find the petitioned area to meet the federal criteria to be considered a DPS****, the best available scientific evidence shows that a separate but similar area is discrete and biologically significant and meets the criteria to be considered a DPS. Furthermore, evidence indicates that mountain lions in the proposed DPS will become imperiled if management actions do not conserve habitat and restore connectivity between the genetic populations within the DPS as well as with the larger statewide population. Therefore, the Department recommends that the Central Coast and Southern California DPS of mountain lions, as delineated below, be listed as threatened under California law.*

In their own words CDFW/Department states, *"The Department has determined, based upon the best available scientific evidence, that there is currently insufficient evidence that the mountain lions within the petitioned area and the genetic populations within the petitioned area boundary meet the criteria to be considered ESUs." … Nor are the mountain lions within the petitioned area sufficiently genetically or morphologically differentiated from the larger California population to suggest the presence of distinct evolutionary lineages or evolutionarily important differences. Therefore, the Department concludes there is insufficient scientific evidence to classify the portions of the California mountain lion population petitioned for listing as one or several ESUs."*

"*The* ***Department also examined the petitioned ESU area and population through the lens of federal DPS policy. While the Department did not find the petitioned area to meet the federal criteria to be considered a DPS…"*** **How can CDFW/Department justify spending the time and money to continually try to get the mountain lion listed as being threatened or endangered?**

The Department's proposed DPS boundary (Fig. 22) would deviate from the petitioned ESU boundary near Mojave California where the petitioned ESU boundary runs east along Highway 58 to Interstate 15 to the California-Nevada border. Instead, the Department proposes a boundary that extends south from Mojave along Highway 14 to its intersection with Highway 138, then east to the intersection with Highway 18, along Highway 18 (which briefly becomes 7th Street in Victorville) to its intersection with Highway 247 in Lucerne Valley, then along Highway 247 to Highway 62, east along Highway 62 to Utah Trail/Park Boulevard/Pinto Basin Road south through Joshua Tree National Park to Interstate 10, then west along I-10 to Highway 86, and south along Highway 86 to the Westside Main Canal of the Imperial Irrigation District near Brawley, then south along the Westside Main Canal to its intersection with the All American Canal; from that intersection due south to the Mexico border and then west to the Pacific coast.

The ***Department also recommends deviating from the boundary at Interstate 5 near Stockton and using Highway 4 to the west as the DPS boundary until it intersects with Highway 160, then north along 160 to the Contra Costa County line, and from there along the Contra Costa and San Francisco County lines (which are in the middle of San Pablo and San Franciso bays) to the Pacific Coast.***

The Department recommends including parts of the Tehachapi Mountains south of Highway 58 in the proposed threatened DPS (as was proposed as the boundary for the petitioned ESU). The genetic characteristics of mountain lions in this and adjacent areas show evidence of connectivity between the primary genetic populations within the DPS and the Western Sierra Nevada genetic population. Therefore, the Department concludes the area is critical for maintaining connection between the proposed DPS and the rest of the state. Highway 58 has been identified as a major barrier to movement of mountain lions (CDFW 2022c), and recent GPS collar location data indicated most lions with home ranges adjacent to or near the highway do not cross it (Vickers unpublished data). Therefore, Highway 58 appears to be the functional boundary between the large Western Sierra Nevada genetic population and smaller genetic populations of the central and south coast of California, and as such, the area south of the highway should be considered part of the proposed threatened DPS.

California does not need or want CDFW ESU or DPS boundaries.

10. Management and Recovery Action Recommendations

California's statewide mountain lion population is complex and diverse. Large areas of the state appear to have robust, genetically diverse, and well-connected lion populations (e.g., NC and SN groups) while other populations show evidence of inbreeding depression and genetic isolation (e.g., SA, Santa Monica Mountains of the CC-S Genetic investigations have demonstrated the importance of the Sierra Nevada region as a reservoir of genetic variation and a source of migrants into other regions of California (Ernest et al. 2003; Gustafson et al. 2019). The overarching goals of mountain lion management in the state should be:

- *Maintaining and enhancing landscape connectivity between robust core populations and the smaller, more isolated populations within the proposed threatened Central Coast and Southern California DPS*
- *Protecting important patches of remaining habitat within the DPS from development and enhancing degraded habitats where feasible*
- *Reducing human-related mortality rates within the populations of the DPS*

Increased connectivity would help offset the risks to small populations that result from demographic and genetic factors. Benson et al. (2019) found that sustaining mountain lion populations in isolated mountain ranges in greater Los Angeles (Santa Monica and Santa Ana Mountains) is feasible with relatively modest increases in landscape connectivity.

One area critical to restoring and maintaining genetic exchange between genetic populations is the Tehachapi Mountains which serve as the link between the relatively robust Western Sierra Nevada genetic population and the more tenuous Transverse Range populations in the CC-S and SGSB. Mitigating the barriers of Highway 58 and Interstate 5 to allow safer and easier dispersal across those roads should be considered high priorities, as well as the conservation of suitable habitat in the Sierra Pelona, Topatopa, and San Emigdio Mountains. Another critical area is the connection between EPR and SA. The EPR is the only genetic population known to exchange migrants with the SA population, and management actions which enhance gene flow between these areas will be critical to the sustainability and recovery of mountain lions in SA. Dispersal into and out of EPR is limited and the degree of dispersal across the border between the U.S. and Mexico remains unknown (Gustafson et al. 2019). While self-sustaining connectivity through a network of corridors, highway wildlife crossings, and habitat patches with functional ecosystem processes would be ideal for long term sustainability, assisted gene flow between populations through targeted translocations should

be considered as a short-term management action to augment the genetic variation of the most isolated small populations.

The specific recommendations below are compiled from sources including the Petitioners, mountain lion researchers, Gustafson et al. (2022), the Department, and others, and are designed to facilitate the above goals.

CDFW has developed a plan to protect one species, with an unbalanced method and means.

10.1 Connectivity

- ***Identify the most strategic locations for wildlife crossing structures at existing roads and highways to improve wildlife connectivity and permeability, and design and build those structures while also protecting adjacent habitat to ensure perpetual wildlife access to the crossing structures and connections*** *(South Coast Wildlands 2008).* ***Crossing infrastructure should include, but is not limited to, overcrossings, underpasses, culverts, and exclusionary fencing that guides animals to safer crossing areas*** *(Vickers et al. 2015). The following crossing locations have been identified by mountain lion experts and should be among the top priorities for the implementation of crossing infrastructure:*
- ***1)Highway 58 near the town of Tehachapi***
- ***2) I-5 between the Grapevine and Gorman***
- ***3) I-15 Freeway at Temecula Creek Bridge to enhance the Palomar Linkage and connect the Santa Ana and Eastern Peninsular Range*** (Ernest et al. 2014; Gustafson et al. 2017; Zeller et al. 2017; Riley et al. 2018b)
- ***4) I-280 between San Bruno and Cupertino****, which is the "deadliest highway for mountain lions in California" according to Shilling et al. (2023)*
- ***5) Highway 101 in the Coyote Valley south of San Jose and at the recently conserved Rocks Ranch in Monterey and San Benito Counties***
- ***6) Highway 152 at Pacheco Pass***
- ***7) I-15 Freeway at the Santa Margarita Ecological Reserve near Temecula.***
- *In recognition of the importance of the Sierra Nevada region as a reservoir of genetic variation and significant source of migrants into other regions of California (Ernest et al. 2003; Gustafson et al. 2019; Gustafson et al. 2022),* ***acquire, maintain, and enhance corridors and patches of suitable habitat linking*** *the SN, CC-S, and SGSB,* ***as well as corridors that connect*** *the SA and EPR populations to one another*

and to SGSB. ***Emphasize the retention and expansion of protected habitat*** *in the* ***Tehachapi, Sierra Pelona, San Emigdio, Santa Ana, Santa Monica, and San Gabriel Mountains****.*

- *Encourage land use and planning agencies at federal, state, county, and local levels of government to identify important corridors within their area of concern, to develop management plans, and to analyze connectivity impacts from projects, especially in the Tehachapi and Sierra Pelona Mountains (Gustafson et al. 2019) and between the SA and EPR (Vickers et al. 2015).*
- *Explore conservation translocations of outbred animals (i.e., genetic rescues) to quickly increase genetic variation in small, isolated mountain lion populations such as the Santa Monica Mountains (CC-S) and SA (Johnson et al. 2010). Translocations should only be used as a short-term strategy to help rescue declining populations from the adverse genetic effects of isolation and small population size (e.g., inbreeding). Translocations should not be considered a substitute for actions needed to support self-sustaining viable, genetically diverse populations over the long term, such as removing barriers and increasing landscape connectivity.*
- *Fund monitoring programs to evaluate the success of wildlife crossing structures, including monitoring the genetic variation and movements of mountain lion populations on either side.*
- *Dedicate sufficient funding from the Wildlife Conservation Board, Habitat Conservation Fund, and other state funding sources towards acquiring key mountain lion and wildlife habitat and for establishment of highway crossing infrastructure.*
- ***Encourage the maintenance and restoration of riparian vegetation and habitats in the DPS to provide prey habitat, resting and feeding cover, and viable movement corridors between remaining patches of mountain lion habitat. This could include limiting water diversions in these areas if such diversions adversely affect riparian vegetation and wildlife communities.***

This massive maze of connectivity is a land and power grab, infringement on private property, misuse of funds, and endangerment to the public. This is CDFW creating an architecture based on expanding the mountain lion population on one quarter [DPS] of the state. This is a methodically planned invasion of mountain lions in multiple areas of California. *"The* ***world's largest wildlife crossing*** *is under construction over the 101 freeway in an attempt to reconnect mountain lion habitat… a* ***$90 million wildlife crossing*** *is completed over an area where the animals were being slaughtered attempting to cross one of the busiest sections*

of Highway 101 near LA." – SF Gate article 10/5/2022 **The Highway 17 Wildlife Crossings Project was estimated at $12M, it is now over $26M, and new estimates to complete it are $38M to $42M, funds are being sought from the Federal Government and other sources to determine the final design. This is being done in collaboration with CalTrans. In the end CalTrans will own all the construction, Midpen will own the directional fencing. It is unimaginable what the seven listed corridors might have and/or will cost. All the while, California roads and infrastructure are in left in major disrepair.**

10.2 Research and Monitoring

While the recommendations below apply statewide, priority should be given to projects that enhance understanding of mountain lion populations and behaviors in the proposed DPS.

- *Periodically replicate genetic analyses similar to Gustafson et al.'s (2019 and 2022) work to monitor genetic variation within the genetic populations and signals of mountain lion immigration and emigration.*
- *Investigate whether heritable local adaptations are present within any of the identified broad-scale and/or fine-scale mountain lion genetic populations.*
- *Determine mountain lion distribution, abundance, resource selection at multiple spatial scales, movements and dispersal patterns, foraging ecology, and landscape genetics in the Sonoran and Mojave deserts, including the lower Colorado River region. Work collaboratively with tribes, adjacent states, Baja California, universities, other government entities (e.g., Caltrans, BLM, NPS, State Parks, USGS, Military), IUCN and IUCN Species Survival Commission Cat Specialist Group, and other NGOs.*
- *Develop rigorous population estimates for the individual genetic populations using available demographic data and/or population modeling techniques.*
- *Monitor wildfire responses to assess how mountain lions, other carnivores, and their prey will be affected by changes in fire frequency and severity.*
- *Evaluate trans-highway movements, resource selection, home range placement, and vehicle-related mortality of adult and subadult mountain lions (Cougar Management Guidelines Working Group 2005; McKinney 2011). Focus primarily on interstates in the South Coast Group (i.e., I-5, I-10, I-15, 101, 405).*
- *Investigate the influence of variation in black bear seasonal density on mountain lion kill rates and prey selection, habitat use, and kitten and adult survival. Also investigate areas where bears and mountain lions overlap with gray wolves to understand interactions.*

- *Design and fund collaborative surveillance programs to rapidly detect, diagnose, and determine the significance of disease outbreaks and emerging diseases such as avian influenza.*
- *Continue AR screening of livers from mountain lion carcasses to further study the locations and effects of AR exposure on mountain lion health and mortality. Continued monitoring should also measure the effectiveness of regulatory changes intended to reduce exposure of non-target wildlife to rodenticides (Rudd et al. 2018).*
- *Investigate potential correlations between habitat, genetics, and prevalence of health and disease issues.*
- *Refine understanding of the conditions associated with human-mountain lion conflict hotspots.*
- *Assess efficacy of non-lethal measures for mitigating/deterring mountain lions from depredating domestic animals.*

CDFW is building a monstrous structure of research, monitoring, studies, all on the backs of the mountain lions. CDFW is creating conflicts, especially human-mountain lion conflicts, thereby creating the endless conflict and endless funding.

10.3 Regulations and Policy

- *Work with the California Department of Pesticide Regulation to improve the regulation of, and foster improved management of, second-generation ARs such as brodifacoum, bromadiolone, difenacoum, and difethialone to reduce mountain lion exposure, with an emphasis on Southern California and central coast mountain lion habitat areas and linkages and explore outreach efforts on this issue.*
- *Improve law enforcement for areas where second-generation AR use is restricted to ensure compliance with the state's regulations.*

California does not want CDFW regulations and policy to be imposed on our lands, the mountain lion is the CDFW tool to gain power.

10.4 Partnerships and Coordination

- *Continue to collaborate with Caltrans and others to analyze how projects in the State Highway Operation Protection Program and State Transportation Improvement Program can be designed to facilitate wildlife connectivity through wildlife passage*

features such as culverts, under crossings, overcrossings, bridges, directional fencing, scuppers, barrier breaks, roadside animal detection systems, signage, etc.

- *Continue to collaborate with Caltrans and the Road Ecology Center at UC Davis to help collect and analyze roadkill data to identify hotspots where mountain lions, deer, and other animals are killed. Investigate funding channels for creating an open access statewide roadkill database for data download and analysis as needed by multiple interested parties.*
- *Encourage local governments to place conditions on new developments to minimize negative impacts on riparian systems and native vegetation by buffering the riparian areas to allow use by mountain lions and their prey. Conditions and measures should include provisions for the long-term management of such areas to maintain their viability as wildlife corridors and minimize wildfire threat and human disturbances. Promote efforts to restore riparian ecosystems and protected lands in the vicinity of wildlife crossing structures.*

CDFW, like Mid Peninsula Regional Open Space, use existing infrastructures, such as roads, culverts, and trails, then use, and/or take, them over for their use. In this case, the useful mountain lion is used to expand areas of control. This is designed and calculated to impose regulations and policies, on developed or developing areas.

Public Education

- *Continue to promote awareness and education regarding mountain lions, human safety, pet and livestock conflict prevention, pesticide exposure, and conservation messaging throughout the central coast and Southern California.*
- *Develop and implement outreach and education activities to promote use of predator-resistant enclosures for domestic animals (Vickers et al. 2015).*

CDFW, like Mid Peninsula Regional Open Space, are only focused on the protection of the mountain lion with an expansionist ideology. CDFW, and Midpen, shield themselves from liability, while they create conflicts. This is a dangerous game. CDFW and Midpen are actively working on the HUMAN-MOUNTAIN LION INTERACTIONS STUDY.

The mountain lion needs to be managed – the mountain lion needs to be contained within appropriate areas of their natural habitat in balance with their natural prey. Management plans should be in place when mountain lion populations get too large. The mountain lion is

also a victim in this situation, with lion saturation and prey decimation, survival needs are expanded.

Ranchers grazing / livestock operations need to be protected, profitable, and productive. People, children and pets need to live in safe environments. Communities are built to bring people together to live in areas which are welcoming, appealing, and have amenities to support and enrich their lives. We have the right to the sanctity of our homes, and not to have to create a fortress to survive. Fear of a predator at anytime, anywhere is not acceptable. We have done better than this.

California is 48% federal land, then there are state lands, and other land designations, with wildlife abundance. Mountain lions do not need to be in urban areas or big cities.

Appendix A – Acronyms, Abbreviations, and Definitions

Caltrans – *California Department of Transportation*

CAL FIRE – *California Department of Forestry and Fire Protection*

CDFW – *California Department of Fish and Wildlife*

CEQA – *California Environmental Quality Act*

CESA – *California Endangered Species Act*

Commission – *Fish and Game Commission*

Department – *California Department of Fish and Wildlife*

Distinct Population Segment (DPS) *– A vertebrate population or group of populations that is discrete from other populations of the species and significant in relation to the entire species.*

Effective Population Size (Ne) *– The number of individuals in a population that effectively participate in producing the next generation.*

Evolutionary Significant Unit (ESU) *– A term related to the federal Endangered Species Act originally applied to anadromous fish populations that designates a population that is substantially reproductively isolated from conspecific populations and represents an important component of the evolutionary legacy of the species.*

FST *– Fixation index. A statistic that measures population differentiation based on genetic structure.*

Fine-Scale Genetic Populations *– Populations of conspecifics whose growth rate depends predominantly on local births and deaths rather than immigration. Genetic populations discussed in this report include:*

Central Coast North (CC-N) *– The genetic population identified by Gustafson et al.'s (2019) microsatellite marker analyses which includes mountain lions in the Santa Cruz Mountains and east bay hills, extending south to approximately the Monterey County line.*

Central Coast Central (CC-C) *– The genetic population identified by Gustafson et al.'s (2019) microsatellite marker analyses which generally includes the mountain lions in the coastal mountain ranges from southern Monterey Bay to Ventura County.*

Central Coast South (CC-S) *– The genetic population identified by Gustafson et al.'s (2019) microsatellite marker analyses which includes the mountain lions in the Santa Monica Mountains, Santa Susana Mountains, Sierra Pelona Mountains, and Simi Hills.*

Eastern Peninsular Range (EPR) *– The genetic population identified by Gustafson et al.'s (2019) microsatellite marker analyses which includes the mountain lions in eastern San Diego County to the Colorado River and the border with Arizona and is bounded on the south by the border with Mexico.*

Eastern Sierra Nevada (ESN) *– The genetic population identified by Gustafson et al.'s (2019) microsatellite marker analyses which includes the mountain lions in the mountains of San Diego County, extending east possibly as far as the Colorado River and the Arizona border, and bounded on the south by the border with Mexico.*

Nevada (NV) *– The genetic population identified by Gustafson et al.'s (2019) microsatellite marker analyses which encompasses mountain lions in most of the state of Nevada.*

San Gabriel and San Bernardino Mountains (SGSB) *– The genetic population identified by Gustafson et al.'s (2019) microsatellite marker analyses and includes mountain lions in the San Gabriel and San Bernardino mountain ranges.*

Santa Ana Mountains (SA) *– The genetic population identified by Gustafson et al.'s (2019) microsatellite marker analyses that encompasses mountain lions in the Santa Ana Mountains.*

Western Sierra Nevada (WSN) *– The genetic population identified by Gustafson et al.'s (2019) microsatellite marker analyses that includes mountain lions from the Oregon border through the Cascades and Sierra Nevada Mountains to the Tehachapi Mountains and includes the Sierra Nevada foothills and much of the Central Valley.*

Genetic Groups / Broad-Scale Genetic Groups *– The four genetic groups for which Gustafson et al. (2022) found the strongest support through SNP analysis. These groups include:*

Central Coast Group *– Mountain lions from the San Francisco Bay and Sacramento-San Joaquin Delta south through the Santa Monica Mountains inclusive of Gustafson et al.'s (2019) Central Coast-North, Central Coast-Central, and Central Coast-South genetic populations.*

North Coast Group *– Mountain lions north of San Francisco Bay through the Coast Ranges to border with Oregon. Largely coincident with Gustafson et al.'s (2019) North Coast genetic population.*

Sierra Nevada Group *– Mountain lions from the Klamath, Cascades, and Sierra Nevada mountains from the Oregon border south through the Tehachapi Mountains inclusive of Gustafson et al.'s (2019) Western Sierra Nevada and Eastern Sierra Nevada genetic populations.*

Southern Coast Group *– Mountain lions in the San Gabriel and San Bernardino, Santa Ana, and Eastern Peninsular mountains inclusive of Gustafson et al.'s (2019) San Gabriel-San Bernardino, Santa Ana, and Eastern Peninsular Range genetic populations.*

Microsatellite Markers *– Repetitive segments of DNA scattered throughout the genome in noncoding regions between genes or within genes.*

NMFS *– National Marine Fisheries Service*

NPS *– National Park Service*

Principal Component Analysis (PCA) *– A statistical multivariate technique which transforms a large number of correlated variables into few uncorrelated variables which represents the whole data set.*

Single Nucleotide Polymorphism (SNP) *– a variation in nucleotides at a single position in a DNA sequence among individuals. Status Review of the petitioned Southern California/Central Coast ESU of Mountain Lion in California, California Department of Fish and Wildlife*

State Wildlife Action Plan *– California's comprehensive plan for examining the health of wildlife populations and prescribing actions to conserve wildlife and vital habitat before they become more rare and more costly to protect.*

USFS *– U.S.D.A. Forest Service*

USFWS *– United States Fish and Wildlife Service*

WDFW *– Washington Department of Fish and Wildlife*

In conclusion, life is a balance, and is constantly changing. Human rights of life, liberty and the pursuit of happiness are fundamental to our existence. The mountain lion is a beautiful and significant animal, as are so many other animals and creatures. The mountain lion is a powerful predator which needs to be kept in balance with nature, in areas where their natural prey can sustain the lions' appetite. Over population of the mountain lion has caused diminished wildlife prey. The result is the lions' search for alternate sources, which becomes destructive to agriculture and communities. Urban areas, a well as rural areas, should be protected against mountain lion population encroachments. This country was built with great men managing resources and wildlife, and developing lands and business, to create a safe and prosperous country. Corridors dispersing the mountain lions across California, is the creation of conflicts. CDFW has the opportunity to manage the mountain lion population, and help balance wildlife in a sustainable manner, while protecting agriculture and communities. The ESU and DPS are both requested under false pretenses with inaccurate data, both increase conflicts, both endanger other wildlife, livestock, farm animals, pets and the public.

Sincerely,



Lucy White

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ATTACHMENTS

A] News Articles Related to Mountain Lions | Page 116

1] 2026/1/5 | SF Gate | Mountain lions menaced hikers, pets for months near national park before fatal attack | Autopsy shows mountain lion killed Colorado hiker near national park | January 5, 2026

2] 2026/1/5 | NewsBreak | A Central California Town on Edge After Repeated Mountain Lion Attacks | January 5, 2026

3] 2026/1/2 | APN News | Colorado | Man fought off a mountain lion weeks before a suspected fatal Colorado attack | January 2, 2026

4] 2025/8/31 | SF Chronicle | This Northern California county is 'overrun' with mountain lions. What should be done? | August 31, 2025

5] 2025/8/22 | SF Gate | 15 alpacas dead, 3 cougars on the loose: NorCal ranch under siege | August 22, 2025

6] 2025/8/11 | SF Gate | California mountain lion bite sends 11-year-old to hospital | August 11, 2025

7] 2025/7/22 | SF Chronicle | Mountain lion prowling around Contra Costa County home | July 22, 2025

8] 2025/3/3 | SF Gate | Mountain lion evades double electric fence, kills pets at Northern California homestead | March 3, 2025

9] 2025/1/17 | SF Gate | California park closed after mountain lion shot with dog in its mouth | Another mountain lion was seen 300 yards from a Calif elementary school | January 17, 2025

10] 2024/9/3 | SF Gate | Mountain lion attacks 5-year-old boy at popular California park | Family members helped fight off the animal as it tried to pull the child away | September 3, 2024

11] 2024/3/25 | SF Gate | California brothers in deadly mountain lion attack identified | March 25, 2024

12] 2024/3/24 | SF Gate | California for first time in 30 years | March 24, 2024

13] 2023/10/27 | SF Gate | California hiker injured when stopping mountain lion attack on dog | October 27, 2023

14] 2023/8/12 | SF Gate | Mountain lion tears dog on leash away from its owner in California neighborhood | August 12, 2023

15] 2023/2/15 | SF Gate | Mountain lions seen eating deer on Hillsborough property | February 15, 2023

16] 2023/2/1 | SF Gate | Bay Area boy attacked by mountain lion was 'fighting for his life' | February 1, 2023

17] 2022/12/8 | SF Gate | 'Shock': Mountain Lion enters Bay Area home, drags dog outside | December 8, 2022

18] 2022/12/4 | SF Gate | Mountain lions seen eating deer on Hillsborough property | December 4, 2022

19] 2022/10/5 | SF Gate | 'They're out there': Why California mountain lion sightings are on the rise | October 5, 2022

20] 2022/6/8 | SF Gate | Dog who saved owner in Northern California mountain lion attack dies | June 9, 2022

21] 2022/6/2 | SF Gate | Mountain lion found at Bay Area high school moves to Oakland Zoo | June 2, 2022

22] 2022/3/21 | SF Gate | Video shows - Mountain lion wandering around California family's swimming pool | March 21, 2022

23] 2022/1/20 | SF Gate | Mountain lion seen in Bay Area neighborhood after killing other lion | January 20, 2022

24] 2022/1/10 | SF Gate | Mountain lion seen near Bay Area school| January 10, 2022

25] 2021/12/28 | SF Gate | Mountain lion spotted in Pacifica backyard gorging on pet chicken | December 28, 2021

26] 2021/10/20 | SF Gate | Mountain lion that shut down 2 Bay Area schools tranquilized | October 10, 2021

27] 2021/7/1 | SF Gate | Petaluma resident shares video of huge mountain lion in his yard | July 1, 2021

28] 2021/5/26 | SF Gate | Mountain lion breaks into SF Bay Area house filled with taxidermy trophy heads | May 26, 2021

29] 2021/5/20 | SF Gate | Wayward San Francisco mountain lion captured after being found in tree | May 20, 2021

30] 2021/5/19 | SF Gate | Mountain lion spotted roaming San Francisco's Bernal Heights | May 19, 2021

31] 2021/3/18 | SF Gate | Woodside resident drives onto lawn to stop mountain lion attack | March 18, 2021

32] 2021/1/14 | SF Gate | California deputy kills mountain lion that stalked family in broad daylight | January 14, 2021

33] 2021/1/6 | SF Gate | Sick, 'desperate' mountain lions are being seen around Santa Cruz | May 19, 2021

34] 2020/9/22 | SF Gate | Video shows mountain lion watching child play on bike in Bay Area | September 22, 2020

35] 2020/6/22 | SF Gate | Mountain lion spotted again in San Francisco's Mission Bay | June 22, 2020

36] 2020/6/19 | SF Gate | 3 marsupials found dead at SF Zoo, a mountain lion cub is a suspect | June 19, 2020

37] 2020/5/12 | SF Gate | Hiker encounters 2 mountain lions on popular trail | Sightings of wild animals increase as humans shelter in place | May 12, 2020

38] 2020/2/20 | SF Gate | Mountain lion that attacked six-year-old girl in Cupertino is euthanized | Rancho San Antonio Park will re-open Friday morning | February 20, 2020

39] 2020/2/19 | SF Gate | Parent reportedly punched a mountain lion in the ribs to save injured 6-year-old girl | February 20, 2020

40] 2019/4/29 | SF Gate | Mountain lion discovered near Santa Rosa Macy's store is sedated | April 29, 2019

41] 2019/1/12 | SF Gate | Mountain lion reported in backyard near Pacifica park | January 12, 2019

42] 2016/5/1 | East Bay Times | East By Times Santa Cruz Mountains residents watch cougar attacks with concern | May 1, 2016

B] Mountain Lion Sighting Maps | Page 205

1] Bay Area Bobcat and Mountain Lion Sightings

2] Schuamcher California Mountain Lion Sightings Map

C] California Department of Fish and Wildlife Petition Maps | Page 209

1] California Department of Fish and Wildlife Petitioned ESU Map

2] California Department of Fish and Wildlife Petitioned DPS Map

D] Mountain Lion Camera Captures | Page 211

1] Mountain Lion Captures near Lobitos Grazing Ranch

E] Mountain Lion Predations | Page 218

Vince Fontana Chronology of Predations 2020 - 2025

▶ ATTACHMENT A

News Articles Related to Mountain Lions

Research solely on SF Gate and San Francisco Chronicle, with AP News and NewsBreak in 2026. This is the tip of the iceberg. Visit links to see actual articles.

The following articles show mountain lions in various locations and different times of day. Most are near or in urban areas. Mountain Lion's have a large range area, and their behavior is extremely unpredictable.

2026

1] January 5, 2026

[redacted]

https://www.sfgate.com/national-parks/article/colorado-fatal-mountain-lion-attack-21277852.php

Mountain lions menaced hikers, pets for months near national park before fatal attack | Autopsy shows mountain lion killed Colorado hiker near national park

SF Gate By **Amanda Heidt** , *Southwest Contributing Parks Editor* Jan 5, 2026

[Photo - At least four mountain lions, including an adult and three juveniles, have been seen in the area surrounding Glen Haven and Estes Park, Col. Photo Georgia Evans/IStockphoto via Getty]

A woman hiking near Rocky Mountain National Park was killed by a mountain lion on New Year's Day, according to an autopsy released Jan. 5. The hiker, identified as Kristen Marie Kovatch of Fort Collins, Colorado, died due to asphyxia caused by external neck compression, the autopsy states.

The fatal attack came just weeks after a man fought off a mountain lion in the same area, and after a group of hikers was surrounded by multiple mountain lions on the same trail. The fatality, which occurred in the woods near the eastern entrance to the national park, is the first death attributed to a mountain lion in the state since 1999.

While such attacks are extremely rare, sightings of the animals are common around the mountain towns of Glen Haven and Estes Park, near where the woman was killed. This is particularly true in winter, when deer and elk move from the mountains down into the lowlands, drawing their predators with them.

"This is a very common time of year to take mountain lion sightings and reports and especially in Larimer County, where this is very good mountain lion habitat," Colorado Parks and Wildlife spokesperson Kara Van Hoose told the Associated Press. "Trails in this area are in pretty remote land, so it's wooded, it's rocky, there's elevation gains and dips."

The fatal attack on New Year's Day occurred near the mountain towns of Estes Park (pictured) and Glen Haven, Colo. Photo Tupungato / istockphoto via Getty

Shortly before noon on Jan. 1, two hikers encountered a mountain lion near a woman's body along the Crosier Mountain Trail, a 10-mile stretch that climbs through Roosevelt National Forest. The pair threw rocks at the animal to scare it away, and one of the hikers, a physician, attended to the victim. She did not have a pulse and was later declared deceased.

The attack follows a handful of other aggressive encounters in the area over the past few months. On Nov. 11, a resident of nearby Glen Haven, Colorado, was running along the same trail when a mountain lion stalked and attacked him. The man, Gary Messina, told the Associated Press he threw his phone, kicked dirt and yelled before using a large stick to club the animal.

"I had to fight it off because it was basically trying to maul me," Messina said. "I was scared for my life and I wasn't able to escape. I tried backing up and it would try to lunge at me."

Messina reported the encounter to officials, who posted signs in the area. The signs were later removed, however.

This photo provided by Gary Messina shows a mountain lion in the brush between two trees along the Crosier Mountain Trail in the Arapaho and Roosevelt National Forests near Glen Haven, Colo., on Nov. 11, 2025. Illustration Gary Messina/AP/ SFGATE

Local news station CBS Colorado (KCNC-TV) also reported that at least three other people have been threatened. One woman was hiking alone on Oct. 29 when a mountain lion attacked and killed her dog, and a couple was surrounded by a group of three mountain lions on the Crosier Mountain Trail at the end of November. A nearby homeowner recently caught a group of four mountain lions, including a mother and three juveniles, on a home camera system. Locals say that the group has been killing dogs for several months.

The hiker's death has shaken up nearby mountain communities. "It's really opened my eyes that we're in nature," the homeowner, Kelly Mahoney, told CBS Colorado, adding that mountain lion activity seems to be increasing over time. "We have to change the way we do things. It's scary."

It's unclear how many mountain lions may have been involved in the fatal attack on Jan. 1, but in the days following the woman's death, wildlife officials attempted to locate mountain lions in the area. A nearby biologist conducting aerial deer surveys was able to assist, and officials also deployed dogs. Two mountain lions found nearby were euthanized, and a search for a third is ongoing. A necropsy will help determine whether any of the animals attacked the woman and whether they had neurological diseases such as rabies or avian flu.

Nearby trails, including Garden Gate Trailhead, Gravel Pit/Rainbow Trailhead and Piper Meadows/Glen Haven Trailhead, were closed for a time, but reopened Jan. 4.

Locals of Estes Park noted on social media that sightings of the big cats — which are also known as pumas or cougars, and can weigh as much as 130 pounds — are common. It's possible, one Reddit user noted, "that the cats in that area are getting too comfortable around people."

Photo A view of Lake Estes, a reservoir in Estes Park, Colo. Sandra Leidholdt/Getty Images

Byron Weckworth, chief conservation officer for the California-based Mountain Lion Foundation, made a similar assessment, telling the Associated Press that "as more people live, work, and recreate in areas that overlap wildlife habitat, interactions can increase, not because mountain lions are becoming more aggressive, but because overlap is growing."

Still, interactions between people and mountain lions remain extremely rare. The Mountain Lion Foundation notes that only about 30 fatal mountain lion attacks have been documented in North America since 1868, and that some of those deaths are only suspected to have been caused by the large cats. A mountain lion attacked two brothers in California's Sierra Nevada foothills in 2024, killing one and significantly injuring the other.

In Colorado, where as many as 4,400 mountain lions live, 28 attacks have occurred in the past 35 years, with no fatalities for the past several decades. In 1997, a 10-year-old was mauled in Rocky Mountain National Park, while in 1999, a three-year-old went missing from a group about 60 miles west of Fort Collins.

When entering mountain lion territory, Weckworth says it's best to travel in groups, keep children close and avoid dawn and dusk when the big cats are most active. If you do find yourself threatened, maintain eye contact with the animal, make yourself appear larger and back away slowly. Fleeing may trigger the animal to attack, so stand your ground and avoid stooping.

Amanda Heidt Southwest Contributing Parks Editor Amanda Heidt (she/her) is the Southwest contributing parks editor at SFGATE, covering parks and public lands across Utah, Colorado, New Mexico, Arizona and Nevada. She is also an award-winning freelance science journalist, with bylines in The New York Times, National Geographic, Nature, Science and NPR, among other outlets. When away from her desk, you can find Amanda kicking around in the desert near Moab or otherwise chasing beautiful scenery. Send story tips to amanda.heidt@sfgate.com, or message her securely on Signal at aheidt.16.

2] January 5, 2026

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https://www.newsbreak.com/news/4426365314559-a-central-california-town-on-edge-after-repeated-mountain-lion-attacks?noAds=1&_f=app_share&s=i3

A Central California Town on Edge After Repeated Mountain Lion Attacks

NEWSBREAK By Sumi Sarkar, 1/5/2025

In the quiet rural community of Corral de Tierra, just east of Monterey in Central California, a series of mountain lion attacks on pets and livestock has rattled residents and wildlife officials alike, prompting warnings and safety advice from the California Department of Fish and Wildlife. Over recent weeks, dogs, a miniature horse and goats have been killed in multiple incidents — prompting concern about predator behavior and backyard coexistence in areas where human and mountain lion territories intersect.

While witnesses and residents reported eerie sounds and sightings in the late night hours, experts emphasize that these big cat conflicts are occurring at times when mountain lions are typically active and that many of the targeted animals were not secured at night, highlighting the importance of proper animal management in predator range.

Early Attacks Stir Alarm in Corral de Tierra

The first attack took place on December 21 around 12:30 a.m., when a resident heard movement on their porch and soon after discovered their family dog had been taken. The following night, the same lion reportedly returned — this time taking a goat to the same spot — without consuming either animal, leading locals to believe the predator may be acting out of instinct rather than hunger.

Other community members have seen the large cat lurking in yards and near homes, prompting a mix of fear and fascination as residents capture fleeting glimpses of this apex predator. These close encounters reflect the expanding interface between human habitation and mountain lion habitat in California.

Wildlife Officials Advise Simple Safeguards

The California Department of Fish and Wildlife hasn't confirmed how many mountain lions are involved in the incidents or if one animal is responsible for all of the attacks. However, department spokesperson Krysten Kellum stressed that the attacks occurred when livestock and pets were left unsecured — a key factor in mountain lion conflict scenarios.

Authorities urge residents to bring pets indoors at night, night-pen livestock in secure enclosures and document all lion encounters through official reporting channels. These basic steps can significantly reduce opportunities for predators to access vulnerable animals.

Reducing Attractants and Hiding Spots

In addition to securing animals, wildlife officials recommend that residents deer-proof their properties to reduce the presence of the mountain lion's natural prey. Deer attract these big cats, so removing dense vegetation, installing outdoor lighting, and eliminating attractants like unsecured pet food can make an area less appealing to roaming lions.

Such habitat modification strategies mirror coexistence approaches used around the world that involve reducing food attractants and human-lion encounters without resorting to lethal measures. These include structural deterrents and community education about lion behavior.

Nonlethal Deterrence Options

If basic precautions fail, wildlife officials say other measures — such as trapping the animal or using nonlethal projectiles like paint balls or noise devices to haze or scare the predator away — might be considered. However, Kellum emphasized that the situation in Corral de Tierra hasn't reached a level requiring these more intensive tactics.

Nonlethal deterrence — ranging from motion-activated lighting to livestock guardian dogs — is increasingly recommended by conservationists as a way to protect animals while allowing mountain lions to remain in their native ranges without undue risk of conflict.

Balancing Safety and Wildlife Presence

Mountain lions are natural predators found throughout much of California, and as human developments encroach deeper into wilderness areas, incidents like these are likely to become more common unless proactive steps are taken. Experts note that mountain lions generally prefer wild prey such as deer, but when domestic animals are accessible and unsecured, they can become opportunistic targets.

This intersection of expanding human habitation and big cat habitat raises broader questions about how communities can coexist with apex predators, balancing safety and wildlife preservation as landscapes and ecosystems change.

Coexistence Starts With Preparedness

The recent mountain lion attacks in Corral de Tierra serve as a stark reminder that wildlife doesn't respect property lines, and that coexistence requires awareness, preparation and respect for nature's boundaries. Securing pets and livestock at night isn't just good practice — it's essential in areas where predators roam.

Rather than viewing mountain lions as unwanted intruders, communities should engage with wildlife agencies and adopt proactive, evidence-based coexistence strategies that protect both people and predators. With thoughtful planning and community cooperation, it is possible to share landscapes with these magnificent cats — but it begins with understanding their behavior and adjusting human practices accordingly.

3] January 2, 2026

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https://apnews.com/article/mountain-lion-attack-woman-killed-colorado-81191e197ebe2d0da59b64351760c3aa

U.S. News

AP NEWS | COLORADO

Man fought off a mountain lion weeks before a suspected fatal Colorado attack

AP NEWS By MATTHEW BROWN

Updated 11:55 AM PST, January 2, 2026

[Photo - This photo provided by Gary Messina shows a mountain lion in the brush between two trees along the Crosier Mountain trail in the Arapaho and Roosevelt National Forests near Glen Haven, Colo., on Nov 11, 2025. (Gary Messina via AP)]

A solo hiker who authorities believe was killed by a mountain lion on a remote Colorado trail on New Year's Day was not the first person to encounter one of the predators in the area in recent weeks.

Gary Messina said he was running along the same trail on a dark November morning when his headlamp caught the gleam of two eyes in the nearby brush. Messina used his phone to snap a quick photo before a mountain lion rushed him.

Messina said he threw the phone at the animal, kicked dirt and yelled as the lion kept trying to circle behind him. After a couple of harrowing minutes he broke a bat-sized stick off a downed log, hit the lion in the head with it and it ran off, he said.

The woman whose body was found Thursday on the same Crosier Mountain trail had "wounds consistent with a mountain lion attack," said Kara Van Hoose with Colorado Parks and Wildlife. An autopsy is scheduled for next week, said Rafael Moreno with the Larimer County Coroner's Office.

Prior warnings and the hunt for a culprit

Wildlife officials late Thursday tracked down and killed two mountain lions in the area — one at the scene and another nearby. A necropsy will help determine if either or both of those animals attacked the woman and whether they had neurological diseases such as rabies or avian flu.

A search for a third mountain lion reported in the area was ongoing Friday, Van Hoose said. Nearby trails remained closed while the hunt continued. Van Hoose said circumstances would dictate whether that lion is also killed.

Based on the aggressiveness of the animal that attacked him on Nov. 11, Messina suspects it could be the same one that killed the woman on New Year's Day.

"I had to fight it off because it was basically trying to maul me," Messina told The Associated Press. "I was scared for my life and I wasn't able to escape. I tried backing up and it would try to lunge at me."

The 32-year-old man from nearby Glen Haven, Colorado, reported his encounter to wildlife officials days later who posted signs to warn people about the animal along trails in the Crosier Mountain area northeast of Estes Park, Van Hoose said. The signs were later removed, she said.

Mountain lions don't often attack humans

Mountain lion sightings in that area east of Rocky Mountain National Park are common, Van Hoose said, because it offers good habitat for the animals: It's remote with thick forests, rocky outcroppings and lots of elevation changes.

Yet attacks on humans by the animals are rare, and the last suspected fatal encounter in Colorado was in 1999, when a 3-year-old boy disappeared in the wilderness and his tattered clothes were found more than three years later. In 1997, a 10-year-old boy was killed by a lion and dragged away while hiking with family members in Rocky Mountain National Park.

Two hikers on Thursday saw the victim's body on the trail at around noon from about 100 yards (meters) away, Van Hoose said. A mountain lion was nearby and they threw rocks to scare it away. One of the hikers, a physician, attended to the victim but did not find a pulse, Van Hoose said.

The victim will be publicly identified following the autopsy by the coroner, who is also expected to provide a cause of death.

Mountain lions — also known as cougars, pumas or catamounts — can weigh 130 pounds (60 kilograms) and grow to more than 6 feet (1.8 meters) long. They primarily eat deer. Colorado has an estimated **3,800 to 4,400** of the animals, which are classified as a big game species in the state and can be hunted.

Back away slowly. Do not run

Thursday's killing would be the fourth fatal mountain lion attack in North America over the past decade, and the 30th since 1868, according to information from the California-based Mountain Lion Foundation. Not all of those deaths have been confirmed as mountain lion attacks.

Most attacks occur during the day and when humans are active in lion territories, indicating the animals are not seeking out the victims, according to the advocacy group. About 15% of attacks are fatal.

"As more people live, work, and recreate in areas that overlap wildlife habitat, interactions can increase, not because mountain lions are becoming more aggressive, but because overlap is growing," said Byron Weckworth, chief conservation officer for the foundation.

To reduce the risk travel in groups, keep children close and avoid dawn and dusk when lions are most active, Weckworth said. During an encounter, maintain eye contact with the lion, make yourself appear larger and back away slowly; don't run, he said.

Last year in Northern California, two brothers were stalked and attacked by a lion that they tried to fight off. One of the brothers was killed.

MATTHEW BROWN Brown is based in Billings, Montana. He covers breaking news, the environment, politics, energy, crime and more.

2025

4] August 31, 2025

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https://www.sfchronicle.com/california/article/mountain-lion-el-dorado-county-21018501.php?cmpid=gsa-sfgate-result

U.S. & World//California

This Northern California county is 'overrun' with mountain lions. What should be done?

[Videos 4 - Mountain lion sightings in El Dorado County. Residents are divided over how to respond as the big cats' behavior appears to be changing around humans. Photo Clockwise from top-left: Maureen Mckindley; Wendy Stabile-Leduc; Fred Buhlert; Kaylee Ries]

San Francisco Chronicle By Lucy Hodgman, Staff Writer Aug 31, 2025

Haley Molzahn remembers the first time she heard a mountain lion's mating cry. The high-pitched wail can't be captured in a YouTube video, she said — in person, it sends "an icy feeling down your spine, like you've just been put back into the Pleistocene Era and you are not at the top of the food chain."

It wasn't unusual to hear mountain lions when Molzahn was growing up in Foresthill (Placer County). The big cats, which are also called pumas and cougars, are native to the area and roam widely through its forests and foothills. But Molzahn said it was rare for her neighbors to actually lay eyes on a mountain lion unless one ran across their path while they were hiking in the woods. That's changed in the last few years.

"Post-2020, you start having people see the lion cross their property, maybe in the late evening or during the day," said Molzahn, who now lives in El Dorado County, about 30 minutes from her hometown. "What's more disturbing is that beforehand, people could yell and scream, and the lion would take off. Now people are yelling and screaming and the lion's just staring at them, like, 'Why are you yelling at me?'"

Growing concern about mountain lions in El Dorado County inspired her to start tracking them last summer. When she posted about her research on Facebook, one commenter called her "an overeducated housewife with too much time on her hands." Molzahn jokes that the description isn't far from the truth: She's worked as a wildlife biologist and a veterinarian, but she was a stay-at-home mom to a toddler when she started the El Dorado County Carnivore Project.

The project has grown to a small team of volunteers that collects data on mountain lions in the area and maintains a map of reported sightings. Molzahn has driven much of the county with her

son in tow, interviewing locals about their run-ins with the lions. She's heard extreme stories about mountain lions following people down their driveways, or in one case, coming inside and hopping onto a kitchen counter. The consensus is that there's been a recent "behavioral change," she said — the area's mountain lions seem less wary of humans than ever.

Molzahn's findings line up with El Dorado County data. For the 13 years prior to 2023, the county recorded an annual average of about 33 mountain lion attacks on domestic animals. The number of attacks spiked to 97 in 2023, then climbed to 202 in 2024. County Agricultural Commissioner LeeAnne Mila said the latest numbers were still unusually high, with 50 attacks reported between Jan. 1 and April 14 of 2025. The lions' primary targets have been sheep and goats, but they've also killed horses, llamas and household pets (six last year).

"A lot of people are of the thought that the mountain lions will only kill what they're going to eat, and that's not true — they also kill for sport," Mila said. "When they're coming in and taking a German shepherd mix at 5 o'clock in the afternoon in front of the owner, they're not afraid of anything."

It's unclear whether there are actually more mountain lions in the county, or whether it's just their behavior that has changed. Peter Tira, a spokesperson for the California Department of Fish and Wildlife, also suggested that growing awareness about the issue in the county could lead more people to report attacks than in previous years.

A population survey published last year estimated that there were between 3,200 and 4,500 mountain lions in California, a number that's stayed relatively consistent since the last count 40 years prior. **The Department of Fish and Wildlife estimates that around 40% of the state is habitable for the lions, which favor forests, brushlands and mountains.**

Reports of mountain lions in El Dorado County tend to note that they look "really skinny," Mila added, **leading her to wonder if they're driven toward humans out of desperation for food.** Mila and Molzahn both pointed to the state's booming population of black bears, which steal and eat the deer that mountain lions kill for dinner. The lions are also likely to find goats and sheep easier to catch than fleet-footed wild animals; Molzahn compared a field of livestock to a mountain lion McDonald's.

The uptick in reported attacks has spawned several Facebook groups where people in the county share stories of their sightings and run-ins. Anxiety reached a fever pitch last year, after brothers Taylen Brooks, 21, and Wyatt Brooks, then 18, were **mauled by a mountain lion** while looking for shed deer antlers on a forest service road in El Dorado County, outside Georgetown. Taylen died at the scene and Wyatt was seriously wounded.

It was the first time since 2004 that a mountain lion has killed a human in California. According to state records, only three other people have died in mountain lion attacks in the last four decades. The incident was also unusual because Taylen and Wyatt were grown men with years of experience hunting and fishing in the area. Their uncle, Malcolm Brooks, said the brothers followed the recommended procedure as soon as they spotted the lion, shouting and waving their arms as they backed away.

"They did everything that you're supposed to do in a face-to-face confrontation, and none of it worked," Brooks said. "It landed like a bomb in that community."

Brooks testified in the state Senate this spring on behalf of **"Taylen and Wyatt's Law,"** a bill sponsored by state Sen. Marie Alvarado-Gil, R-Jackson (Amador County). **The legislation, which died in May, aimed to create a pilot program in El Dorado County allowing trained dogs and their handlers to chase mountain lions until they could escape to safety in a tree.**

Known as "tree-and-free," the practice is intended to restore the lions' fear of humans. **Brooks noted that chasing lions with dogs was common in California until Proposition 117** made mountain lions a "specially protected" species in 1990. He'd ultimately like to see that protection repealed.

Wildlife advocates are skeptical that the tree-and-free method is as humane as proponents claim. Robin Parks, a longtime volunteer with the Mountain Lion Foundation, a Sacramento-based nonprofit devoted to mountain lion conservation, fears many of the chases would end with lions being shot.

"If a mountain lion goes after their dogs, they're going to shoot it," Parks said. "If it goes after one of them, they're going to shoot it. The odds are really good that one of those two things will happen. The idea here is that there will be mountain lions killed, not just mountain lions 'treed.'"

Parks offered a simple explanation for the increased mountain lion presence in El Dorado County: Humans are encroaching on their territory, and the lions have less space to retreat to than ever. He's found that simple scare devices like light and noise alarms serve as effective deterrents, and he laments the fact that people seem more interested in chasing the lions up trees "for fun."

On the other end of the spectrum are locals who say the tree-and-free method doesn't go far enough. That's the position of Fred Buhlert, who's 74 and has lived in the county his whole life. For most of that time, "there wasn't a lion anywhere," he said. Now, the county is "overrun." Buhlert would like to see a **"controlled hunt" of mountain lions, requiring hunting tags and a quota on the number that can be killed.**

"Every predator should be managed," Buhlert said. "It's just obvious that you have to control the population or there's going to be more problems."

California remains the only state where hunting mountain lions for sport is banned outright. Instead, state residents can apply for permits to haze or shoot mountain lions that have injured or killed their livestock or pets. Last year, the California Department of Fish and Wildlife issued 68 of those permits in El Dorado County, about a third of the 208 total statewide. 19 of those permits authorized killing lions, according to Tira.

Wendy Stabile-Leduc, who's lived in the county for 10 years, is wary of the "red tape" around killing mountain lions. But she's also not convinced of the effectiveness of light and sound alarms when it comes to protecting her animals — her doorbell cameras sometimes catch lions passing the house, and they don't flinch when her security light flashes on. **Now, when she goes out to feed her horses, she braces herself for a "massacre."**

"I love wildlife," Stabile-Leduc said. "I don't really want to see them killed. But I would like to see something come back where they're afraid of people again."

Staff writer Lucy Hodgman is a Hearst Fellow on the Climate Team at the San Francisco Chronicle, covering seismic building issues, homeowners insurance and breaking energy and environment news. She previously covered politics for the Times Union, in Albany, New York, and breaking news for Politico and the Sacramento Bee.
Originally from Brooklyn, Lucy graduated from Yale University with a degree in English. Reach her at lucy.hodgman@hearst.com.

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5 | Aug 22, 2025

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https://www.sfgate.com/northcoast/article/northern-california-mountain-lion-alpaca-attacks-20889731.php

News | North Coast

15 alpacas dead, 3 cougars on the loose: NorCal ranch under siege | The attacks occurred over three nights on a Lake County ranch in Northern California

SF Gate By **Matt LaFever**, *North Coast Contributing Editor*

A two-hour drive north of San Francisco, on a 340-acre ranch tucked into the hills outside **Middletown** in **Lake County**, Julie Barr has spent nearly a decade raising alpacas. A retired Navy nurse, she moved her herd from Texas in 2015, filling the pastures with animals she describes as "so adorable."

She told SFGATE she had "never lost an animal to attack." But that peace ended last weekend, when a spree of mountain lion attacks over three consecutive nights left 15 of her alpacas dead.

She remembered stepping onto her porch the evening of Sunday, Aug. 17, when she heard a crash. Barr and her husband rushed out to inspect the alpaca enclosure and found a section of fence smashed from the inside out. Only later did she realize it was made by her alpacas, stampeding in the dim light and slamming against the boards in a blind panic as the lions struck.

What stunned her most wasn't just the scale of the killing, but the nature of it. "It's not like they just killed one and ate it," she said. "They just killed" and ate nothing. She has Great Pyrenees guard dogs on the property, but, as she put it, "there's no way my dogs could take care of all that.'"



[Photo - Alpacas graze peacefully in a Lake County meadow, nestled in the quiet hills of Northern California. Photo Julie Barr]

Her neighbor, Jesse Cude, was called to Barr's ranch the following morning and told SFGATE he found "eight dead and four still breathing." He said he was forced to "put down like four or five of them."

Cude returned that night to stand guard, shotgun in hand. As dusk settled, he sat quietly, waiting.

"I'm just sitting there being quiet," he said, "and I see out of the corner of my eye two cats run right by me like 20 feet away. It's straight towards the alpacas."

They were “big cats, probably 100 pounds, running at full speed right by me," he added. "Didn’t notice me, smell me, nothing.”

The alpacas screamed as the lions struck again. Two more animals would die that night, and another pair the following evening, bringing the toll to 15.

[Photo -In the peaceful hills of Northern California's Lake County, a herd of alpacas pauses their grazing to greet the camera. Photo Julie Barr]

California Department of Fish and Wildlife spokesperson Peter Tiara confirmed the scope of the attacks. “We showed up after the first incident, 11 alpacas killed, three more injured as well as injuries to one of their livestock guardian dogs,” he said. “**It was a mountain lion attack and we issued a non-lethal permit.**”

After the lions returned, CDFW escalated its response. “At that point, we issued a lethal depredation permit to take one adult lion.”

Tiara told SFGATE that the mountain lions were not likely killing for sport, but due to their prey drive. “If they get into a pen and there’s multiple animals, they’re in kill mode, right? As long as there’s movement, they’re taking out every animal they can get,” he explained. “It’s just a predatory response.”

On Barr's ranch, the aftermath lingers — empty pens beside scattered survivors, the remaining alpacas uneasy in pastures once filled with calm routine. She said animal experts have told her mountain lions don’t kill for sport. But her eyes told her something else.

“They killed 15 animals," Barr said. "They’re not going to eat 15 animals. They came back two nights and killed.”

She grew up in West Virginia, where her family hunted. “We eat what we kill,” she said. “But this just seemed a shame.”

Matt LaFever North Coast Contributing Editor

Matt LaFever is a former SFGATE contributing editor for the North Coast. A Humboldt State grad and 20-year Emerald Triangle resident, he's previously reported on California’s North Coast in print and radio for nearly a decade.

6] August 11, 2025

[redacted]

https://www.sfgate.com/la/article/california-mountain-lion-bite-20812509.php

News | Los Angeles

California mountain lion bite sends 11-year-old to hospital

SF Gate By Olivia Hebert, *News Reporter* Aug 11, 2025

A Sunday evening on the Malibu coast took a chaotic turn when an 11-year-old was bitten by a mountain lion, sparking an emergency response that ended with the animal's death.

The attack occurred around 5:40 p.m., the Los Angeles County Sheriff's Office told SFGATE. Deputies with the Malibu and Lost Hills Sheriff's Station responded to the scene, along with members of the Los Angeles Fire Department, after getting a call reporting the attack.

"Deputies provided scene security, while fire provided medical aid to the juvenile," the sheriff's office said in a statement.

Officials with the California Department of Fish and Wildlife also helped, tracking down the mountain lion and killing it, according to KTLA-TV. DNA samples were collected from the child to confirm the animal's involvement in the attack. The child suffered a bite to the arm and was rushed to the hospital for treatment but "is expected to be OK," KTLA-TV reported.

Requests for further information from Fish and Wildlife were not answered by the time of publication.

Olivia Hebert **News Reporter** Olivia Hebert is a news reporter at SFGATE, where she covers breaking news and a diverse array of topics. Before joining SFGATE, she wrote lifestyle news for the Independent, often exploring the intersection of health, technology, pop culture, travel and style. She's also written entertainment news for Collider, Distractify and StyleCaster. You can reach her at olivia.hebert@sfgate.com.

7] July 22, 2025

[redacted]

https://www.sfchronicle.com/bayarea/article/video-shows-mountain-lion-prowling-around-contra-20781593.php

Bay Area

Video shows mountain lion prowling around Contra Costa County home

San Francisco Chronicle By Jerry Wu, Staff Writer July 22, 2025

Brentwood residents are being advised to stay vigilant — and keep an eye on pets — after a home security camera caught a mountain lion walking just outside a home in the area of Fairview Avenue and San Jose Drive on Tuesday morning.

A Facebook post from Brentwood Police Department displayed a video of one of the felines prowling on what appeared to be a recycling bin in the side alley of a house.

Police said that the California Department of Fish and Wildlife was notified.

Anyone who sees the mountain lion is asked to report the sighting to the California Department of Fish and Wildlife at 707-428-2002 or contact Brentwood Police Dispatch at 925-809-7911.

Staff Writer Jerry Wu is a breaking news intern at the Chronicle. He is a rising junior at Northwestern University, where he studies journalism and international studies. He previously interned at his hometown newspaper, the San Diego Union-Tribune, on the government and watchdog team. At his college newspaper, the Daily Northwestern, Jerry has served as managing editor, campus editor, diversity and inclusion chair and a senior beat reporter covering local labor unions and student activism. He is also a senior editor for NWAZN, Northwestern's Asian American magazine. Outside of journalism, he enjoys street photography, fishing and playing pickleball. After spending his youth in San Mateo, he is excited to return to the Bay Area this summer.

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8] March 3, 2025

https://www.sfgate.com/northcoast/article/mountain-lion-kills-goats-sheep-mendocino-coast-20199972.php

Mountain lion evades double electric fence, kills pets at Northern California homestead | A mountain lion breached a fenced enclosure and killed two goats and a sheep

SF Gate By Matt LaFever, *North Coast Contributing Editor* March 3, 2025



[Photo - The mountain lion a Mendocino Coast resident believes is responsible for killing two goats and a sheep. Photograph contributed by Nadia El Adili]

In the early hours of Feb. 28, Mendocino Coast resident and biologist Nadia El Adili awoke to a grim scene: two goats and a sheep — all cherished family pets — had been killed by a mountain lion. Despite a double electric fence and a three-sided enclosure, the predator managed to breach their defenses. "We thought it would be safe enough and it obviously wasn't," El Adili lamented to SFGATE.

Later that night, the game camera on the rural property captured a chilling sequence: the mountain lion, undeterred by its earlier kill, stealthily returning to the scene.

Nadia and her husband have cultivated a homestead on Fort Bragg's Airport Road for the past decade, sharing their lives with a variety of animals, including goats, sheep, a dog, and chickens. Their property, while not heavily forested, is part of a region where wildlife sightings are not uncommon.

Reflecting on the incident, El Adili noted the broader implications of human encroachment on wildlife habitats. "As they're getting less and less habitat, we're definitely going to have more interactions," she observed.

Having hiked extensively in the area since 2020, she recounted only one prior mountain lion encounter, during which the animal fled upon seeing her. "They tend to be pretty scared of humans," she added, acknowledging that while such attacks are rare, they may become more frequent as human development continues to infringe upon natural territories.

In the aftermath of the attack, El Adili reported the incident to the California Department of Fish and Wildlife and consulted with neighbors to raise awareness. She hopes that sharing her experience will prompt others in the community to take proactive measures in safeguarding their animals and coexisting responsibly with the region's wildlife.

Peter Tira, a spokesperson for the CDFW, told SFGATE in a statement the agency's commitment to assisting residents and ranchers in protecting their pets and livestock from mountain lion attacks. He notes that CDFW employs a full-time wildlife biologist in Mendocino County to provide technical assistance and preventative recommendations. "Attacks need to be reported to us within 48 hours so there is evidence around to confirm it was indeed a mountain lion attack," Tira advises. He adds that the department will investigate reported incidents, as "sometimes attacks are attributed to mountain lions when other animals – coyotes, even dogs – are responsible."

When it comes to managing confirmed mountain lion depredations, Tira explains that **CDFW issues both non-lethal and lethal depredation permits.** However, he stresses that "**lethal depredation permits, however, are a measure of last resort** as we prioritize effective non-lethal actions." In cases where mountain lions pose a direct threat to public safety, Tira indicates that these incidents are typically addressed immediately by CDFW's Law Enforcement Division. He advises that "anyone in an emergency situation fearing for their safety due to a mountain lion should always call 911."

CDFW claims that mountain lions attacking humans is exceedingly rare. Statistically, a person is 1,000 times more likely to be struck by lightning than attacked by a mountain lion. **Since 1890, there have been fewer than 50 verified mountain lion attacks in California, and only six have been fatal**. In most cases, the victims were alone at the time of the encounter.

According to the CDFW, the most recent mountain lion attacks on humans in Mendocino County occurred in August 1994, with two incidents reported that month.

El Adili's background as fisheries biologist on the Mendocino Coast provides her with a unique perspective on the loss of her sheep and goat. She understands the delicate balance between

human expansion and wildlife preservation, but also misses her animal friends. “It's a huge bummer,” she said.

Matt LaFever **North Coast Contributing Editor** Matt LaFever is a former SFGATE contributing editor for the North Coast. A Humboldt State grad and 20-year Emerald Triangle resident, he's previously reported on California’s North Coast in print and radio for nearly a decade.

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9] Jan 17, 2025

[redacted]

https://www.sfgate.com/california/article/mountain-lion-attack-dog-small-california-town-20041042.php

California

California park closed after mountain lion shot with dog in its mouth | Another mountain lion was seen 300 yards from a Calif. elementary school

SF Gate By **Julie Brown Davis**, *Mountain Towns Editor* Jan 17, 2025

[Photo - FILE: The day after a mountain lion was shot and killed in Downieville, another mountain lion sighting was reported near an elementary school in a neighboring town. Moose Henderson / Getty Images/iStockphoto]

A mountain lion was attacking a dog at a residence in Downieville early in the morning on Monday when a neighbor shot and killed it, according to the California Department of Fish and Wildlife.

Two other mountain lions were nearby during the attack, Peter Tira, spokesperson for the California Department of Fish and Wildlife, confirmed. Likely, the three mountain lions were a mother and her offspring.

The mountain lion had the dog in its mouth when it was shot and killed, Tira said. Downieville’s newspaper, the Mountain Messenger, reported that the dog did not survive. The California Department of Fish and Wildlife is investigating the shooting.

The attack occurred in a **residential area,** in the north part of the small Sierra Nevada town, near a county park and the upper portion of Main Street, a road that runs along Downie River.

“It’s prime mountain lion habitat,” Tira said. “It’s rural, mountainous.”

After Monday's attack, the Sierra County Sheriff's Office closed down the county park in Downieville, including the playground, tennis courts and basketball court. SFGATE called Sierra County Sheriff Mike Fisher multiple times for comment but did not hear back before publication.

"We urge all residents and visitors in the Downieville area to exercise caution and report any mountain lion sightings to the Sheriff's Office," the sheriff's office wrote on Facebook.

Local newspaper reports there were 2 shooters

Downieville's newspaper, the Mountain Messenger, published a detailed account of Monday's attack, reporting that two people shot the mountain lion that morning.

The Messenger did not name any of the individuals involved in the attack, but the publication reported that a Downieville resident who lives on Main Street heard her two dogs make noises around 3 a.m. on Monday. She opened her back door to let them go outside into a fenced backyard. That's when she saw a pair of eyes staring at her from the hillside. She told the Messenger that she called her dogs back into the house. One obeyed. The other didn't make it back.

A mountain lion in the woman's backyard seized her dog in its mouth, the Messenger reported. Shortly after, a neighbor arrived with a loaded shotgun. The neighbor shot the mountain lion and injured it, the Messenger reported.

[Photo - FILE: A mountain lion was shot and killed in Downieville on Monday, Jan. 13. Kevin Schafer/Getty Images]

At that point, another family friend arrived at the house with a hunting rifle, according to the Messenger. This person also shot the mountain lion, this time killing it.

State law allows people to protect themselves, as well as their pets and property, from any attack by a wild animal, Tira said. "Mountain lions are a specially protected species in California. But obviously public safety is a huge priority," he said.

Another mountain lion sighting reported near an elementary school

On Tuesday, the day after the shooting, another mountain lion sighting was reported in broad daylight in Loyalton, almost 50 miles away from Downieville, the Sierra County Sheriff's Office said on Facebook. This mountain lion was seen just 300 yards from the elementary school, near Church and Zollinger streets.

"This incident happened just after school was released for the day," the sheriff's office wrote on Facebook.

Because the mountain lion posed a public safety concern, sheriff's deputies attempted to euthanize it but were unable to. Instead, **they used hazing techniques to scare the mountain lion out of the area.**

Longtime resident says mountain lion sightings are on the rise

Mountain lion sightings are happening more frequently than in years past, said Lydia Miyasato, a 35-year resident in the area. The general manager of a hotel in Downieville, Miyasato lives in Camptonville, a small town 20 miles west. She's seen mountain lions multiple times while driving the rural highways that crisscross the mountains.

Last summer, a mountain lion broke into her mother-in-law's home and nearly killed the dog. The mountain lion had the dog in its mouth when Miyasato's mother in law screamed, "Oh my God!" Miyasato said she thinks her mother-in-law's scream made the mountain lion drop the dog. The mountain lion hissed at Miyasato's mother-in-law and left.

"The words that came out of her mouth, she feels like, is the only way of saving grace," Miyasato said.

The increasing presence of mountain lions in the area is unnerving, Miyasato said. While the region has also experienced traumatic incidents from bear attacks — in 2023, a bear broke into a woman's home in Downieville and killed her — Miyasato said mountain lions scare her much more than bears.

"A bear will leave if you make enough sound," she said. "A mountain lion, if you do eye contact, it makes them want to approach you more."

Sheriff Fisher told the Sacramento Bee that he wouldn't recommend jogging outside in the Sierra foothills, especially at the beginning or the end of the day. Tira also advised that people travel in groups to remote, rural areas of the woods and communicate with family members or friends about their whereabouts. He also advised keeping pets on a leash.

"These are wild animals and this is their habitat. There's no need to be fearful about recreating outdoors, but you do need to pay attention to your surroundings and have a plan," Tira said.

Last year, a mountain lion killed an adult man for the first time in 30 years.

Julie Brown Davis **Mountain Towns Editor** Julie Brown Davis is the California mountain towns editor at SFGATE. She has been writing about mountain towns in the Sierra Nevada for more than 15 years. Julie has written for a variety of publications, from the New York Times and Washington Post to Powder Magazine and Tahoe Quarterly, to name just a few. She grew up on Lake Tahoe's West Shore. Her corgi is named Squirrel.

2024

10] Sep 3, 2024

[redacted]

https://www.sfgate.com/la/article/malibu-mountain-lion-attacks-boy-19739610.php

News | Los Angeles

Mountain lion attacks 5-year-old boy at popular California park | Family members helped fight off the animal as it tried to pull the child away

SF Gate By **Erin Rode**, *Contributing LA Outdoors Editor* Sep 3, 2024

A 5-year-old boy is recovering from his injuries after a terrifying mountain lion attack at Malibu Creek State Park in the Santa Monica Mountains on Sunday afternoon.

The state park is located within the largely unpopulated Santa Monica Mountains between Calabasas and the Malibu coast.

The children were "playing in the immediate vicinity of the family's picnic table" when a mountain lion attacked the young boy, causing "significant but non-life-threatening injuries."

After some of the adults charged at the lion, it let go of the boy and then retreated up a tree.

"Somebody screamed the baby's name, and his dad started running," the boy's aunt told KTLA. "The father grabbed the mountain lion with his hands, and he just fought. Then the mountain lion let go."

"The lion remained in the tree until State Parks rangers arrived. In consultation **with CDFW wildlife officers, they deemed the mountain lion a threat to public safety and a ranger euthanized it via firearm,**" the California Department of Fish and Wildlife said.

The 5-year-old was airlifted to Northridge Hospital Medical Center and released in the early morning on Monday.

Mountain lion attacks on humans are rare, with a person "one thousand times more likely to be struck by lightning than attacked by a mountain lion," according to the **California Department of Fish and Wildlife**. There have been less than 50 verified mountain lion attacks on human in California since 1980, six of them fatal. **In March of this year, a mountain lion killed a 21-year-old man in El Dorado County, the first fatal attack by a mountain lion in Northern California in three decades. In Southern California, the last fatal attack was in 2004, when a mountain lion killed a 35-year-old man in Orange County's Whiting Ranch Wilderness Park.**

The Santa Monica Mountains are home to about 10 to 15 adult and subadult mountain lions at any given time, in addition to kittens. The population is increasingly threatened by habitat that's been lost to development in the hills and fragmented by major freeways. **The world's largest wildlife crossing is under construction over the 101 freeway in an attempt to reconnect mountain lion habitat.**

The department recommends that hikers, campers and picnickers "stay alert on trails" while out in the wilderness, adding that pets should remain leashed and adults should walk closely with small children. If a mountain lion becomes visible, do not approach it and do not run or turn your back. Instead, face the animal and make loud noises while trying to appear as large as possible. Ensure the mountain lion has an escape route as well.

Erin Rode Contributing LA Outdoors Editor Erin Rode is SFGATE's Contributing Los Angeles Outdoors Editor. Erin grew up in Los Angeles County and has hiked area trails for over a decade. She previously covered the environment for The Desert Sun in Palm Springs.

11] March 25, 2024

https://www.sfgate.com/bayarea/article/california-brothers-mountain-lion-attack-19367715.php

California brothers in deadly mountain lion attack identified

News | Bay Area & State

SF Gate By **Katie Dowd**, *Managing editor* March 25, 2024



[Photo - Brothers Taylen Robert Claude Brooks, left, and Wyatt Jay Charles Brooks of Mt. Aukum, Calif., were attacked by a mountain lion on March 23, 2024. Photo El Dorado County Sheriff's Office/Handout]

Two brothers have been identified in an exceptionally rare **mountain lion mauling in Northern California**.

Taylen Robert Claude Brooks, 21, and Wyatt Jay Charles Brooks, 18, of Mount Aukum, California, were the victims in the attack, the El Dorado County Sheriff's Office confirmed Monday. **Taylen Brooks' death was the first by a mountain lion in California in two decades; there have been only three verified killings by a mountain lion in the state since 1986, according to California Department of Fish and Wildlife records.**

"We would like to express our sincere thanks for the outpouring of support and prayers from family, friends and the community," the brothers' family said in an emailed statement. "We are all devastated by the tragic loss of Taylen yet thankful Wyatt is still with us and are well-aware the outcome could have been even worse."

According to the sheriff's office, the pair were antler shed hunting along Skid Road, a rural part of the county about 30 minutes north of Placerville. While walking, they noticed a mountain lion alongside them. "Both Taylen and Wyatt did what they had always learned," the sheriff's office said in a statement. "They raised their hands in the air to appear larger, yelled at the lion and Wyatt even threw his backpack at the lion, all in an attempt to scare the lion away."

The mountain lion charged at Wyatt and began biting his face. Taylen attempted to pull the animal off his brother, and amid the tussle, "the lion released Wyatt, got up and charged Taylen." The mountain lion grabbed Taylen by the throat and wouldn't let go, prompting Wyatt to get his phone to call 911. But with poor cell service, Wyatt had to run back to where the pair had parked their car to try to get the call to connect. When first responders arrived 15 minutes later, Wyatt had "traumatic injuries to his face," the sheriff's office said, and Taylen was nowhere to be found.

After a search of the area, **sheriff's deputies** discovered a mountain lion "crouching" next to Taylen. **They fired their guns to chase the animal off, but Taylen was already dead.** Wyatt was rushed to a hospital and underwent "reconstructive surgery of the major lacerations to his face and neck," the sheriff's office said. "Wyatt is home recuperating from the tragic ordeal."

The mountain lion was tracked down and euthanized, CDFW confirmed Sunday.

Taylen worked as a house painter with his father, loved the outdoors and was "an extremely talented guitar player," his family said in a statement. Wyatt is enrolled at the Mt. Adams fire

academy and hopes to someday work for Cal Fire. A fund has been set up to support the family, and a memorial will be held at a later date.

“A brother is a friend given by nature,” his family said. “These two brothers were driven by nature.”

Katie Dowd **Managing editor** Katie Dowd is the SFGATE managing editor. She started her career at SFGATE in 2011 shortly after graduating from UC Berkeley. She was born and raised in the Bay Area.

12] March 24, 2024

[redacted]

https://www.sfgate.com/bayarea/article/mountain-lion-kills-man-northern-california-19365657.php

California for first time in 30 years

By **Katie Dowd**, **Amanda Bartlett** Updated March 24, 2024 12:32 p.m.



[Photo - Darling Ridge Road in rural El Dorado County, where two brothers were attacked by a mountain lion on March 23, 2024. Photo Google Street View]

LATEST March 24, 5:04 p.m. California officials confirmed that a mountain lion they euthanized in the vicinity of a fatal attack in a remote area near Georgetown was the same animal that killed a 21-year-old man Saturday afternoon.

DNA samples collected by the California Department of Fish and Wildlife at the scene matched those taken from the lion's carcass, the agency's wildlife forensics laboratory found. The

animal was a male, weighed approximately 90 pounds and "appeared to be in healthy condition," the CDFW said.

At the time of the attack, the man was said to be antler shed hunting with his 18-year-old brother, who was severely injured but survived and was able to call for help. **CDFW officials dispatched a professional trapper to the scene, who found and euthanized the animal within a few hours**, but it wasn't until the test results were released that they could know it was the mountain lion involved.

Forensic scientists with the CDFW are still analyzing necropsy results to determine whether the animal had any underlying health conditions. The agency said it plans to continue investigating the attack in conjunction with the El Dorado County Sheriff's Office while standard pathology and other assessments are completed.

"First and foremost, our hearts go out to the families and loved ones affected by this tragic incident," CDFW director Charlton H. Bonham said in the news release. "Our thoughts are with them during this difficult time."

March 24, 6:16 a.m. For the first time in 30 years, someone has been killed by a mountain lion in Northern California.

According to the El Dorado County Sheriff's Office, dispatchers received a desperate 911 call around 1:15 p.m. Saturday from Darling Ridge and Skid roads in a rural part of the county about 30 minutes north of Placerville. The caller was an 18-year-old who said he and his older brother had just been attacked by a mountain lion. During the fight for their lives, the two brothers were separated, and the young man wasn't sure where his 21-year-old brother was.

Shortly after 1:30 p.m., help arrived. Paramedics discovered the younger brother with "traumatic injuries to his face" and began giving him medical attention. Sheriff's office deputies started looking for the missing brother. About 15 minutes into the search, they encountered a "crouched mountain lion next to a subject on the ground." They fired their guns to scare the animal off and rushed to help the man, but he was already dead.

The sheriff's office told SFGATE in a statement that neither man will be identified right now. "The 18-year-old brother has undergone multiple surgeries for his injuries and is expected to make a full recovery," the statement read. "The family is grateful for the prayers and condolences from the community however wishes for privacy in order to process this tragic event."

According to the California Department of Fish and Wildlife, the last **verified deadly mountain lion encounter** in Northern California was three decades ago. In April 1994, Barbara Schoener, 40, was jogging on a trail near the town of Cool in El Dorado County when a mountain lion

jumped on her from behind. Evidence gathered by investigators indicated that the animal dragged Schoener downhill and covered her body with leaves, initially causing detectives to think she had been killed by a person. An autopsy showed she was bitten on the head and neck, suffering a fatal skull injury. At the time of her death, the Sacramento Bee reported it was the first deadly mountain lion attack in the state since 1909.

More recently, a man was killed by a mountain lion in Orange County in Jan. 2004. The 35-year-old was biking in Whiting Ranch Wilderness Park when he stopped to fix a broken bike chain. As he crouched down, investigators believe a mountain lion pounced on him, killing him in an ensuing struggle. Not long after, the same mountain lion attacked a 30-year-old woman biking through the area, grabbing her head in its jaws before other cyclists were able to fight off the animal and rescue the woman. The woman survived.

Although there **are thousands of mountain lions in California**, they're rarely seen by humans. "They are reclusive and solitary animals, mostly avoiding people when possible," CDFW says on its website. "A person is one thousand times more likely to be struck by lightning than attacked by a mountain lion," the agency adds. About 50 **verified** attacks have been **recorded by CDFW** since 1890. Six of them were fatal; if verified, Saturday's would be the seventh.

According to the El Dorado County Sheriff's Office, the mountain lion that attacked the two brothers was located and "dispatched."

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On X

California Department of Fish and Wildlife

@CaliforniaDFW

Following the mountain lion attack today, Sat., March 23, 2024, in Georgetown, California, a mountain lion was euthanized near the scene of the attack. The mountain lion has been sent to the CDFW forensics laboratory to obtain DNA information and general health of the lion.

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CDFW recommends people do not hike, bike or jog alone or at dawn, dusk or nighttime. Crouching should also be avoided, as this may mimic four-legged animals that are more common prey for cougars. Should you encounter a mountain lion, never run away, as this may trigger its instinct to chase. “Face the animal, make loud noise and try to look bigger,” CDFW recommends.

2023

13] Oct 27, 2023

[redacted]

https://www.sfgate.com/bayarea/article/california-hiker-injured-by-mountain-lion-18452236.php

California hiker injured when stopping mountain lion attack on dog

SF Gate By Amy Graff, *Senior News Editor* Oct 27, 2023

[Photo - FILE: This Feb. 9, 2015, photo, released by the National Park Service, taken from a remote camera in the Santa Monica Mountains National Recreation Area, shows a mountain lion. Photo AP]

A California hiker was injured Tuesday when stopping a mountain lion's attack on a dog, officials said.

The individual was walking a small dog in Solstice Canyon in the Santa Monica Mountains National Recreation Area when the mountain lion attempted to pounce on the dog. Upon intervening, the person was scratched by the mountain lion and received a puncture wound on the hand, a social media post from the recreation area said.

National Park Service rangers treated the person's injuries. The dog was unharmed.

The Solstice Canyon area was closed until Thursday. "The area closure was instituted to give the lions time to leave the area and minimize the chances of any further conflict," park officials said.

Mountain lions are generally shy animals, and conflicts with humans are uncommon. "If you do encounter a mountain lion, make yourself appear as large and intimidating as possible by yelling, waving your arms, and even throwing objects in the direction of the animal," park officials said. "Slowly back away and allow space for the mountain lion to move away. Do not turn your back and run!"

Amy Graff Senior News Editor Amy Graff was the senior news editor for SFGATE. She currently works at the New York Times.

14] Aug 12, 2023

[redacted]

https://www.sfgate.com/bayarea/article/mountain-lions-hillsborough-18293218.php

Mountain lions seen eating deer on Hillsborough property

News | Bay Area & State

SF Gate By **Sam Mauhay-Moore**,*National Parks Reporter* Aug 12, 2023

[Photo - FILE: Mountain lions have recently been spotted in the Bay Area community of Hillsborough. Photo Moose Henderson/Getty Images/iStockphoto]

Multiple mountain lions have been spotted recently in a Hillsborough neighborhood, including two wild cats that were seen eating a deer in a residential area, officials said.

A resident on the 1400 block of Marlborough Road reported seeing two mountain lions eating a deer on their property, the Hillsborough Police Department announced in a Facebook post. A neighbor also reported seeing mountain lion cubs in a nearby den.

Mountain lions are known to frequent the hills and green belts that surround Hillsborough, police said. Though their primary food source is deer, they've been seen on trail cameras attacking other animals, including pets.

According to the county of San Mateo, local mountain lion sightings are rare, but the animals may be encountered at parks throughout the area. Police recommend that residents who live in known mountain lion habitats keep their pets indoors during dawn, dusk and evening hours, and lock their doors at night. Police also advise residents to not feed local deer and to keep a close eye on small children when hiking.

"If you see a mountain lion DO NOT APPROACH IT, especially one that is feeding or with offspring. Most mountain lions will try to avoid confrontation," Hillsborough police said in the Facebook post.

Though population estimates of mountain lions in California are relatively stable, there has been **an increase in reported sightings of the cats over recent years** due to an increase in home security cameras and personal trail cameras, according to the **California Department of Fish and Wildlife**. Mountain lions have been considered a "specially protected" species in the state since the passing of the California Wildlife Protection Act in 1990.

Sam Mauhay-Moore **National Parks Reporter** Sam Mauhay-Moore is a National Parks reporter for SFGATE. He grew up in Long Beach and studied journalism and ethnic studies at San Francisco

State. When he's not home in East Oakland, he's truck camping in the mountains or soaking in a hot spring. You can email him at sam.moore@sfgate.com.

15] Feb 15, 2023

[redacted]

https://www.sfgate.com/bayarea/article/california-mountain-lion-tears-away-dog-17786091.php

Mountain lion tears dog on leash away from its owner in California neighborhood

News | Bay Area & State | SF Gate By **Amy Graff**,*Senior News Editor*

[Photo - A mountain lion ran off with a dog on a walk with its owner in San Luis Obispo on Feb. 11, California Fish and Wildlife said. Photo Kevin Schafer/Getty Images]

A woman was out for a walk with her dog in a Central California neighborhood when a mountain lion emerged from the brush and pounced on her dog, officials said. She held onto the leash in an attempt to save the animal, but she was knocked to the ground and the mountain lion ran off with her pet, according to the California Department of Fish and Wildlife. The woman was injured in the fall.

The incident occurred at 5:30 p.m. near Laguna Lake Mobile Estates in San Luis Obispo; the residential area neighbors open space that is "suitable mountain lion habitat," California Fish and Wildlife said.

CDFW spokesperson Ken Paglia said the agency set a trap and if the mountain lion is caught, it will be relocated to a remote area of San Luis Obispo County.

"With this plan, we're trying to strike a balance between giving the mountain lion the best chance at living a life in the wild and minimizing the chance that an incident like this occurs again," Paglia wrote in an email.

The mountain lion may be the same animal that has been spotted in the same area a couple time in the past two months.

"It is believed to be an adult mountain lion," he wrote. "It's also possible that there are two mountain lions in the area. San Luis Obispo is mountain lion habitat ... and generally speaking, wherever there are deer there are mountain lions ... so the presence of mountain lions itself is not out of the ordinary."

Mountain lions are generally shy animals that avoid humans. The size of the state's cougar population is unknown. A 1996 Fish and Wildlife study found **4,000 to 6,000** mountain lions live in the state. **The agency started a new population count in 2014 and it has not been completed.**

Conflicts with humans are uncommon. Paglia said that while the data does not suggest that mountain lion conflicts are increasing, it may appear that they are because the ways to capture images and video of wildlife, such as with home security cameras and cellphones, have expanded.

If you encounter a mountain lion, Fish and Wildlife advises that you do not run away or turn your back to the animal. Instead you should try to make yourself look bigger by putting your hands over your head and make the loudest noises possible.

Amy Graff **Senior News Editor** Amy Graff was the senior news editor for SFGATE. She currently works at the New York Times.

16] Feb 1, 2023

[redacted]

https://www.sfgate.com/bayarea/article/bay-area-mountain-lion-attack-17757602.php

News | Bay Area & State

Bay Area boy attacked by mountain lion was 'fighting for his life'

SF Gate By Amy Graff, *Senior News Editor* Updated Feb 1, 2023 7:08 p.m.



[Photo - Five-year-old Jack was attacked by a mountain lion in Half Moon Bay, Calif., on Jan. 31, 2023. Photo Courtesy Trexler Family]

A 5-year-old **California** boy was discharged from the hospital after surviving a terrifying mountain lion attack, a family member told SFGATE Wednesday.

The attack came on Tuesday evening when the family was on a hike in their hometown of Half Moon Bay, 30 miles south of San Francisco. The animal tore into Jack, leaving deep lacerations on his face and body, before his mother scared it off.

“It’s my understanding that the boy was fighting for his life and his mom charged at the lion. As far as I know, before the mom made physical contact with the lion, it released the son,” **Capt. Patrick Foy, a public information officer with the California Department of Fish and Wildlife's Law Enforcement Division**, told SFGATE.

Foy said Fish and Wildlife had not had a formal interview with the family as of late Wednesday morning; the agency's details on the attack were limited.

Jack's aunt Amie Wagner provided more information on what happened on Tuesday. Wagner told SFGATE over the phone that her nephew was hiking with his mother and grandparents in the hills on the Potrero Nuevo Farm when he ran a little ahead. "He must have scared the mountain lion," said Wagner, who posted a GoFundMe to cover Jack's medical bills. "[Jack's mother] ran up and was able to scare the mountain lion off. She said that she believed it was a juvenile."

The San Mateo County Sheriff's Office said it received a call about the incident at 6:50 p.m. on Tuesday. "When deputies arrived on scene, the boy had already been transported to the hospital," Sgt. Javier Acosta, a spokesperson for the sheriff's office, said. The boy had multiple puncture wounds and was taken to a hospital in Redwood City and then transferred to Stanford Medical Center, officials told SFGATE. Wagner said Jack had lacerations and bruises all over his body; the worst injuries, including deep wounds and a fracture, are on his face.

"Jack is an adventurous courageous little boy," Wagner said. "Physically he's going to heal from these injuries. Most importantly, we want his adventurous spirit to remain through all of this."

Foy said wildlife officers conducted an interview with Jack's mother today and collected appropriate evidence including clothing the child was wearing and swabs of the wounds.

"The evidence is in route to our Sacramento forensic laboratory," he said.

Jack's parents, Suzie and Jay Trexler, manage a farm on Tunitas Creek Road that grows and donates organic produce to low-income families in the Half Moon Bay area. Potrero Nuevo Farm also employs people who are unhoused.

"They're a special family who have dedicated their lives to serving the community," Wagner said. "The farm, everything it produces goes to support people experiencing homelessness."

Fish and Wildlife is seeking permission to access the private property where the attack occurred and look for the animal, **Foy** said.

An estimated 4,000 to 6,000 mountain lions call California home, according to the most recent survey by Fish and Wildlife, conducted in 1996. They are shy, solitary animals that typically avoid humans.

On X

San Mateo County Sheriff's Office

@SMCSheriff

@SMCSheriff was dispatched to a report of a mountain lion attack and we can confirm a child was transported to a local trauma center after the attack. Incident occurred on the 1000 blk of Tunitas Creek Rd. in unincorporated SMC. @CaliforniaDFW actively investigating the incident
7:46 PM · Jan 31, 2023

"Mountain lion attacks are exceedingly rare, and I would never discourage a family like this from going on a nature hike," Foy said. "Compared to the attacks we see from domestic dogs, I think you're going to have a far greater chance of your child being attacked by the neighbor's dog than by a mountain lion."

"I've been doing this almost **20 years,"** Acosta said of working for the sheriff's office. **"We have sightings all the time. To the best of my recollection, this is the only attack that I'm familiar with."**

Amy Graff Senior News Editor Amy Graff was the senior news editor for SFGATE. She currently works at the New York Times.

2022

17] December 8, 2022

[redacted]

https://www.sfgate.com/bayarea/article/mountain-lion-bay-area-home-17637691.php

'Shock': Mountain Lion enters Bay Area home, drags dog outside

By **Amy Graff**, *Senior News Editor* Updated Dec 8, 2022 10:32 a.m.

Video *[This video screenshot shows a mountain lion attacking Rebecca Kracker's dog Sherman at her home in Bennett Valley, a rural neighborhood in Santa Rosa, on Nov. 28, 2022. Photo Courtesy of Rebecca Kracker]*

A mountain lion that entered a Santa Rosa home and dragged a dog outside on Nov. 28 was euthanized by a Sonoma County trapper on Dec. 3, officials said. California Department of Fish and Wildlife spokesperson Ken Paglia said the agency had issued a depredation permit to the county for the animal, which had also killed goats on the same property.

Rebecca Kracker, the owner of the dog and goats, was relieved the wild animal was killed but wrote in a lengthy Dec. 4 Facebook post that she wishes the issue had been resolved sooner.

"This animal was undeniably sick and in need of being put down," Kracker wrote on Facebook. "... Losses happen, but this cat was out of control. It posed a safety threat considering that it was bold enough to enter my home and take a 70 lb border collie. Then had no concern for the presence of humans and continued stalking my house for hours following the attempted kill."

Video footage of a recent mountain lion attack of a dog in a Santa Rosa home. Video courtesy of Rebecca Kracker

Kracker shared a detailed account of the mountain lion's attack on Facebook. She wrote that she was in her living room watching her two dogs play when at 5:55 p.m. her older border collie, Sherman, started to growl in the kitchen.

When she went to check on him, she wrote, she found that he was "convulsing" as a mountain lion was pulling him by his neck out of the house. The mountain lion had entered the home through an open door in the kitchen.

"I stood shaking and documenting the ordeal while I waited for backup with the mountain lion hissing, baring her teeth, and continuing to strangle my poor Sherman," Kracker wrote. "My neighbor was able to get here 10 minutes later and took a shot at the mountain lion. He missed by all accounts, but it did make the mountain lion run off… as did Sherman!"

The dog survived but was rattled and in a state-of-shock.

It's unknown exactly how many mountain lions live in California. According to a 1996 Fish and Wildlife study, anywhere from 4,000 to 6,000 mountain lions live in the state, but Paglia thinks this number may be inflated. He said the agency is conducting a new study that will provide more up-to-date numbers. Mountain lions are elusive solitary animals that avoid humans; they mainly feed on deer and wildlife but in some cases prey on pets and livestock, according to the agency. Mountain lions usually live up to 10 years in the wild, according to the National Wildlife Foundation. This particular mountain lion was was an estimated 15 to 16 years old and that may have contributed to its unusual behavior.

"We of course can't get in the mind of a mountain lion, but it's safe to assume the mountain lion was simply taking advantage of an opportunity that it saw," Paglia wrote in an email. "It was an older mountain lion so perhaps it wasn't as good at chasing down deer as it used to be."

Living with Lions, a North Bay nonprofit monitoring the behavior of local mountain lions, said the animal on Kracker's property was collared, tracked and identified as P1.

"Clearly, something was wrong with P1," Living with Lions principal investigator Dr. Quinton Martins said in a statement. "She was very old for a mountain lion which may have led to issues related to aging, including tooth wear, slowed responses, weakened senses, and possibly other health issues. In recent weeks, she was more willing to put herself near human activity with people having frequent sightings of her, as well as feeding almost exclusively on livestock, all of which is very unusual behavior."

Kracker told SFGATE on the phone that in her 30 years of living on the property in Bennett Valley, a rural neighborhood in Santa Rosa, she had never seen a mountain lion.

"We've always known they were around, but we've never seen one, which would be normal mountain lion behavior," Kracker said.

Coincidentally, two days before the animal attacked her dog, she had lost a 100-pound, 9-month-old goat to a puma.

"I never thought the mountain lion would be bold enough to enter my home to take my 70 lb border collie," she wrote on Facebook.

Kracker said the word "shock" describes how she felt when she realized a mountain lion was attacking her dog inside her home.

"I thought he was having a seizure or something along those lines," she told SFGATE on the phone. "And when it all clicked in my head, I realized this is different than I thought. ... What do I do now?"

After the attack, Kracker immediately filed a report over the phone with the Sonoma County Fish and Wildlife Commission and set up a meeting for the next day. She was told to stay inside and make any trips outdoors quickly and infrequently.

Later that evening, she stepped outside with the dogs and saw the mountain lion sitting about 20 feet away on a neighbor's fence.

"She stood up and hissed at us as we moved away," she wrote on Facebook. "We quickly moved all the animals inside and watched the mountain lion through our kitchen windows. She sat vigil watching the house for a solid 30 minutes."

Kracker requested a depredation permit and posted on Facebook that her ask was delayed by one day; she didn't receive it until Nov. 30. She wrote that the animal was showing erratic, unsafe behavior, and she wished the situation had been addressed more quickly.

"We lost a whole night," she wrote. "This cat could have moved on and potentially caused more significant damage to another community member."

Under California law, property owners can apply for a depredation permit with Fish and Wildlife to kill a problematic predator causing damage to their property.

"We want to provide people with what they're looking for, but it's also our duty to exercise caution in issuing a lethal permit," Paglia told SFGATE on the phone. "In this case, it took a day."

The mountain lion wasn't spotted on the property again until Dec. 3. Kracker wrote on Facebook that she was sitting at her computer when just after 7 p.m., she heard a goat screaming. She called the county trapper, who arrived on the property a half-hour later, trapping and killing the animal as it was attacking a goat. The mountain lion had killed two goats that night.

"I shudder to think what could have happened in our community if she hadn't been killed last night," Kracker wrote.

Amy Graff Senior News Editor Amy Graff was the senior news editor for SFGATE. She currently works at the New York Times.

18] Dec 4, 2022

https://www.sfgate.com/bayarea/article/Rare-footage-captured-of-4-mountain-lions-17630338.php

Rare footage captured of 4 mountain lions together in Santa Cruz County

News | Bay Area & State

SF Gate By **Brisa Colón**, *KSBW* Dec 4, 2022



[Photo - A trail camera captured a group of four mountain lions following behind a deer in Soquel. Photo KSBW/Courtesy]

SOQUEL, Calif. — A trail camera captured a group of four mountain lions following behind a deer in Soquel. The California Department of Fish and Wildlife says this is the first time they've heard of them being spotted in a while.

"I knew that we had wildlife mountain lions in this area but I've never seen one so the neighbors have seen it and we've lived here for 13 years so I thought maybe I can get one on the camera," said Lars Pierce, Soquel resident.

Lars Pierce and his family were out for Thanksgiving and came home to find the footage. "I've seen them for over the last year. They visit about once every two months, but just a single mountain line I've never seen more than one at a time," Pierce said.

The California Department of Fish and Wildlife says mountain lion sightings are not typical but not unusual because of the landscape they call urban edge, because it's near the city but also nature.

"This is the first time that we are hearing about mountain lions at least recently in Santa Cruz," said Ken Pagia, public information officer for The California Department of Fish and Wildlife.

Biologists at The Department of Fish and Wildlife believe the four are most likely a mom and her cubs that are about to be a year old. Officials are warning, the public to stay on alert.

"Don't let your pets outside, unsupervised, especially at dusk till dawn, and as far as like what we can do to keep safe you know, be mindful of your surroundings when you're outside," Pagia said.

The department isn't seeing an increase in mountain lion spotting in the Santa Cruz area, but they say they are in other parts of the state.

"We feel really privileged to be able to live in their neighborhood just privilege to be around a big top of the food chain predators like that I think it makes us hopeful that we have a healthy ecosystem here," Pierce said.

It is incredibly rare for humans to be attacked but for now, Pierce says he's going to be extra careful. "I think a little bit more and keep my eyes open a little bit more," Pierce said.

Pierce says neither he nor his neighbors have found remains of the deer and as for the mountain lions, the whereabouts are currently unknown.

19] Oct 5, 2022

[redacted]

https://www.sfgate.com/centralcoast/article/california-mountain-lion-population-growing-17486279.php

'They're out there': Why California mountain lion sightings are on the rise

Central Coast

By **Andrew Pridgen**,*Central California Editor*Updated Oct 5, 2022 6:14 a.m.



[This July 10, 2016, photo shows an uncollared adult female mountain lion photographed with a motion sensor camera in the Verdugos Mountains in in Los Angeles County, Calif. Photo 212032020021/AP]

A popular **Central Coast** urban hiking destination was shut down over the weekend amid numerous mountain lion sightings.

Now California wildlife experts say the spate of recent encounters represents just a fraction of the animals' current activity. Mountain lions are using the wildland area that borders San Luis Obispo's densely populated corridor and Highway 101 as a thoroughfare of their own to get to less densely populated areas or search for food or water.

And it could be indicative of the animals' careful movements through the state's many urban-wildland interface areas.

"Mountain lions here have pretty wide regions, but their habitat is splintered by urbanization," Ken Paglia, a spokesperson for the California Department of Fish and Wildlife, told SFGATE. "But often it's going from one patch of suitable habitat to another patch of suitable habitat — that's why we now see cross through neighborhoods and the urban edge of communities."

This Feb. 9, 2015, photo, released by the National Park Service, taken from a remote camera in the Santa Monica Mountains National Recreation Area near the Los Angeles and Ventura county line, shows a female mountain lion identified as P-33. She is one of several mountain lions observed in and near urbanized areas in greater Los Angeles. Photo AP

In the Bay Area, a mountain lion strolled through the **Bernal Heights neighborhood** in San Francisco in 2021, followed by another sighting at a **Daly City school in 2022.** There are so many recent sightings that the **Bay Area Puma Project, in partnership with the UC Santa Cruz**

and the Department of Fish and Wildlife, has an active map with the places where mountain lions have been spotted in recent weeks.

The epicenter of the recent sightings on the Central Coast is Cerro San Luis, a modest peak better known to locals as Madonna Mountain. The landmark rises 1,292 feet above sea level, features miles of trails for beginner and intermediate hikers and offers unobstructed views of downtown San Luis Obispo, Edna Valley's vineyards to the southeast and the Pacific Ocean to the northwest.



[This Monday, March 26, 2018, aerial image made from video provided by KABC-7 shows a mountain lion darting from one residential house into another in in the eastern Los Angeles County community of Azusa, Calif., near the San Gabriel Mountains wilderness. Photo Live Air 7/AP]

Those who are familiar with the region's most famous roadside attraction, the over-the-top mid-century icon Madonna Inn, will recognize the hill's nickname, that of the eponymous family that still owns and grazes horses and cattle on a pastoral swath of the lower mountain today.

The popular destination can be easily accessed by foot or bike from downtown San Luis Obispo. Office workers are known to take a long lunch break to summit it. And area mountain bikers can't wait for the first rain of the season that pats down the dirt into tacky mud and slicks up the granite surfaces.

But over the weekend, the popular hike was closed due to multiple reports of mountain lions in the area, the city said.

"It is unusual for us to close a trail, but it's not unusual for us to receive so many sightings in this short amount of time," Bob Hill, the city's sustainability and natural resources official, told the San Luis Obispo Tribune. "Some of the sightings have been during the day and at dusk."

By Monday afternoon, San Luis Obispo Parks and Recreation's Ranger Service had reopened the trails to visitors. On social media, the agency advised users to "remain highly alert, keep their dogs on leash, and stay on designated trails while hiking on Cerro San Luis."

[Cerro San Luis, a small peak right across Highway 101 in San Luis Obispo, posts a warning after a recent mountain lion sighting. Urban-adjacent open space in California has had a high number of sightings and encounters this year. Photo By Andrew Pridgen]

A sign posted at the trailhead kiosk looks like a wanted sign of yesteryear, with a stock image of a mountain lion at the top, along with the date of the most recent sighting (Sept. 25) written in black Sharpie. The notice has a handful of advisory bullet points in case of an encounter:

-Don't hike, bike or jog alone.
-Don't crouch down or bend over.
-Don't run from the animal.
-Don't approach one.
-Pick up and hold small children.
-If there is an encounter, face the animal, make noise and look bigger. Throw rocks or other objects.

If the full parking lot adjacent to the Higuera Street trailhead of the recreation area was any indicator, visitors returned to the trails with vigor.

"I've lived here for five years and remember my roommate saying she's seen one, but I'm not sure she was right," Mary Steele, a Cal Poly grad student, told SFGATE upon completion of her mid-afternoon hike. "I know there's always been mountain lions nearby. During the daytime and afternoon, you're not really going to see them. But it's just wild to think that we're here in the middle of the city and we're forcing them to use that space too.

"It's not an active concern, but you know they're out there."

[Signs are posted on the Borrego Canyon trailhead at the entrance to Whiting Ranch in Foothill Ranch, Calif. Game wardens trapped a mountain lion Tuesday, July 17, 2012, that was spotted several times in Whiting Ranch. Photo Mark Boster/Los Angeles Times via Getty Image]

Steele's intuition is correct. Mountain lions prefer to prowl at dawn, dusk and night. They can roam a radius up to 200 square miles in search of prey. Most of all, they don't want anything to do with humans.

But if you actually see a mountain lion, wildlife experts warn that it's probably too late.

"Lions see us all the time," Doug Updike, then the state's mountain lion coordinator for Fish and Wildlife, told the San Francisco Examiner in 2008. "They're well camouflaged and shy, it's not easy to spot them ...and typically, we look right at them and never see them."

Last week's sightings in San Luis Obispo weren't the only mountain lion activity in the region. On Monday, Sept. 26, **a 7-year-old boy was attacked by a mountain lion** at the Pico Canyon Park

near Santa Clarita — a suburb bordering the Angeles National Forest about 35 miles northwest of downtown LA.

This undated photo released by the National Park Service shows the adult female mountain lion P-65. Photo AP

The boy and his father were walking up a flight of stairs at the park at dusk when a mountain lion leapt from the brush and bit the boy on the buttocks. The father said he charged the big cat, who let go of the boy and disappeared back into the bushes. The boy was treated at a nearby hospital for non-life-threatening injuries.

The unprovoked attack was an anomaly. In 110 years of recording mountain lion activity in California, only 20 confirmed attacks have taken place — with none recorded between 1910 and 1986. Since 1986, there have been 22 confirmed mountain lion attacks in California; three have been fatalities.

Instead, it's the human inhabitants of California who have been the aggressors. **California shelled out more than half a million dollars in bounties for 12,461 mountain lions, decimating the population for sport from 1907 to 1963, the Los Angeles Times reported**.

Protection of the animals started in 1990 with the passage of Proposition 117. The law put mountain lions under protected status, which means permits to kill the animals can be issued only if the animal mauls livestock or threatens or kills a person.

[This undated remote camera image shows a female mountain lion known as P-53 roaming in the Santa Monica Mountains, Calif. Photo AP]

Thanks in part to Prop. 117, mountain lion numbers in California have risen. **Today the population here is estimated to be 4,000 to 6,000 cats**. But wildlife experts feel there's still a long way to go in protecting the species that once roamed these hillsides by the tens of thousands. **A 2019 petition from the Center for Biological Diversity proposes to list mountain lions as a candidate species under the California Endangered Species Act.**

If approved, the animals would be protected within a designated area known as an evolutionarily significant unit in Southern California and on the Central Coast. Their **population is also protected during the review period**.

In the decades since we've changed our views from destruction of the species to protection, some mountain lions have become celebrities in their own right. In Los Angeles County, a male mountain lion known as P-22 roves the Hollywood Hills. Like anyone who occupies a certain pop culture stratum, he has his own ugly Christmas sweater and unauthorized biography.

[Photo A close-up of a California mountain lion. Despite urban creep into the animals' territory, their population numbers have crept up over the past two decades thanks to protection measures. Photo Stefanie Byrd / EyeEm/Getty Images/EyeEm]

P-22 and his lesser-known cohort may have an even greater chance of survival once a **$90 million wildlife crossing is completed over an area where the animals were being slaughtered attempting to cross one of the busiest sections of Highway 101 near LA.**

"These sightings highlight the need for connectivity, because of urbanization there's some evidence of a genetic mix-up of mountain lions," Fish and Wildlife spokesperson Paglia concluded. "They don't have a ton of space, and that can affect them.

"It doesn't have to be an entire bridge or passageway. Educate. Respect their boundaries and their habitat."

Andrew Pridgen Central California Editor Andrew Pridgen is an editor at SFGATE. He covers Central California. A Bay Area native, Pridgen lived in Lake Tahoe before moving to the Central Coast a decade ago.

20] June 8, 2022

https://www.sfgate.com/bayarea/article/Norcal-dog-who-fought-mountain-lion-dies-17228294.php

Dog who saved owner in Northern California mountain lion attack dies

News | Bay Area & State

SF Gate By Ashley Harrell, *National Parks Bureau Chief* Updated 11:47 a.m.

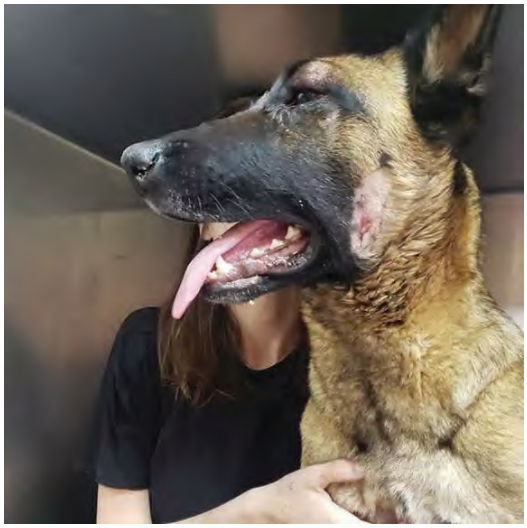


[Photo - This heroic Belgian sheperd saved her owner, Erin Wilson, from a mountain lion attack. Photo Courtesy of Connor Kenny]

The story of Eva — a Belgian shepherd who protected her owner from a mountain lion attack last month — drew attention from media outlets across the nation and prompted an outpouring of emotional and financial support from readers.

Unfortunately, those who donated to help save the dog were in for a heartbreaking update this morning. Over the last several days, Eva's condition deteriorated, and yesterday she slipped into a coma.

"We said goodbye," owner Erin Wilson wrote on the GoFundMe page this morning announcing her passing. "We love you Eva."



[Photo - Eva sustained grave injuries when a mountain lion bit down on her head and refused to let go. Photo Courtesy of Erin Wilson]

Wilson, 24, an avid outdoorsman, had been on a short walk with Eva in mid-May off Highway 299 in Trinity County, some 300 miles north of San Francisco, when the mountain lion attacked Wilson. Responding to Wilson's call for help, Eva had turned the predator's attention on herself, and the cat locked its jaws over the 2-year-old dog's head, refusing to let go.

"The woman attempted to throw rocks, tug, pull, and even attempted to gouge the eyes out of the lion, to no avail," California Department of Fish and Wildlife Capt. Patrick Foy wrote in an email.

Desperate to free her dog, Wilson flagged down passing motorist Sharon Houston, and using pepper spray and a piece of a PVC pipe, the two women managed to fight off the mountain lion. Wilson rushed Eva to the hospital, where the dog received care for her grave injuries, including two skull fractures, a punctured sinus cavity and severe damage to her left eye. Readers moved by Eva's story donated more than $30,000 to help with the dog's treatment.



[Erin Wilson and her dog Eva, who came to the rescue when a mountain lion attacked. Photo Courtesy of Connor Kenny]

Over the last several weeks, Eva appeared to be recovering. According to a GoFundMe post on May 18, she was walking and climbing into her humans' laps, playing outside and eating soft foods. "There was pep in her step," Wilson wrote.

"Goodbye my beautiful sweet girl," Wilson posted on Eva's Instagram page. "You are my world, my light, my best friend. The world is a much darker place."

CDFW searched for the mountain lion for a week, but came up empty, Foy wrote in an email. It has not been seen since the attack.

Ashley Harrell National Parks Bureau Chief Ashley Harrell is the national parks bureau chief at SFGATE, where she's worked since 2020. She recently co-authored the National Geographic book "100 Beaches of a Lifetime: The World's Ultimate Shorelines," and has reported from 17 countries, working on more than 50 travel guidebooks. Her story about human-turtle conflict on

Hawaii's Poipu Beach won gold in the environmental and sustainable tourism category of the Lowell Thomas Awards in 2024. Send story tips or comments to ashley.harrell@sfgate.com

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21] June 2, 2022

[redacted]

https://www.sfgate.com/bayarea/article/Mountain-lion-found-in-high-school-17212441.php

News | Bay Area & State

Mountain lion found at Bay Area high school moves to Oakland Zoo

SF Gate By **Amy Graff** ,*Senior News Editor* Updated 12:04 p.m.

A mountain lion that was hiding out at Pescadero High School was trapped and taken to the Oakland Zoo for care. Photo Oakland Zoo

LATEST June 2, noon A mountain lion that was hiding out at Pescadero High School on Wednesday was trapped and taken to the Oakland Zoo for care.

The 6- to 8-month-old cub was treated at the zoo's veterinary hospital, where a badly fractured tooth was extracted, the zoo said on Twitter.

The zoo said the mountain lion is too young to be able to survive in the wild and he will be placed in an accredited zoo.

On X

Oakland Zoo

@oakzoo

We just received another rescued mountain lion. This 6-8 month old male was discovered at Pescadero High School. (Students and staff were safe and had been dismissed from school at the time).

June 1, 10:38 a.m. A mountain lion that wandered into a San Francisco Bay Area high school Wednesday morning is being safely held in an English classroom until wildlife experts arrive on scene, officials said.

Javier Acosta, a detective for the San Mateo County Sheriff's Office, said custodians discovered the mountain lion at Pescadero High School early this morning.

"As of right now, students and teachers are all safe," Acosta said. "The mountain lion is being contained to the English classroom. We are on scene to make sure everyone is safe."

A mountain lion was contained in the English classroom at Pescadero High School on June 1, 2022. Photo Credit San Mateo County Sheriff's Office

California Fish and Wildlife officials were on the scene by 10 a.m.

The animal is likely a juvenile. "It probably got lost," Acosta said.

Pescadero is a small coastal town about 45 miles south of San Francisco in San Mateo County.

Amy Graff Senior News Editor Amy Graff was the senior news editor for SFGATE. She currently works at the New York Times.

22] March 21, 2022

[redacted]

https://www.sfgate.com/news/article/Video-shows-mountain-lion-at-pool-17018569.php

[Video shows - Mountain lion wandering around California family's swimming pool]

News

SF Gate By **Amanda Bartlett**, *Assistant Local Editor* Updated 2:16 p.m.

[Video - A recent video of a mountain lion prowling around a California family's backyard swimming pool before paddling across a nearby lake might seem like a rare occurrence — but Zara McDonald, a wildlife biologist with the Bay Area Puma Project, says it's actually "not all that unusual."]

The mountain lion, which McDonald suspects might be a young male, was spotted on Valerie Strowski's property along Lake Mission Viejo in Southern California at about 1:20 a.m. on

Saturday morning. Strowski told the Mercury News she captured footage of the animal from her balcony after her husband saw it first and woke her up to go take a look.

Even in the darkness, she could see the mountain lion was focusing its attention on a toy fish in the pool that belonged to one of her four children, possibly mistaking it for prey. Then, it wandered down to the dock and gazed out at the lake for about 15 minutes before suddenly leaping into the water with a splash.

Strowski, who had never seen a mountain lion near her home before, called the Orange County Sheriff's Department. She told the Mercury News that police arrived on the scene when the animal was already in the water — it was about 300 yards from the shoreline and had nearly reached the other side of the lake.

"If there wasn't video of this animal swimming across the lake, I wouldn't have believed you if you told me," J.R. Stewart, an animal control sergeant for Mission Viejo Animal Services, told the Mercury News.

A spokesperson for the Orange County Sheriff's Department told SFGATE that they had received a number of calls from residents after the video began to circulate. A statement shared by the city of Mission Viejo on Saturday night confirmed reports of the sighting of the mountain lion at the intersection of Marguerite Parkway and Alicia Parkway near Lake Mission Viejo, adding that the lion had swum across the lake toward the Mallorca Condominium Community.

Mission Viejo Animal Services is currently working with the California Department of Fish and Wildlife and researchers in the area to identify the animal, which has not been seen since, Michelle Claud-Clemente, director of animal services for Mission Viejo, told SFGATE.

"I have a feeling that when sheriffs responded, they may have startled the cat, which is what caused it to jump into the water," said Claud-Clemente, noting that while mountain lions have been seen in the area before, they don't always approach residential properties that closely. "They may have frightened it enough that it doesn't come back."

McDonald said mountain lions don't typically seek out water and prefer not to get wet, but they have flexible spines that allow them to maneuver around multiple obstacles, quickly changing directions if needed as they move through their dwindling habitats and seek out prey.

"If you think about it from this perspective, mountain lions have the largest range of any terrestrial mammal in our hemisphere. It really shouldn't be surprising that they can swim, which they can do really well." said McDonald. "They'll take fish. They'll take seals, sea lion pups, otters… Lots of different sea animals. They're highly adaptable."

More increasingly in California, McDonald said she's seeing mountain lions come into populated areas simply because their habitats have become "severely fragmented." This occurs when fences, highways, dams and other structures intended for human activity are built between quality patches of the mountain lions' habitats, like forests, causing them to move into regions where they typically aren't seen.

"Cover is really important to mountain lions," which trees provide, said McDonald. "They can be secretive. When they pounce on their prey, they're not seen. And when you break up that habitat, it makes it difficult for them to traverse, and human-wildlife contact increases."

The Bay Area Puma Project has "a lot" of documented cases of mountain lions crossing lakes and bodies of water in search of their next meal — or simply to get to the other side and keep moving, said McDonald. She added that deer tend to move around more frequently in residential areas, so mountain lions will naturally follow suit. The fact that this particular mountain lion was wandering around a pool is somewhat atypical, but she said the animal may have been attracted to it if it saw prey there (or in this case, a pool toy that resembled prey).

Anecdotally, McDonald has also received a number of photos of mountain lions swimming in lakes throughout Washington and Canada as well as California. About three or four years ago, she received a report from a man and his son who were in a boat at Shasta Lake and came across two mountain lions swimming right next to them.

"That was an unusual sight for them," said McDonald. "They were taken aback but gave them the space they needed and allowed them to continue on."

Though it may seem like mountain lion sightings have become more frequent, especially throughout the pandemic, McDonald believes that's up for debate.

"What's happening is that we have more technology to view them in the middle of the night when we never could previously — Ring cameras, Nest cameras, that sort of thing," said McDonald. "People are placing these cameras around their residential properties and it allows them to document movements they may not have known about, which is great and interesting, but it makes people think there are more mountain lions, which is not true."

"Lions in some of these areas are in peril, and we need to pay attention," she said.

McDonald encourages people who live in areas populated by mountain lions to be respectful of the animals. While people might be driven by fear if they see one and assume that it is coming after them, McDonald said that couldn't be further from the truth. In many cases, it could be a young male lion striking out to find his own territory, or a mother trying to find a place to raise her cubs.

"I would guess this mountain lion is long gone," she said of the animal spotted in Mission Viejo. "They probably won't see him again. It probably wasn't fun for him to traverse those human-dominated areas."

At the same time, she thought it was "really cool" to see the mountain lion's behavior in the video.

"It wasn't strange at all," said McDonald. "I'm not sure how the couple took it but I hope they saw it as a treat, because it's so rare."

Amanda Bartlett **Assistant Local Editor** Amanda Bartlett is an award-winning writer and the assistant local editor for SFGATE covering culture, history, science and breaking news. Prior to joining the newsroom in 2019, she worked for the Roxie Theater, Noise Pop and Frameline Film Festival. Outside of the newsroom, she hosts movie nights with Cinema SF as part of a series called "SFGATE Screens" and has also appeared as a guest on the Midnight Mass and Western Neighborhoods Project podcasts. She lives in Oakland with her fiancé and their rescue rabbit, Alberta Einstein. Send her an email at amanda.bartlett@sfgate.com.

23] January 20, 2022

https://www.sfgate.com/bayarea/article/Mountain-lion-slays-other-lion-seen-on-16787947.php

News | Bay Area & State

Mountain lion seen in Bay Area neighborhood after killing other lion

SF Gate By Andrew Chamings, *Editor-at-Large* Updated 8:16 a.m.

An "aggressive" mountain lion was seen walking a residential street in Belmont after killing another lion early Wednesday morning.

According to the Belmont Police Department, the animal was seen on the 2500 block of Hastings Drive between Carlmont High School and Waterdog Lake and Open Space.

"The fight between the lions was heard only by the reporting citizen," Belmont police Lt. Pete Lotti told SFGATE over email. "The deceased lion was later located in the 2500 block of Hastings Dr. by the responding officer, and ultimately collected by the Department of Fish & Wildlife. The location of the remaining mountain lion is unknown at this time."

The police advise the public to use caution in the area.

On X

Belmont Police Dept.

@belmontcapolice

Mountain lion seen in the 2500 block of Hastings. An aggressive mountain lion that fought & killed another mountain lion in the area was seen around 2:00am. Game wardens have responded. Pls use caution!

The U.S Forest Service states that, territorially, mountain lions "maintain spatial separation between each other, thereby assuring each individual has the resources necessary to survive," adding "if these separations are not maintained, mountain lions will kill each other."

A lion was seen in another Peninsula neighborhood in Daly City last week. It's not clear if this is the same mountain lion spotted in Belmont.

The **California Department of Fish and Wildlife states on its website** that in recent years there has been **"ever-increasing interactions between people and mountain lions."**

The wild cats, also know as pumas and cougars, call more than half of California home. Mountain lions tend to live wherever deer are found. "They are solitary and elusive, and their nature is to avoid humans," the CDFW says. If you live in mountain lion country, which includes much of the Bay Area, the agency advises deer-proofing yards, setting up motion sensitive lighting and avoiding letting pets out when mountain lions are most active at dawn, dusk and night.

Andrew Chamings **Editor-at-Large** SFGATE's Editor-at-Large Andrew Chamings is a British writer in San Francisco. Andrew has written for The Atlantic, Vice, SF Weekly, the San Francisco Chronicle, McSweeney's, The Bold Italic, Drowned in Sound and many other places. Andrew was formerly a Creative Executive at Westbrook Studios. You can reach him at andrew.chamings@sfgate.com.

24] January 10, 2022

[redacted]

https://www.sfgate.com/news/article/Mountain-Lion-seen-near-Bay-Area-school-16765066.php

News

Mountain lion seen near Bay Area school

SF Gate By **Andrew Chamings**, *Editor-at-Large* Jan 10, 2022

A mountain lion sighting in Daly City on Monday afternoon prompted police to warn people in a residential neighborhood to use caution when leaving their homes.

Both police and California Department of Fish and Wildlife staffers are on scene in the area, near Westmoor and Baldwin avenues, police said in a news release shortly after 1 p.m.

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On X

Daly City Police

@DalyCityPD

Mountain Lion Sighting Daly City Police Officers and Department of Fish and Wildlife are on scene in the area of Westmore Avenue and Baldwin Avenue. We do not have photos. Use caution leaving your house. We will keep you updated as we receive more information.

1:06 PM · Jan 10, 2022

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The location is around a mile south of San Francisco and near Westmoor High School and Westmoor Park.

Last week a Mountain Lion was spotted in a backyard in Pacifica eating a pet chicken, after eventually fleeing the scene.

Another cat, who put two schools in the North Bay on lockdown in October, was eventually tranquilized by California Department of Fish and Wildlife.

Mountain lions, also known as cougars or pumas, are native to California. **California Fish and Wildlife estimate that 4,000 to 6,000 mountain lions live in the state**, though there have been only 16 verified mountain lion attacks on people in California since 1890, six of them fatal.

Bay City News contributed to this story.

Andrew Chamings **Editor-at-Large** SFGATE's Editor-at-Large Andrew Chamings is a British writer in San Francisco. Andrew has written for The Atlantic, Vice, SF Weekly, the San Francisco Chronicle, McSweeney's, The Bold Italic, Drowned in Sound and many other places. Andrew was formerly a Creative Executive at Westbrook Studios. You can reach him at andrew.chamings@sfgate.com.

2021

25] Dec 28, 2021

https://www.sfgate.com/bayarea/article/Mountain-lion-in-Pacifica-eats-chicken-16734681.php

News | Bay Area & State

Mountain lion spotted in Pacifica backyard gorging on pet chicken

SF Gate By **Joshua Bote**, *SFGATE*

A mountain lion was spotted in a backyard in Pacifica, gorging on a pet chicken, police say.

Pacifica police arrived at a home on Valencia Way on Sunday morning just after 7:30 a.m., according to a police press release, and found an "adult mountain lion approximately 30 yards" behind the home, standing in the backyard, eating the pet chicken after stealing it from the homeowner's coop.

After the mountain lion had consumed the chicken, police monitored the animal for at least two hours, according to the release. An officer with the California Department of Fish and Wildlife also reportedly arrived to speak with the homeowner. The mountain lion fled the area at about 9:45 a.m., police said.

"The mountain lion did not appear to pose a threat to human life," said police in the release. Still, neighbors were urged to avoid their backyards and not bring pets near the area.

Mountain lions are a constant in Pacifica and throughout the Bay Area, with at least three other confirmed sightings in Pacifica alone this year. In 2020, a viral video showed a mountain lion cub seemingly keeping an eye on a group of children biking outside in Pacifica. Another mountain

lion cub was also believed to have killed three marsupials — two wallaroos and a red kangaroo — at the San Francisco Zoo in 2020.

Joshua Bote **Tech Editor** Joshua Bote is the tech editor at SFGATE. He grew up in the Los Angeles area, went to UC Berkeley and has previously worked as a news reporter at USA Today and SFGATE and as a music writer at NPR. **Email: joshua.bote@sfgate.com** and **Signal: 707-742-3756**

26] Oct 20, 2021

[redacted]

https://www.sfgate.com/bayarea/article/Mountain-lion-Rhonert-Park-schools-16542712.php

Mountain lion that shut down 2 Bay Area schools tranquilized

News | Bay Area & State

By **Amy Graff**, *Senior News Editor* Updated 7:07 a.m.

[Photo - A mountain lion that prompted two schools to close in Rohnert Park was tranquilized by Fish and Wildlife officers and then evaluated by experts at Sonoma County Wildlife Rescue. Photo Sonoma County Wildlife Rescue]

A mountain lion that put two schools in the North Bay on lockdown Monday was tranquilized by California Department of Fish and Wildlife officials and was under medical evaluation by experts on Tuesday after exhibiting behavior that was unusual for an adult cougar, multiple media outlets reported.

"It was crouching, not able to move with a small amount of people, probably eight people, which is a lot with 75 feet," Doris Duncan, executive director of Wildlife Rescue Sonoma County, told KTVU. "That animal would have darted off, just hearing us coming 500 feet away. So to see it just sitting there like that, we know there was something significantly wrong it."



[Photo - Rohnert Park officers were on scene in the area of the Five Creek Trail and Crane Creek Trail just east of Eagle Park and Evergreen School for a mountain lion spotted on the creek path Monday morning. Rhonert Park Police Department]

Rohnert Park officers were on scene in the area of the Five Creek Trail and Crane Creek Trail just east of Eagle Park and Evergreen School for a mountain lion spotted on the creek path Monday morning.

Rhonert Park Police Department

Evergreen Elementary School and Lawrence Jones Middle School in Rohnert Park implemented full campus lockdowns for several hours Monday. The Rohnert Police Department said the mountain lion was first spotted in the area of the Five Creek Trail and Crane Creek Trail just east of Eagle Park and Evergreen Elementary.

The 70-pound adult female is under the care of Wildlife Rescue Sonoma County, one of only four wildlife facilities in California licensed to handle mountain lions.

The Press Democrat reported that the medical evaluation will likely last several days. The state Department of Fish and Wildlife will eventually release her into the wild when she is considered healthy and fully alert.

Amy Graff Senior News Editor Amy Graff was the senior news editor for SFGATE. She currently works at the New York Times.

27] July 1, 2021

[redacted]

https://www.sfgate.com/bayarea/article/Petaluma-mountain-lion-video-footage-warning-16285764.php

News | Bay Area & State

Petaluma resident shares video of huge mountain lion in his yard

SF Gate By **Amy Graff**, *Senior News Editor* Updated July 1, 2021 8:22 a.m.

[Video - A Petaluma resident captured video footage of a mountain lion in his yard in June 2021. Photo Joe Luchok]

A mountain lion prowled through the yard of a neighborhood in Petaluma, Calif., early Wednesday morning, and officials are warning the community to use caution.

Joe Luchok said his wife rose early Wednesday morning and was shocked to see the big cat through the window of their home in west Petaluma about 5:45 a.m.

"At first, she says, 'Oh my gosh, that's a gigantic dog.' I'm still asleep and then she says, 'That's not a dog, that's uhuhuh … .' She couldn't get the words out because it was right out front and it was huge. It was a giant cat."

Luchok said he checked footage from his Nest cam set up in the backyard and it showed the animal walking across the lawn. (See a screen capture from the footage above.)

"It was in our backyard, which is all fenced in," he said. "It must have climbed over the back fence. Then it went on the side of the house and climbed into our front yard."

He added, "It was absolutely stunningly beautiful. It was as if it just came out of showroom. It was so pretty. I'm thankful to have seen something like that."

Luchok reported the incident by calling 911.

This wasn't the only mountain lion sighting in Petaluma in the past few days.

The Petaluma Police Department released a warning after a puma was spotted Wednesday in the hillside beyond Hayes Lane. "Please use caution in the area," police said.

The department said a mountain lion was also spotted east of Highway 101 in Petaluma about 10:30 p.m. Tuesday.

It's unknown whether this was the same lion in all three sightings.

Petaluma residents are being asked to call the police if they see a mountain lion and avoid the animal.

Mountain lions are native to California and are generally shy animals that avoid humans.

Amy Graff Senior News Editor Amy Graff was the senior news editor for SFGATE. She currently works at the New York Times.

28] May 26, 2021

[redacted]

https://www.sfgate.com/bayarea/article/Mountain-lion-breaks-into-SF-Bay-Area-house-16204370.php

Mountain lion breaks into SF Bay Area house filled with taxidermy trophy heads

News | Bay Area & State

SF Gate By **Amy Graff**, *Senior News Editor* May 26, 2021

A curious mountain lion broke through the exterior glass window of a residence in the San Francisco suburb of San Bruno early Tuesday.

The homeowner scared the animal out of the house. Authorities were unable to locate it.

The incident occurred at 12:20 a.m. in the 200 block of Ross Avenue, which is near open space that stretches from the coast in Pacifica across the peninsula to the Santa Cruz Mountains.

Mountain lion sightings aren't uncommon in California. The **Department of Fish and Wildlife estimates 4,000 to 6,000 mountain lions live in the state**. But the San Bruno Police Department called what happened Tuesday "out of the ordinary."

The department offered tips for homeowners who live near mountain lion territory to secure their homes. The suggestions including deer-proofing your property to avoid attracting a lion's main food source, removing dense vegetation from around the home to reduce hiding spaces, installing outdoor lighting to make it difficult for mountain lions to approach unseen, and not leaving small children or pets outside unattended.

Last Wednesday a mountain lion was captured in San Francisco after being spotted in a tree. Fish and wildlife said data collected from the puma's radio collar revealed this was the same animal spotted roaming city streets several days last week.

The mountain lion was found in a tree on Santa Marina and Mission streets on the west side of Bernal Heights. Officials darted the animal with a tranquilizer and transported it to the Oakland Zoo where it was observed before being released back into the wild.

Amy Graff **Senior News Editor** Amy Graff was the senior news editor for SFGATE. She currently works at the New York Times.

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29] May 20, 2021

[redacted]

https://www.sfgate.com/bayarea/article/mountain-lion-San-Francisco-captured-Bernal-Height-16190720.php

News | Bay Area & State

Wayward San Francisco mountain lion captured after being found in tree

SF Gate By **Amy Graff**, *Senior News Editor* Updated May 20, 2021 3:06 p.m.



[In the early morning hours of May 20, 2021, the Oakland Zoo took in a 2-year-old male Mountain lion captured in San Francisco's Bernal Heights neighborhood. This male marks the 16th mountain lion rescue for the Zoo through their Bay Area Cougar Action Team (BACAT) alliance. Photo Oakland Zoo]

A mountain lion was captured in San Francisco on Wednesday night and is in the care of the Oakland Zoo.

The California Department of Fish and Wildlife said data collected from the puma's radio collar revealed this is the same animal spotted roaming city streets in the past two days.

The mountain lion was found in a tree on Santa Marina and Mission streets on the west side of Bernal Heights, about two blocks from Holly Park, according to San Francisco Animal Care and Control.

[A wayward mountain lion that was spotted in a tree on Santa Marina Street near Mission Street in San Francisco was captured May 19, 2021. Photo Ken Shelf]

Animal Care and Control was the first on the scene and posted an image of the animal in the tree on social media. Capt. Amy Corso coordinated with the San Francisco Police Department to establish a safe perimeter.

Fish and Wildlife officers arrived next and darted the animal in the hindquarters with a tranquilizer.

KCBS reported the lion got woozy and fell asleep on the front porch of a nearby home before officers tagged and caged it.

San Francisco resident Ken Shelf was on a walk with his wife in the neighborhood when he noticed the Animal Care and Control van and police cars.

"We stopped and somewhat kiddingly asked them if they were out looking for the lion and they told us yes, it was currently in the tree," said Shelf, who snapped the photo of the puma in the tree that was shared by the agency on social media. "I felt frightened, but also somewhat giddy to have the worlds collide in this fashion, a beautiful beast like that, living in the wild, yet wandering the city at night, looking for something to do, and possibly a bite to eat — just like the rest of us."

[A mountain lion was captured in San Francisco on May 19, 2021. Photo Quinn Klaiman]

"The sedated lion was taken to the Oakland Zoo for evaluation and will probably be released in a more suitable location later today," said Deb Campbell, a spokesperson for Animal Care and Control.

The Oakland Zoo added in a statement that the mountain lion is a large, healthy male of about 100 pounds. The animal was met by hospital staff at the Oakland Zoo Veterinary Hospital at about 1 a.m. Thursday.

A mountain lion has been seen in Bernal Heights and the Portola District in the past two days. Earlier this week, a resident in the Portola District captured footage of the animal with a home security camera.

Pumas in search of new habitat and hunting territory occasionally wander into San Francisco from San Mateo County. Over the years, there have been occasional sightings, usually around Lake Merced, but typically the animals quickly realize they don't want to be in the city and head back south.

Last June, a juvenile puma was captured in the SoMa neighborhood.

Amy Graff Senior News Editor Amy Graff was the senior news editor for SFGATE. She currently works at the New York Times.

30] May 19, 2021

https://www.sfgate.com/local/article/mountain-lion-bernal-heights-park-gaven-sighting-16186411.php

Local

Mountain lion spotted roaming San Francisco's Bernal Heights

SF Gated By **Katie Dowd**, *Managing editor* Updated May 19, 2021 6:59 a.m.



[Photo - A mountain lion was seen near Bernal Heights Park, pictured here, on Tuesday morning. Photo Justin Sullivan/Justin Sullivan/Getty Images]

A wayward mountain lion has been seen roaming San Francisco's busy Bernal Heights neighborhood, far from the quiet green spaces that it calls home.

The sightings, one from an eyewitness and another via home security video, were between 3 a.m. and 6 a.m. Tuesday. San Francisco Animal Care and Control spokesperson Deb Campbell said cougar sightings are not uncommon in the city but, upon investigation, many turn out to be ordinary pet cats. These sightings, on Gaven Street and near Bernal Heights Park, were the real deal, however.

"If we hadn't seen him on that video, we might have thought it was a big, healthy house cat that the eyewitness saw," Campbell said.

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On X

Andrea Nakano

@AndreaKPIX

I just talked with the homeowner in the Portola District that captured the footage of the mountain lion. She gave me the original video which is a bit clearer than the one I posted earlier.

Campbell said the mountain lion appeared to be a large size and was possibly an adult. A year ago, a mountain lion made it all the way to Mission Bay, but that individual was a gangly teen.

"Lockdown is over," Campbell joked. "Maybe he was looking for some nightlife, didn't find any and went back home."

Home is probably in the South Bay, particularly in the Crystal Springs area. This is likely a very stressful experience for the poor adventurer, as mountain lions are naturally reclusive. That bashfulness also may explain why no one saw the puma cruising through city streets in daylight or dusk hours.

"They are shy, they keep to themselves," Campbell said. "We have more mountain lion visitors than we actually find out about."

Animal Care and Control patrolled the neighborhood and sought more evidence of the furry visitor, but didn't spot him. Campbell says the mountain lion may have already made it back out of the city, but neighbors should take common-sense precautions like keeping their dogs on leash

and watching their small children. If the animal approaches, make yourself big, wave your arms and do not turn your back on it or run.

Anyone who sees the mountain lion should call Animal Care and Control's emergency dispatch number at 415- 554-9400.

Katie Dowd **Managing editor** Katie Dowd is the SFGATE managing editor. She started her career at SFGATE in 2011 shortly after graduating from UC Berkeley. She was born and raised in the Bay Area.

31] March 18, 2021

[redacted]

https://www.sfgate.com/bayarea/article/mountain-lion-san-mateo-county-woodside-dog-16035388.php

News | Bay Area & State

Woodside resident drives onto lawn to stop mountain lion attack

SF Gate By **Amy Graff**, *Senior News Editor* Updated March 18, 2021 2:35 p.m.

A resident of Woodside, Calif., drove her car onto her lawn Wednesday night to scare off a mountain lion that was attacking her dog, officials said.

The San Mateo County Sheriff's Office said the dog's owners were at home when they heard a commotion in their yard just before 10 p.m.

"When they looked out the window, they saw a mountain lion had the dog by the neck," the sheriff's office said in a statement. One of the owners got into her car and drove onto the lawn to scare the mountain lion off, the sheriff's office said.

The homeowners told the sheriff's office the mountain lion had to climb a 6-foot-tall deer fence to access the property.

The dog was taken to a vet and is expected to make a full recovery, officials said.

The sheriff's office is asking residents to report any mountain lion sightings.

Mountain lion sightings aren't unusual around the San Francisco Bay Area, and the California Department of Fish and Wildlife estimates 4,000 to 6,000 mountain lions live in California.

The animals mainly prey on deer and other wildlife, but they will also feed on vulnerable pets and livestock. **Fish and Wildlife receives hundreds of reports annually about attacks on pets.**

The department advises bringing pets indoors when mountain lions are most active — dawn, dusk and at night. Pet food should also be brought inside to prevent attracting raccoons and other wildlife that mountain lions prey on, according to Fish and Wildlife.

Conflicts between people and lions do occur but are rare. "There have been only 16 verified mountain lion attacks on humans in California since 1890, six of them fatal," Fish and Wildlife said. "The last documented attack occurred in September 2014 in Santa Clara County."

Editor's note: This story was updated on March 18 at 2:30 p.m. after new information was received about the incident from the San Mateo County Sheriff's Office.

Amy Graff **Senior News Editor** Amy Graff was the senior news editor for SFGATE. She currently works at the New York Times.

32] January 14, 2021

[redacted]

https://www.sfgate.com/bayarea/article/mountain-lion-stalk-family-El-Dorado-Placerville-15869836.php

News | Bay Area & State

California deputy kills mountain lion that stalked family in broad daylight

SF Gate By Amy Graff, *Senior News Editor* Updated Jan 14, 2021 9:10 a.m.



[Photo - An El Dorado County sheriff's deputy killed a mountain lion on Jan. 11 that had been following a family on a bike trail in the foothills of the Sierra Nevada east of Placerville, officials said. Photo El Dorado County Sheriff's Office]

A California sheriff's deputy shot and killed a mountain lion Monday that was stalking a family of four on a bike trail in the Sierra Nevada foothills east of Placerville, county officials said.

The El Dorado County Sheriff's Office said it responded late Monday afternoon to a 911 call from a couple with two small children in a stroller and two small dogs.

The adult mountain lion followed the family for 10 minutes and continued to track them even when they yelled, according to reports.

When a deputy arrived on the scene, he watched the lion pacing back and forth and also tried shouting at the animal, the Sheriff's Office said.

The "lion started walking toward the deputy instead of running away as a normal healthy mountain lion would," according to a report from the Sheriff's Office posted on Facebook.

The deputy fired a shot into the ground in front of the lion but it continued toward the deputy, "further showing that it was not well and dangerous to the public," the office said. "The deputy had no option other than to put down the animal."

The sheriff's office told Fox 40 that "it regrets the incident but called it unavoidable."

The California Department of Fish and Wildlife is examining the mountain lion's remains "to see if there is any explanation of the unusual behavior," Fox 40 reported.

It's unknown exactly how many mountain lions inhabit California, but estimates from Fish and Wildlife range from 4,000 to 6,000. Mountain lion sightings in California aren't unusual, but attacks are uncommon, with six fatal incidents since 1890.

"In most cases, the person was alone when the attack occurred," according to **Fish and Wildlife**. "The last documented human-lion attack occurred June 2020 in San Diego County."

Amy Graff **Senior News Editor** Amy Graff was the senior news editor for SFGATE. She currently works at the New York Times.

33] January 6, 2021

[redacted]

https://www.sfgate.com/local/article/Sick-desperate-mountain-lions-california-pumas-15847975.php

Local

Sick, 'desperate' mountain lions are being seen around Santa Cruz

SF Gate By **Andrew Chamings**, *Editor-at-Large* Updated Jan 6, 2021 8:23 p.m.

[Photo - The multiple sightings of mountain lions in Santa Cruz County are raising concerns that the cats' condition is linked to last year's wildfires in the region. The mountain lion pictured here is not among the malnourished cougars sought by local wildlife groups. Photo John Conrad/Getty Images]

Just days after a malnourished mountain lion was captured in a downtown Santa Cruz apartment complex, a second sickly cat has been spotted elsewhere in the county.

The multiple sightings are raising concerns that the cats' condition is linked to last year's wildfires, or poisoning through fire retardant or rodenticides, according to a press release from Wildlife Emergency Services.

"Our concern is, the lion is malnourished. Desperate. A desperate cat is a dangerous cat," said spokesperson Rebecca Dmytryk in the statement.

The black and white video taken from a stationary camera posted on Facebook Monday shows a skinny cat prowling near Newell Creek, Santa Cruz County.

These aren't the only sightings of mountain lions near well-populated Bay Area spots lately. In June a mountain lion seen around San Francisco was safely captured in Mission Bay and moved

to the Oakland Zoo. Later in the year, another cougar was seen watching kids play in Pacifica before the children rode safely away on their bikes.

Mountain lions, also known as cougars or pumas, are native to California. **California Fish and Wildlife estimate that four to six thousand mountain lions live in the state, though there have been only 16 verified mountain lion attacks on people in California since 1890, six of them fatal.**

Zara McDonald, a biologist with the Bay Area Puma Project, told SFGATE that mountain lions are solitary, shy animals that avoid people.

Dmytryk said in the press release that the rescue group is sharing information with the California Department of Fish and Wildlife on the recent sighting, in hopes of finding the animal.

Andrew Chamings **Editor-at-Large** SFGATE's Editor-at-Large Andrew Chamings is a British writer in San Francisco. Andrew has written for The Atlantic, Vice, SF Weekly, the San Francisco Chronicle, McSweeney's, The Bold Italic, Drowned in Sound and many other places. Andrew was formerly a Creative Executive at Westbrook Studios. You can reach him at andrew.chamings@sfgate.com.

2020

34] September 22, 2020

https://www.sfgate.com/local/editorspicks/article/Video-shows-mountain-lion-stalking-child-on-bike-15585015.php

Local | **Local: Editors' Picks**

Video shows mountain lion watching child play on bike in Bay Area

SF Gate By **Andrew Chamings**, *Editor-at-Large* Updated Sep 22, 2020 8:46 a.m.

A mountain lion was seen sitting and watching a child play on a bike on a quiet Pacifica street this weekend, reports SFist.

The video was captured and uploaded by resident Timothy Kerrisk with the comment "Mountain Lion in Pacifica watching kids ride bikes in front of my house."

The footage shows the large cat watching from behind Kerrisk's white picket gate, before jumping over a fence in the direction of the child.

The child can be seen eyeing the cat before riding safely away.

There is no evidence that the cat was preying on the child, but the proximity to the sometimes dangerous species is a little unnerving.

Kerrisk told SFist that the audio on the video was removed as it was "just me yelling for the neighbor across the street to come down and grab the kids."

Video https://youtu.be/p1oLgXJdQu4

Earlier this summer a mountain lion alarmed San Franciscans, prowling the streets at night all the way from Russian Hill to the Salesforce Tower, before being eventually caught by the city's Animal Care and Control.

The wild cat captivated the attention of San Franciscans, before being released back into the wild on the Peninsula, only to be later found dead near Highway 1 in Pacifica.

Mountain lions, also known as cougars or pumas, are native to California. **California Fish and Wildlife estimate that four to six thousand mountain lions live in the state,** though there have been only 16 verified mountain lion attacks on people in California since 1890, six of them fatal.

Zara McDonald, a biologist with the Bay Area Puma Project, told SFGATE that mountain lions are solitary, shy animals that avoid people.

"They are very genetically programmed to avoid humans," she said.

Andrew Chamings **Editor-at-Large** SFGATE's Editor-at-Large Andrew Chamings is a British writer in San Francisco. Andrew has written for The Atlantic, Vice, SF Weekly, the San Francisco Chronicle, McSweeney's, The Bold Italic, Drowned in Sound and many other places. Andrew was formerly a Creative Executive at Westbrook Studios. You can reach him at andrew.chamings@sfgate.com.

35] June 22, 2020

[redacted]

https://www.sfgate.com/local/article/Video-mountain-lion-wandering-in-San-Francisco-15344437.php

Local

Mountain lion spotted again in San Francisco's Mission Bay

SF Gate By **Amanda Bartlett**,*Assistant Local Editor* Updated June 22, 2020 9:59 a.m.

In a **video** shared by San Francisco resident Luis Fernando, a mountain lion could be seen wandering around Russian Hill early Tuesday morning. Video Luis Fernando

LATEST June 18, 8:29 a.m. The young mountain lion was captured in San Francisco's Mission Bay early Thursday morning. Officers from S.F. Animal Care and Control and the California Department of Fish and Wildlife cornered the disoriented animal at Fourth and Channel streets near Oracle Park and used a large net to seize it. Read more here.

LATEST June 17, 8:23 p.m.: There was a second sighting of a mountain lion Wednesday evening in the East Cut neighborhood of the city, according to the San Francisco police.

"It is likely the mountain lion is confused and lost, and will soon find its way south and out of the city," police said in a tweet. "If approached by the mountain lion make yourself appear big and shout. Remain vigilant and use caution outdoors."

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On X

San Francisco Police

@SFPD

!Mountain Lion Spotted! Mountain Lion last spotted in the East Cut Neighborhood of #SF. If seen stay away, back up slowly facing the lion, and do not run. Call at 415-554-9400. For after hours assistance please call 911.

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Luis Fernando wasn't expecting to encounter a mountain lion in San Francisco, but there it was standing just a few feet away from his vehicle, its yellow eyes glinting in the reflection of his headlights.

Fernando, 34, said he saw the animal around 12:30 a.m. on Tuesday morning. He frequently takes walks late at night after finishing his online classes and said he was heading toward the intersection of Lombard and Leavenworth, where his car was parked. He got in and began to drive down Leavenworth when he saw something moving on the sidewalk. He knew it was some kind of animal, but couldn't quite identify it at first.

"Then it turned around and looked at me," said Fernando. "I immediately recognized it was a mountain lion and began filming it on my phone."

He followed the animal to the intersection of Greenwich and Jones streets, where he eventually lost sight of it. In the video, the mountain lion can be seen pausing on the sidewalk next to a couple of trash cans before it darts off into the night.

At around 12:30 am I spotted a mountain lion roaming the streets of Russian Hill. I followed from inside my car and lost visual contact near intersection of Greenwich and Jones. Be safe when walking alone at night or when walking your pets. I reported the sighting to @SFPD pic.twitter.com/xlreghRSaJ

— Fernando Robles (@Ing_Fehr) June 16, 2020

Fernando couldn't determine the age of the mountain lion but said it appeared to be a juvenile and was about the size of his 25-pound Great Pyrenees mix, Rosa. After spotting the animal he called the San Francisco Police Department, who later put him in touch with S.F. Animal Care & Control around 6 a.m. After reviewing the video, Fernando said they confirmed the animal to be a mountain lion — a very small and young one.

"It's highly unusual for a mountain lion to be in these areas because it's quite young and very inexperienced," said Deb Campbell, a spokesperson for SF Animal Care & Control. "Usually when families have litters, they disperse to find their own territory. This one probably went a little early and ended up here and doesn't know how to get out."

It's not the first sighting of the animal, either. Surveillance footage from ABC7 captured a mountain lion wandering through a parking lot outside of the KGO-TV studios along the Embarcadero around 3:30 a.m. Campbell added that the animal was also captured on a security camera at the intersection of Fremont and Market Street at approximately 3:57 a.m.

"The last thing I expected was to see a mountain lion in Russian Hill," said Fernando. "But I wanted to alert the neighborhood and keep everyone safe."

The mountain lion has not yet been identified, though Zara McDonald, head of the **Bay Area Puma Project**, suspects the animal is between 14 and 16 months old. The organization has conducted research on mountain lion sightings throughout the region since 2004. **Over the years,**

trail cameras used by the Bay Area Puma Project have indicated a gradual decline of the mountain lion population, so the organization has been compiling data to determine their likelihood of survivability in future decades.

Mountain lions are typically solitary animals and tend to avoid people by nature. Sightings are becoming more frequent, however, as the human population expands into their natural habitats, **according to the California Department of Fish & Wildlife.**

"Ultimately, it comes down to habitat loss and fragmentation, which is unfortunate," said McDonald. "It's a really tough situation for these animals south of San Francisco that are living in that open space. There's nowhere for them to go but south, and when they do go north, they inadvertently end up in a big, noisy city."

In recent months, McDonald said there were several sightings of a mother with her cubs wandering some of the trails in Pacifica. She thinks the mountain lion might be one of those cubs.

"In the video, the cub looks very nervous and anxious to get out," said McDonald. "It's possibly hunkered down, waiting to move out at night."

Justin Dellinger, a wildlife biologist with the CDFW, said the department is waiting for the animal to do just that.

"If you allow them to help themselves, they'll figure it out," he said. "We're aware of it and will intervene if we have to in order to keep everyone safe, including the animal."

MORE: Parent reportedly punched a mountain lion in the ribs to save injured 6-year-old girl

The department advises people to hike or jog in groups and avoid doing so at dawn, dusk, and at night, when mountain lions are the most active. If you encounter a mountain lion, remain calm and do not run away from it. Instead, keep a distance between yourself and the animal, make noise and try to make yourself look bigger in order to drive it away.

Sightings should be reported to your local CDFW regional office, or the S.F. Animal Care & Control emergency dispatch by calling 415-554-9400. To help with the Bay Area Puma Project's research, McDonald has also requested that people report encounters to their puma sighting map.

Amanda Bartlett Assistant Local Editor Amanda Bartlett is an award-winning writer and the assistant local editor for SFGATE covering culture, history, science and breaking news. Prior to joining the newsroom in 2019, she worked for the Roxie Theater, Noise Pop and Frameline Film Festival. Outside of the newsroom, she hosts movie nights with Cinema SF as part of a series called "SFGATE Screens" and has also appeared as a guest on the Midnight Mass and Western

Neighborhoods Project podcasts. She lives in Oakland with her fiancé and their rescue rabbit, Alberta Einstein. Send her an email at amanda.bartlett@sfgate.com.

36] June 19, 2020

[redacted]

https://www.sfgate.com/bayarea/article/San-Francisco-mountain-lion-dead-kangaroo-zoo-15352957.php

News | Bay Area & State

3 marsupials found dead at SF Zoo, a mountain lion cub is a suspect

SF Gate By **Amy Graff**, *Senior News Editor* Updated 2:39 p.m.

[Photo – FILE: Entrance to the San Francisco Zoo in the Ocean Beach neighborhood of San Francisco, California, with sign reading 'Welcome to the San Francisco Zoo,' January 31, 2018. Photo Smith Collection/Gado/Getty Images]

Two wallaroos and a red kangaroo were found dead at the San Francisco Zoo last week, and findings suggest a local wild carnivore is responsible, the zoo confirmed in a statement Friday.

In a rare event, a lost mountain lion cub was spotted wandering the streets of S.F. multiple times at night last week and was captured by Animal Care & Control on Thursday (read more on SFGATE). The zoo is investigating whether the young cat may have been the perpetrator and entered the Australian Walkabout exhibit.

Zara McDonald, a biologist with the Bay Area Puma Project, said if the zoo finds that the mountain lion killed the marsupials, it will help explain how the animal entered the city.

Experts hypothesized the city's recent puma visitor came from San Mateo County, as the wildlands around Crystal Springs Reservoir and Sweeney Ridge are home to several mountain lions. A visit to the zoo would help confirm the animal's route. "In a way it's part of the story," McDonald said.

The mountain lion cub is currently under examination at the Oakland Zoo and will be released in the wild.

Experts identified the 50-pound animal as a male of about 14 to 15 months old, an age when cubs are usually still under the care of a mother. McDonald said it's possible that even a mountain lion of this size and age could have killed the marsupials.

She explained that under unusual circumstances mountain lions kill multiple animals without the intention of eating them and is behavior known as "surplus killing."

"It's not common, but there have been numerous instances over the years where we've had pumas go into enclosures with animals and kill tons of them, and maybe eat one," McDonald said.

McDonald recalled an incident in the East Bay several years ago, when a cougar jumped into an enclosure holding goats and sheep.

"The puma figured out a way into the top and then got stuck inside. He killed a bunch of them and only ate one," she said. "Eventually the puma got out."

In rare instances, pumas in search of new habitat accidentally wander into San Francisco. Over the years, there have been occasional sightings, usually around Lake Merced, but typically the animals quickly realize they don't want to be in the city and head back south.

McDonald said video footage of the mountain lion captured on surveillance cameras reveals this animal was confused and scared, and this behavior is what you would expect in a cub separated from his mother.

"I think once it came into the dense area of the city, the first video footage captured clearly shows this lion was confused," said McDonald. "You can tell from it's energy, it seemed uncomfortable. It would dart everywhere and stay low to the ground, which is a behavior that you see in these cats when they're scared and feel threatened."

Officers from S.F. Animal Care and Control and the California Department of Fish and Wildlife cornered the disoriented animal at Fourth and Channel streets near Oracle Park early Thursday and used a large net to seize it. The goal was to capture the animal without tranquilizing it.

"We have been monitoring the lion's movements since Tuesday, and felt that because he or she was young and inexperienced that there was no easy, safe exit route from the city," Deb Campbell, a spokesperson for SF Animal Care & Control, said. "We were afraid that the lion would be hit by a car, or starve."

Amy Graff **Senior News Editor** Amy Graff was the senior news editor for SFGATE. She currently works at the New York Times.

37] May 12, 2020

[redacted]

https://www.sfgate.com/outdoors/article/Hiker-encounters-2-mountain-lions-on-trail-15265749.php

Sports | Outdoors

Hiker encounters 2 mountain lions on popular trail | Sightings of wild animals increase as humans shelter in place

SF Gate By Mike Moffitt, *SFGATE* Updated May 12, 2020 1:46 p.m.



[Photo - A mountain lion stares warily at a hiker who encountered it Thursday on the Sweeney Ridge Trail between Pacifica and San Bruno. The big cat was accompanied by a second cougar as it prowled along the trail. Photo San Bruno Police Department]

We can forgive the photographer for the slightly blurry images. When the subject of the picture is a mountain lion staring at you from a dozen yards away, anyone is bound to get a little twitchy.

The camera-packing hiker encountered the mountain lion and its companion on the popular Sweeney Ridge Trail between Pacifica and San Bruno about 7 p.m. Thursday.

Mountain lion attacks against humans are rare, and according to the Mountain Lion Foundation, the big cats have no urge to hunt people. **They prefer deer, rabbits, raccoons and coyotes.**

San Bruno police posted the photos on their Facebook page, and advised people on the 7.7-mile out-and-back trail off Sneath Lane to exercise caution. Dogs accompanying hikers could

especially be at risk. While mountain lions are wary of humans, a small pooch might be viewed as a tempting morsel.

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On X

Fremont Police Department

@FremontPD

Large bobcat sighting in the area of Mission Blvd and Paseo Padre Pkwy. Bobcat sightings east of Mission Blvd are common. - Be aware and cautious - Do not approach - Secure small animals and chickens - Bring in small pets & pet food - Call Animal Services at 510-790-6635

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If you do encounter a mountain lion, wildlife experts say you should stop immediately and not run away. Instead, maintain eye contact. Stand tall and try to look bigger by raising and waving your arms. Give the cat room and time to move away. In the unlikely event that you are attacked, fight back. Most people can successfully thwart a mountain lion attack.

The cougar sighting is the latest example of wild critters venturing into areas where they are rarely seen. With humans hunkering down in COVID-19 lockdown, animals have become emboldened.

On Sunday, a bobcat was seen near Mission Boulevard and Paseo Padre Parkway in Fremont.

Coyotes have been wandering San Francisco's empty streets, serenading North Beach, taking in the views at Kirby Cove and even prancing on rooftops,

And in Napa County, a wildlife cam in the Dry Creek area captured three young mountain lions on the prowl. Audubon Canyon Ranch posted the video on its Facebook page last week..

Mike Moffitt **Reporter** Reporter Mike Moffitt has been writing and editing stories for newspapers and news websites for more than 25 years. Before joining the SFGate team, he worked at the San Francisco Examiner, Arizona Republic and Phoenix Gazette. He covers news, politics, science, sports, outdoors and Bay Area history.

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38] Feb 20, 2020

[redacted]

https://www.sfgate.com/news/article/Mountain-lion-euthanized-attack-Cupertino-park-15072022.php

News

Mountain lion that attacked six-year-old girl in Cupertino is euthanized

Rancho San Antonio Park will re-open Friday morning.

SF Gate By **Amanda Bartlett**, *Assistant Local Editor* Updated Feb 20, 2020 3:35 p.m.

The mountain lion that was confirmed to have attacked a six-year-old girl at Rancho San Antonio Park in Cupertino has been euthanized, officials say.

According to a press release from the California Department of Fish and Wildlife, officers and park rangers spent three days searching for the animal, which was eventually found in a tree on Wednesday afternoon.

"Because the animal has been confirmed to be the same one involved in the attack, it has been humanely euthanized by CDFW staff for public safety purposes," wrote CDFW spokesperson Jordan Traverso. "We made the decision to euthanize the lion because it was confirmed to have attacked a human."

Officers initially sedated the mountain lion for DNA testing to determine the sample matched that of results taken from the victim on the day of the incident. Now deceased, the female lion was estimated to be 2-to-4 years old, weighing 60-70 pounds.

"That's small for a full-grown lion, which can mean she wasn't thriving," **Midpeninsula Regional Open Space District Area Superintendent Brad Pennington** said in a statement on the park's website. "Mountain lions face a lot of challenges. They need large, connected areas of habitat. Our region is divided by roads and development, which puts wildlife closer to people and us closer to the wildlife."

The girl who was attacked is recovering from minor injuries, the CDFW reported. The park will re-open on Friday morning.

The incident occurred on a trail called Wildcat Loop, where park rangers have recently placed warning signs reminding park visitors of the recent attack. They'll continue to monitor for "unusual wildlife behavior," according to the statement.

The best way to handle a close-up confrontation with a mountain lion is to make loud noises and slowly back away — not running or turning your back to the animal. Midpen rangers will hold an all-ages presentation and Q&A session on "Coexisting with Cougars" on Mar. 12 at Hidden Villa in Los Altos Hills.

Amanda Bartlett **Assistant Local Editor** Amanda Bartlett is an award-winning writer and the assistant local editor for SFGATE covering culture, history, science and breaking news. Prior to joining the newsroom in 2019, she worked for the Roxie Theater, Noise Pop and Frameline Film Festival. Outside of the newsroom, she hosts movie nights with Cinema SF as part of a series called "SFGATE Screens" and has also appeared as a guest on the Midnight Mass and Western Neighborhoods Project podcasts. She lives in Oakland with her fiancé and their rescue rabbit, Alberta Einstein. Send her an email at amanda.bartlett@sfgate.com.

39] Feb 19, 2020

[redacted]

https://www.sfgate.com/news/article/Cupertino-park-closes-child-mountain-lion-injury-15061367.php

News

Parent reportedly punched a mountain lion in the ribs to save injured 6-year-old girl

SF Gate By Amanda Bartlett, *Assistant Local Editor* Updated Feb 19, 2020 7:46 a.m.

[A file photo of a mountain lion. A mountain lion injured a six-year-old girl at Rancho San Antonio Park at Cupertino, leading to its closure Sunday morning. Photo Kevin Zaouali / EyeEm/Getty Images/EyeEm]

A nature preserve in Cupertino closed Sunday morning after a mountain lion injured a 6-year-old girl walking on a hiking trail approximately two miles from the main parking area.

A Midpeninsula Regional Open Space District ranger responded to the incident at Rancho San Antonio Park about 10 a.m., according to a statement from park officials.

Brad Pennington, a Midpen park ranger, told KPIX that the mountain lion "came out of the bushes and reached for the girl," clawing one of her legs before a parent accompanying her intervened by reportedly punching the animal in the ribs to scare it away. Sustaining minor puncture wounds, the girl was treated at the scene and released to parental care.

Calling the incident "very unusual," park officials said California Department of Fish and Wildlife officers are investigating the encounter and "will attempt to locate and positively identify the animal." It's the third time the well-trekked South Bay preserve has closed in the past year due to an apparent surge in typically rare mountain lion sightings.

On X

Midpen Open Space

@MidpenOpenSpace

Recent sightings have confirmed there is a mountain lion family in Rancho San Antonio. Mother lions will be protective of their young. Following recent encounters, we closed several trails according to internal protocols.

Trails closed last August after there were **numerous sightings** of a mother mountain lion with her three cubs. By Labor Day weekend, officials monitoring the area told the Mercury News the lions had "retreated" to less-populated areas of the preserve and deemed it safe to reopen.

But just two months later, Quarry Trail and portions of Stephen E. Abbors and Upper Meadow trails were closed again as a result of more mountain lion activity.

MORE: Mercury in the fog is poisoning Santa Cruz mountain lions, study finds

"Mountain lions in California face many challenges. They need large habitats, and because their native territories in the Santa Cruz Mountains have become hemmed in by roads and development, some mountain lions inhabit areas of open space near the wildland-urban interface," the district said in an alert on its website. "As a top-level predator, mountain lions play an important role in our local ecosystem and projects like the Midpen Highway 17 Wildlife and Trail Crossings are critical to keeping wildlife populations safe and healthy."

Park officials advised the public to "remain vigilant" while outdoors, to hike in groups and to "remain calm, make yourself large and loud and slowly back away" if coming in contact with a mountain lion. Sightings should be reported to park rangers at 650-691-2165.

Rancho San Antonio Park will welcome visitors again once the current investigation has concluded and officials determine it is safe to do so. As of 3 p.m. on Tuesday, the mountain lion had not yet been identified.

Amanda Bartlett **Assistant Local Editor** Amanda Bartlett is an award-winning writer and the assistant local editor for SFGATE covering culture, history, science and breaking news. Prior to joining the newsroom in 2019, she worked for the Roxie Theater, Noise Pop and Frameline Film Festival. Outside of the newsroom, she hosts movie nights with Cinema SF as part of a series called "SFGATE Screens" and has also appeared as a guest on the Midnight Mass and Western Neighborhoods Project podcasts. She lives in Oakland with her fiancé and their rescue rabbit, Alberta Einstein. Send her an email at amanda.bartlett@sfgate.com.

2019

40] April 29, 2019

https://www.sfgate.com/bayarea/article/Santa-Rosa-mountain-lion-sedated-Macys-mall-13804006.php

News | Bay Area & State

Mountain lion discovered near Santa Rosa Macy's store is sedated

SF Gate By **Amy Graff**, *Senior News Editor* Updated 10:19 a.m.



[Photo - California wildlife officers sedated a mountain lion discovered near a Macy's store at a mall in downtown Santa Rosa on April 29, 2019. Photo Santa Rosa Police]

A mountain lion was discovered in a brick planter box near the Macy's store at the Santa Rosa Plaza in downtown Santa Rosa Monday morning.

At 9:44 a.m., Santa Rosa Police announced wildlife officers were sedating the animal.

"Avoid the area of B Street between 4th and 7th Streets," police warned.

By 10 a.m., the procedure was done and police announced it was safe to go downtown.

Battalion Chief Jason Jenkins told the Press Democrat the animal will be relocated.

Amy Graff

Senior News Editor Amy Graff was the senior news editor for SFGATE. She currently works at the New York Times.

41] January 12, 2019

[redacted]

https://www.sfgate.com/bayarea/article/Mountain-lion-reported-in-backyard-near-Pacifica-13529154.php

News | Bay Area & State

Mountain lion reported in backyard near Pacifica park

SF Gate By **John King**, *Urban Design Critic* Updated 1:35 p.m.

A mountain lion sighting was reported Friday evening in Pacifica — not in one of San Mateo County's protected natural spaces, but in a suburban tract above Highway 1.

The report was sent to the city's police department at around 6:30 p.m., according to a statement released by the police Saturday morning. The mountain lion supposedly was seen in the backyard of a home on the 1300 block of Crespi Drive near Oddstat Park. The accuracy of the report — which the police passed along to the state Department of Fish and Wildlife — could not be confirmed.

This wouldn't be the first time that a mountain lion — also known as a cougar and technically a Puma concolor — has explored developed areas of this stretch of San Mateo's rugged coast. In 2016 a large mountain lion was reported on the 700 block of Big Bend Drive, more on the outskirts of town.

In addition to reporting the sighting, the police passed along a few tips about what to do if you do see a mountain lion. Among them: "Never approach a mountain lion. Give them an escape route."

John King Urban Design Critic John King is the Chronicle's former urban design critic. His book "Portal: San Francisco's Ferry Building and the reinvention of American cities," is now available in paperback by W.W. Norton.

42] May 1, 2016

[redacted]

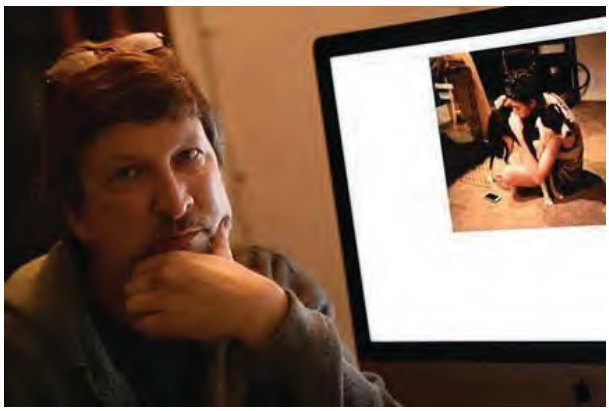
https://www.eastbaytimes.com/2016/05/01/santa-cruz-mountains-residents-watch-cougar-attacks-with-concern/

East By Times Santa Cruz Mountains residents watch cougar attacks with concern

By **Lindzi Wessel**

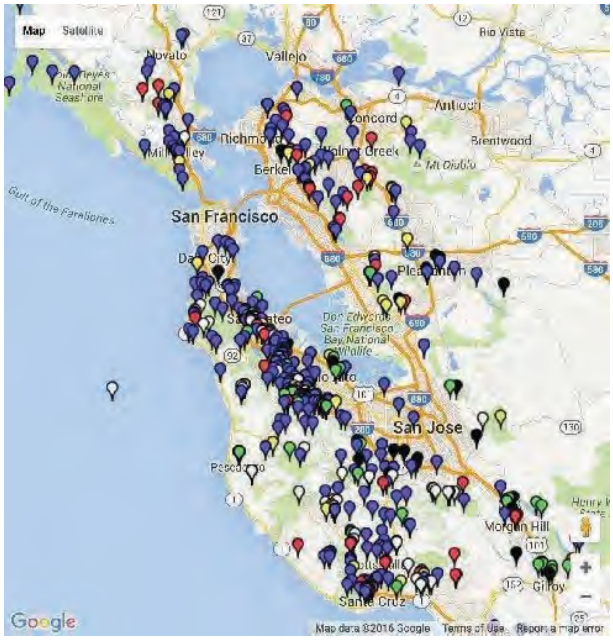
PUBLISHED: May 1, 2016 at 1:20 PM PDT | UPDATED: August 15, 2016 at 9:26 AM PDT

[Photo Slideshow]









1 of 4 *Larry McVoy photographed with an image of his son and dog Holly at his Los Gatos, Calif., home on Friday, April 8, 2016. It is believed that Holly was killed by a puma. There have been several incidents of predation of farm and domestic animals by pumas in the Santa Cruz mountains. (Dan Honda/Bay Area News Group)*

2 of 4 *Ruth McCormick, 82,, recounts the killing of some of her goats at her Los Gatos, Calif., home on Friday, April 1, 2016. It is believed that her goats were killed by a puma. There have been several incidents of predation of farm and domestic animals by pumas in the Santa Cruz mountains. (Dan Honda/Bay Area News Group)*

3 of 4 *Anthea Josling recounts the killing of one of her goats at her Los Gatos, Calif., home on Friday, April 1, 2016. It is believed that her goat was taken by a puma. There have been several incidents of predation of*

4 of 4 *Bay Area Puma Project's puma sighting map*

LOS GATOS — One late afternoon in early December, Ruth McCormick, a hobby farmer who lives in the hills above Los Gatos, rode her tractor down to her pasture and was stunned to find five of her dairy goats slaughtered.

The attack had all the telltale signs of a mountain lion, a predator that McCormick and her neighbors fear is now disturbing their once-bucolic way of life.

Less than two weeks before McCormick's grisly discovery, she had found another four of her goats dead. The blaring speakers she had placed near the pen did nothing to keep the attacker at bay. So as darkness fell, the 82-year-old McCormick worked to board up the barn to keep the remaining goats safe. She now has a huge dog, a Kangal named Hanigan, for protection and treks down to the pasture every evening to lock up her goats.

In the past year and a half, McCormick's neighbors have documented 16 other suspected cougar attacks on goats and alpacas. And as frustrated residents search for answers, their homes in the mountains are beginning to seem a little less like home.

"It's definitely changed how we feel about living here," said Larry McVoy, a neighbor of McCormick who suspects a mountain lion killed his son's border collie, Holly, in February. "We used to be pretty fearless."

Wildlife researchers say new data suggests that as the Bay Area's population grows, habitats for mountain lions are becoming more fragmented, so they can't be as choosy about where they live.

"It's their choice, naturally, to stay in the wild, natural lands where humans are not moving around. However, in the Bay Area it's become more difficult for them to avoid these areas," said Zara McDonald, president of the Felidae Conservation Fund, one of the groups in a research consortium dubbed the Bay Area Puma Project.

McVoy can't be sure Holly was taken by a mountain lion, but he believes no other animals could make off with a 40-pound dog. A line showing where the pet was dragged through the grass and a tuft of dog fur were the only hints to the collie's fate.

Having mountain lions as neighbors has always been a reality for people living in the Santa Cruz Mountains. But experts don't have concrete historical population counts.

The current estimate for the Santa Cruz Mountains ranges from 50 to 100 cats. Numbers for the greater Bay Area simply don't exist.

McCormick and McVoy find themselves at a loss when it comes to answering some basic questions: Are their problems being caused by one troublesome cat? A few? Or is something causing mountain lions to become bolder?

Researchers say they can't say for sure whether puma attacks are increasing. But they do know that cougar populations throughout the state have increased since 1963, when California stopped paying bounties for killing the cats. And their numbers grew even more after 1990, when California voters passed a ballot measure banning hunting them for sport.

Still, residents can apply for depredation permits from the state Department of Fish and Wildlife to hunt and kill cats that make meals out of their pets and livestock. In 2015, 107 mountain lions were killed with such permits.

Environmentalists, worried that suppressing mountain lion populations can destabilize ecosystems, also want to help keep lions away from forbidden snacks.

"Two cats we collared in Los Gatos were not alive six months later due to the fact that they took a goat or sheep," McDonald said.

Researchers with the Santa Cruz Puma Project, a partnership between UC Santa Cruz and the Department of Fish and Wildlife, have fitted more than 50 mountain lions in the Santa Cruz Mountains with tracking collars — and published tracking data to the project's website: **santacruzpumas.org**.

Other pumas remain untracked, largely because collaring them is quite a feat. To place a collar, researchers must stalk pumas through the woods, using dogs to scare them into trees. If the cats don't climb so high that a fall would be dangerous, the researchers dart them with tranquilizers, fit the collars and then wait with the cats until they recover.

The endeavor, which sometimes keeps researchers out overnight, has to be repeated every two years when a cat's transmitter runs out of juice. Only a few Bay Area cats outside the Santa Cruz Mountains wear collars, but plans are underway to increase those numbers in the North Bay and East Bay over the next few years.

While lion forays into highly urban areas remain rare, one was spotted roaming the streets of San Francisco in the summer of 2015. Five years earlier, police shot a lion after chasing it through Berkeley streets.

As more mountain lions venture onto Bay Area land dotted with homes, it "kind of puts the onus on humans to say, 'OK, well I'm going to predator-proof my property so I don't tempt the lions,'" McDonald said.

The most effective safeguard is putting livestock and pets in fully enclosed, covered structures at night, she said. Livestock-guarding dogs can also help. These techniques, McDonald said, will protect livestock not just from mountain lions — which can scale most fences — but also from coyotes and bobcats that live in the region.

And these kinds of fixes will last, said Veronica Yovovich, a graduate student in environmental studies at UC Santa Cruz who works on the puma project.

Counterintuitively, she said, killing one lion can make the problem worse. It can create a void that younger lions will fight to fill, temporarily increasing the number of lions in the area.

"What you really want to do is figure out a long-term solution," she said.

But Yovovich acknowledges there are no guarantees — something that another Santa Cruz Mountains resident, Anthea Josling, can attest to.

Locking her goats up at night didn't stop a mountain lion — which her son-in-law spotted — from killing her Nigerian Dwarf goat in broad daylight on Christmas Day last year.

And for McVoy, he's particularly worried because cougars don't typically attack dogs. So he wonders what else the lion that killed Holly would go after.

"I think people in this area are in a state of denial," he said. "I don't want the mountain lion killed, but I don't want my kids killed either."

Attacks on humans are extremely rare: There have been 14 documented cougar attacks in California, resulting in three deaths, in the past three decades.

"Your risk is way higher just driving on Highway 17," Yovovich said.

But wildlife experts were reminded of the dangers when a cat in Cupertino in September 2014 dragged a 6-year-old boy into the bushes, releasing him only when chased down by two men hiking with the boy.

"When things do go wrong," Yovovich said, "they can go very wrong."

Contact Lindzi Wessel at 408-920-5012. Follow her at Twitter.com/LindziWessel.

ATTACHMENT B

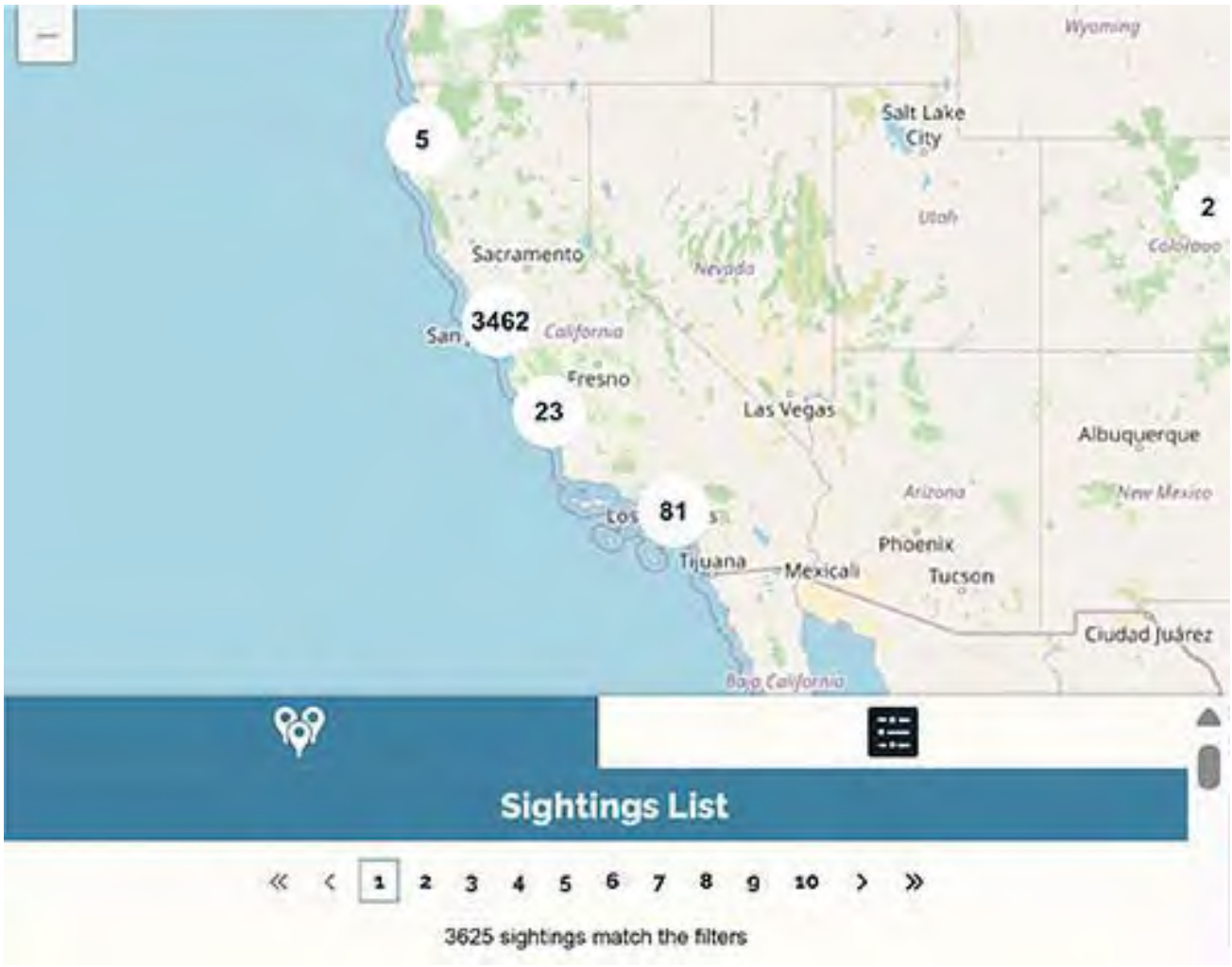
Mountain Lion Sighting Maps

1] Schuamcher California Mountain Lion Sightings Map | 1/14/2026

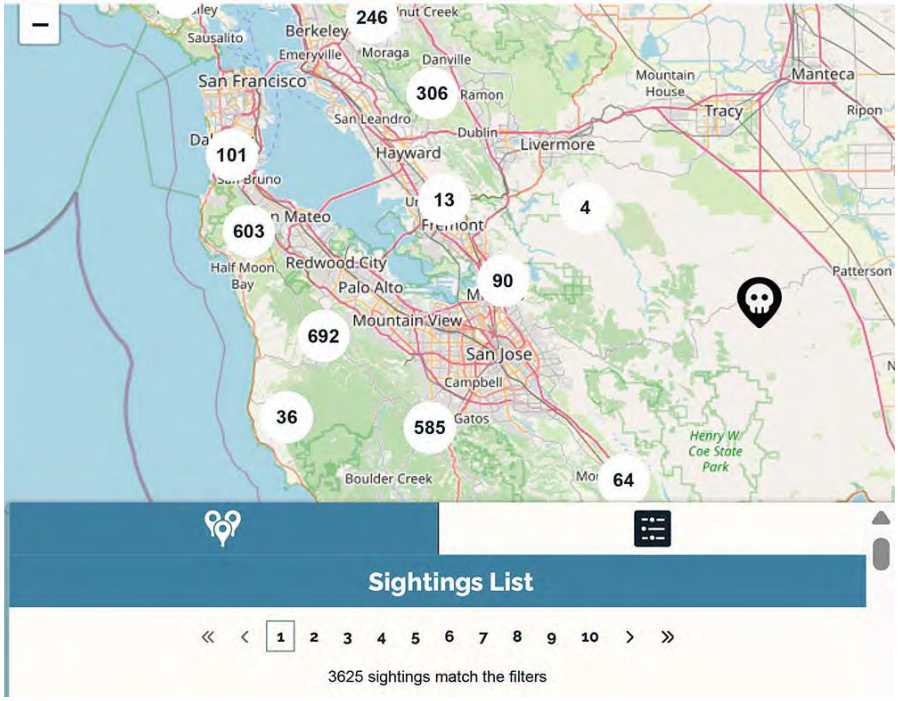


2] Bay Area Puma Project | Puma & Bobcat Sightings Maps

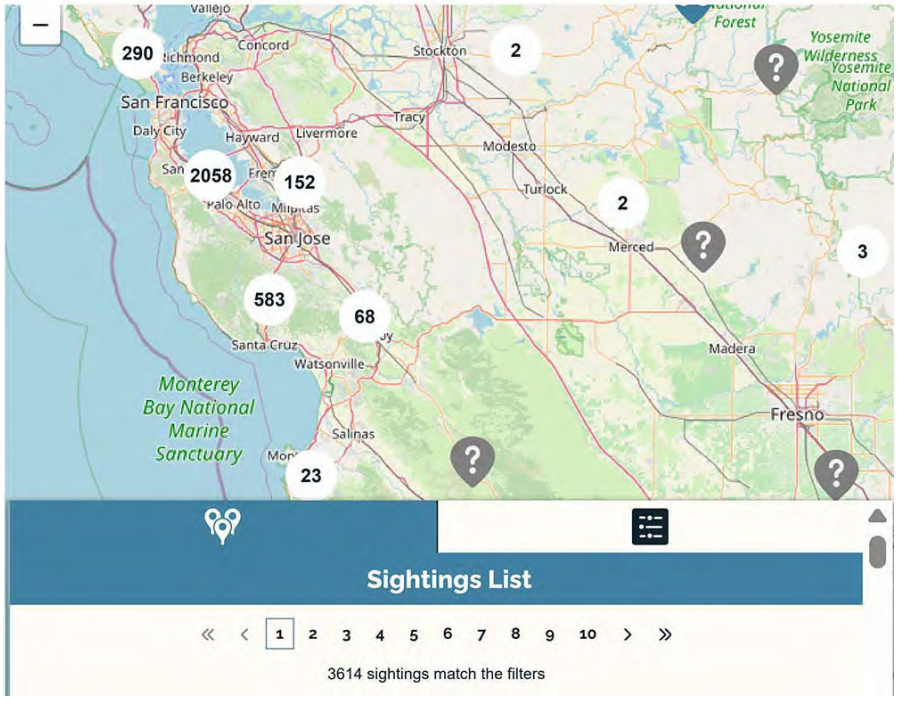
https://bapp.org/meet-puma/sightings



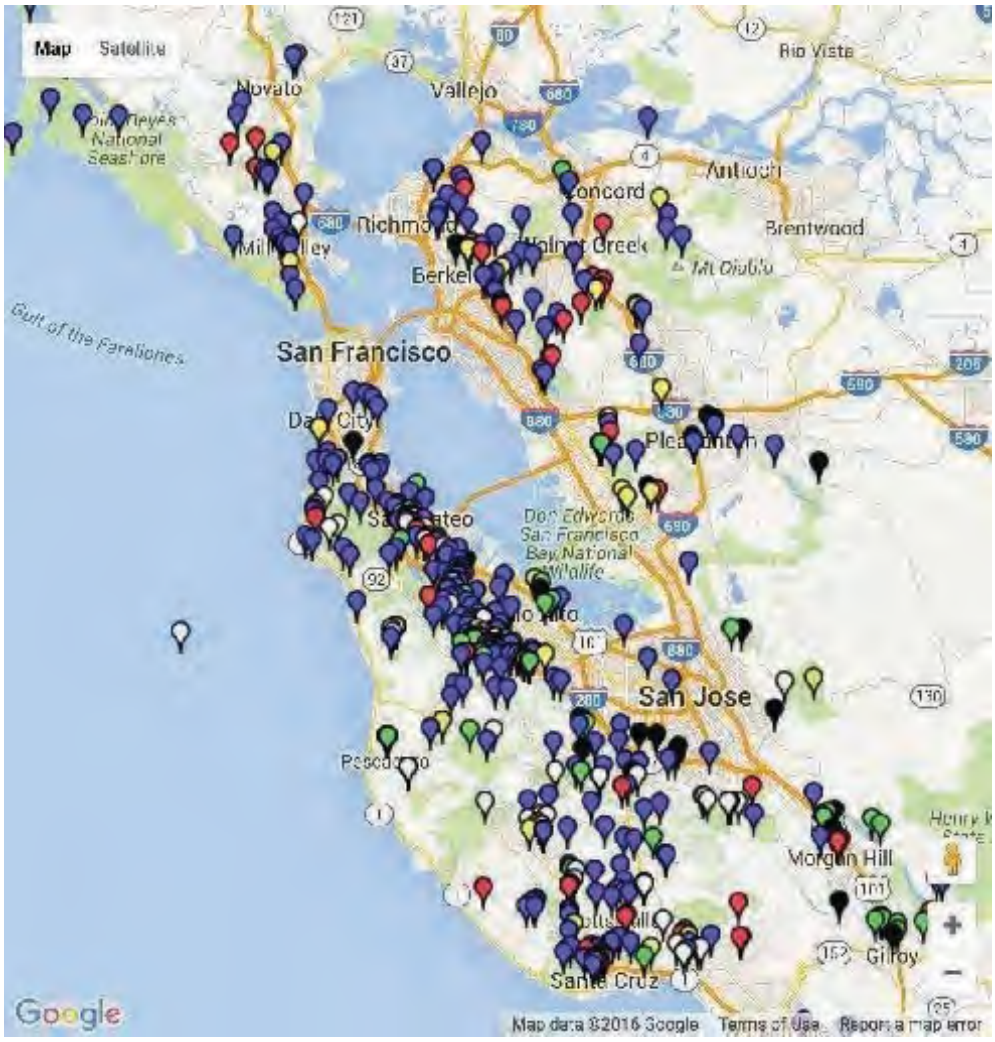
January 9, 2026 | Bay Area Puma Project Sightings



January 9, 2026 | Bay Area Puma Project Sightings



December 28, 2025 | Bay Area Puma Project Sightings



May 1, 2016 | Bay Area Puma Project's puma sighting map

▶ ATTACHMENT C

California Department of Fish and Wildlife Petition Maps

1] California Department of Fish and Wildlife Petitioned ESU Map

Status Review of the petitioned Southern California/Central Coast ESU of Mountain Lion in California
California Department of Fish and Wildlife



Figure 20. Public and tribal lands within the petitioned Southern California/Central Coast mountain lion ESU.

59

2] California Department of Fish and Wildlife Petitioned DPS Map

DPS in blue inside ESU in black

Status Review of the petitioned Southern California/Central Coast ESU of Mountain Lion in California
California Department of Fish and Wildlife

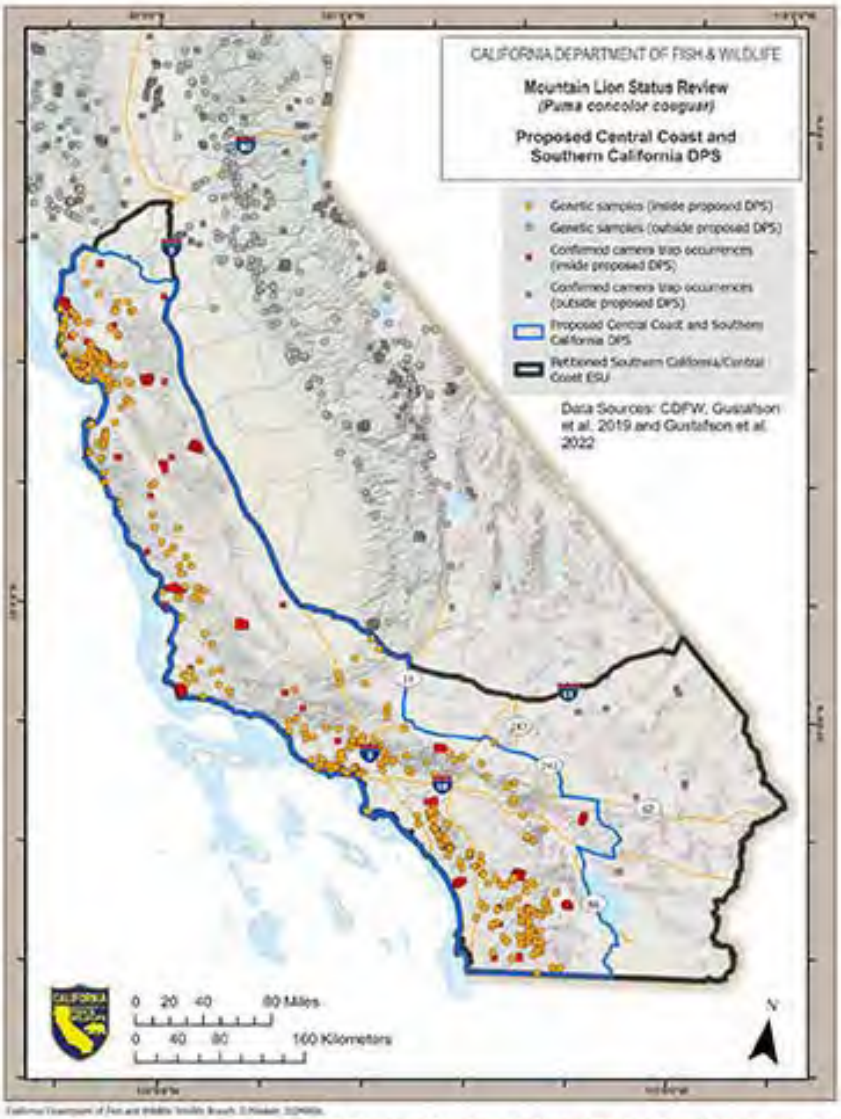


Figure 22. Proposed boundary of Central Coast and Southern California Distinct Population Segment.

75

▶ ATTACHMENT D

Mountain Lion Camera Captures

Mountain Lion Captures near Lobitos Grazing Ranch

Time relationships of photos related to kills noted

1] 9/3/2021 – 22:20

2] 1/20/2022 – 1:45

3] 8/26/2022 – 12:39 am Calf Kill | VF Lobitos

4] 9/9/2022 – 12:39 am

5] 9/13/2022 – 3:05 am

6] 12/10/2022- 5:37 am

7] 9/18/23 – 5:49 am Calf Kill | VF Lobitos

8] 2/21/24 – 8:57 pm – Goats Kill | Bob Marsh

9] 2/25/2024 – 11:22 pm – Goats Kill | Bob Marsh + Calf Kill | VF Lobitos

10] 7/1/2024 – 4:43 –Mini Donkeys Kill | Bellonie + Calf Kill | VF Lobitos

11] 12/10/2024- 5:46 – Cow Kill | VF Lobitos

12] 2/26/2025 – 7:39 pm

13] 2/27/2025 7:38 pm – Calf Kill | Bob Marsh

14] 4/7/2025 – 11:04 pm

15] 9/7/2025 – 11:14 pm


48F 09C 2021/09/03 22:20:15


41F 05C 2022/01/20 01:45:43


55 °F
08:52:07
2022/08/26


M 8 °C / 46 °F
09/09/2022 12:39:30 AM
SULY


M 8 °C / 46 °F
09/09/2022 12:39:30 AM
SULY


M 9 °C / 48 °F
12/10/2022 05:37:40 AM
SULY


50 °F
05:49:00AM
2023/09/18


M 8 °C / 46 °F
02/21/2024 08:57:07 PM
SULY


M 11 °C / 51 °F 02/25/2024 11:22:35 PM SULY


53 °F 04:43:55 2024/07/01


M 9 °C / 48 °F 12/10/2024 05:46:55 AM SULY


M 11 °C / 51 °F 02/26/2025 07:39:27 PM SULY


M 12 °C / 53 °F 02/27/2025 07:38:01 PM SULY


M 10 °C / 50 °F 04/07/2025 11:04:13 PM SULY


M 10 °C / 50 °F 04/07/2025 11:14:40 PM SULY

▶ ATTACHMENT E

Mountain Lion Predations

VINCE FONTANA CHRONOLOGY | PREDATIONS 2020 - 2025

PREDATIONS

Vince Fontana Losses Predations by Mountain Lions.

Lobitos Grazing Ranch [Unit] is Mid Peninsula Open Space District property.

Not one Predation has been identified as a mountain lion kill.

1] October 24, 2020 | Lobitos Grazing Ranch – Depredation Permit – may be reported as ML calf

2] August 24, 2022 | Lobitos Grazing Ranch

3] January 2023 | Lobitos Grazing Ranch

4] August 20, 2023 | Lobitos Grazing Ranch

5] October 29, 2023 | Lobitos Grazing Ranch

6] November 6, 2023 | Lobitos Grazing Ranch

7] March 14, 2024 | Lobitos Grazing Ranch

8] May 24, 2024 | Lobitos Grazing Ranch

9] August 2024 | Lobitos Grazing Ranch

10] September 24, 2024 | Lobitos Grazing Ranch

11] December 13, 2024 | Lobitos Grazing Ranch

12] June 30, 2025 | Lobitos Grazing Ranch

13] July 29, 2025 | Lobitos Grazing Ranch

14] August 24, 2025 | Lobitos Grazing Ranch

15] November 22, 2025 | Private Lease | San Gregorio





Predation November 22, 2025 | Stocker Calf | Vince Fontana Private Lease



Predation August 25, 2025 | Vince Fontana Lobitos Grazing Ranch | Midpen Property



Predation July 29, 2025 | Vince Fontana Lobitos Grazing Ranch | Midpen Property





Predation June 30, 2025 | Vince Fontana Lobitos Grazing Ranch | Midpen Property



September 24, 2024 | Vince Fontana Lobitos Grazing Ranch | Midpen Property



Predation September 2024 | Red Cow | Vince Fontana Lobitos Grazing Ranch | Midpen Property



Predation May 24, 2024 | Calf | Vince Fontana Lobitos Grazing Ranch | Midpen Property



Predation March 14, 2024 | Calf | Vince Fontana Lobitos Grazing Ranch | Midpen Property





Predation November 6, 2023 | Calf | Vince Fontana Lobitos Grazing Ranch | Midpen Property





Predation October 29,2023 | Calf | Vince Fontana Lobitos Grazing Ranch | Midpen Property



Predation August 20, 2023 | Calf | Vince Fontana Lobitos Grazing Ranch | Midpen Property



Predation August 24, 2022 | Calf | Vince Fontana Lobitos Grazing Ranch | Midpen Property



Predation October 24, 2020 | Calf | Vince Fontana Lobitos Grazing Ranch | Midpen Property

January 14, 2026

RE: PETER MARCHI RESPONSE TO: CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE PETITION OF THE MOUNTAIN LION IN CALIFORNA AS EVOLUTIONARILY SIGNIFICANT UNIT [ESU], OR DISTINCT POPULATION SEGMENT [DPS]

California Fish and Game Commission:

I Peter Marchi, 3rd generation Coastside farmer in San Mateo County, am strongly opposed to the mountain lion listed as Evolutionarily Significant Unit (ESU), or Distinct Population Segment (DPS). The mountain lion is already overpopulated, they are wreaking havoc on ranches and killing livestock, the rural population now runs in fear on their own property, and coastside residents are intimidated by mountain lion sightings and actions. The mountain lion has multiplied so greatly and gotten out of control, that the whole community has been affected.

I am 66 years old, the whole time I grew up, I never saw a mountain lion. Now people see them a lot, daytime and nighttime. The mountain lion is too close to schools, like La Honda Elementary School, which my wife attended. My wife and I, both attended Pescadero High School, where in 2022, a mountain lion cub was found hiding. Now there are sightings everywhere, I never dreamed that anything like this could happen here on the coast. Due to the mountain lion population's huge growth, people are being held hostage on their own property by a carnivore.

The mountain lion is not threatened or endangered. I am strongly against putting the mountain lion on the ESU or DPS List.

Sincerely,

Peter Marchi

Peter Marchi

Harold V. Feeney Jr

San Gregorio, CA 94074
Los Altos Hills, CA 94024
hal@feeney.us.com

January 28, 2026

California Fish and Game Commission
P.O. Box 944209
Sacramento, CA 94244-2090

RE: California Fish and Game Commission Petition of the MOUNTAIN LION in California as an Evolutionary Significant Unit [ESU] or Distinct Population Segment [DPS]

Dear Members of the Fish and Game Commission:

Based on information available and also personal experience, the mountain lion is neither threatened nor endangered. I am against putting the mountain lion on the ESU or DPS lists.

My wife and I have owned ranch property in San Gregorio for over 30 years. During that time, we have not personally seen mountain lions, but we know that they are there. We have witnessed deer carcass remnants every year— we have also witnessed shrinkage of the deer herds and have collected many deer parts. The accompanying photo shows one of the deer kills that we were able to capture. Neighboring ranchers have lost cattle to mountain lion predators.

In addition, newspaper accounts have become more numbeous during the same 30-year period. Incidents include a young person being injured by a lion while walking in Rancho San Antonio County Park, a mountain lion in a parking garage near downtown Mountain View, and this week, a young mountain lion was captured within the city limits of San Francisco. The news reports indicated that the mountain lion was tagged and had been captured several times. One of those capture points was in Rancho San Antonio, the same area where the child was injured.

I am very familiar with Rancho San Antonio preserve because my home in Los Altos Hills is less than 0.5 miles away from the preserve. Many of our neighbors have video cameras or video door bells—there have been many reports of mountain sightings through our Neighborhood Watch Program, sometimes as often as monthly. References to the incidents are attached.

It should be evident that there is not enough habitat for the mountain lions to safely roam. The young San Francisco mountain lion travelled over 50 miles. There are too many mountain lions for such a small urban area. The animals must be managed, not protected. My wife and I are afraid to venture outside after dark even though we have a fully fenced yard. Do not take an action that endangers people.

Sincerely,

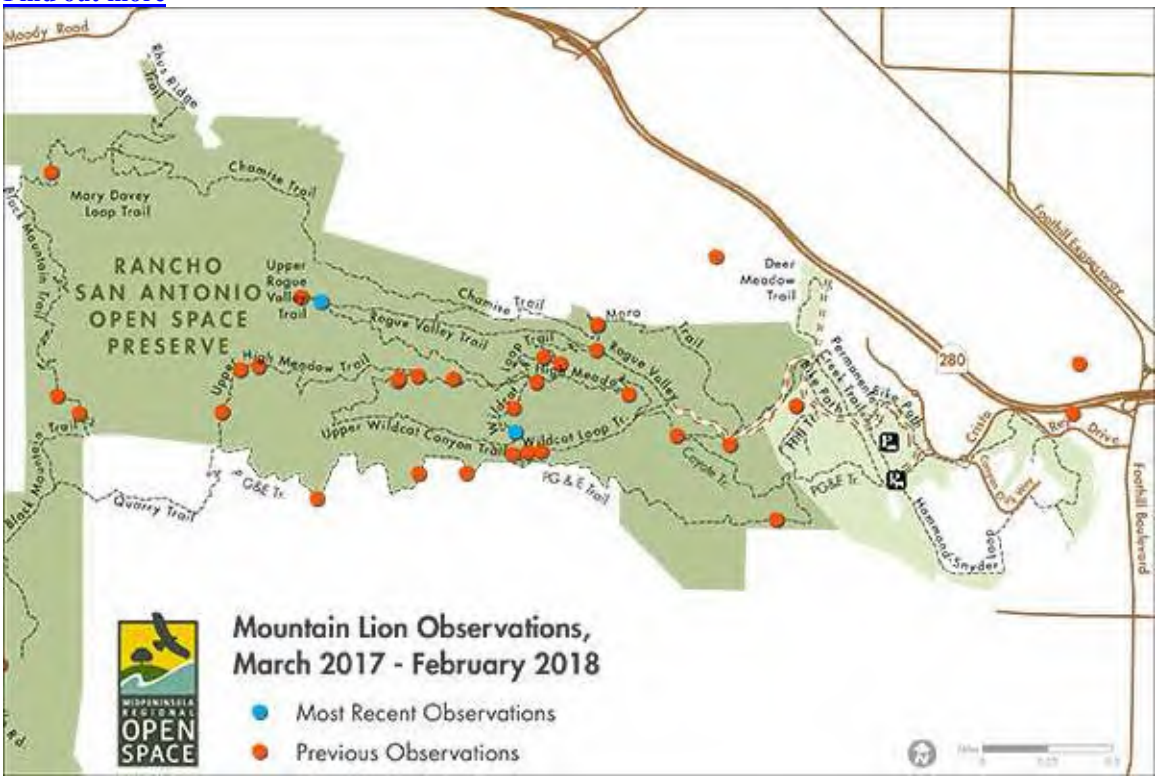
Harold V. Feeney Jr


Stealth Cam 02-07-2008 18:14:35

Mountain Lion Activity

https://www.openspace.org/newsletter/mountain-lion-activity

Midpen Biologists believe that one or more mountain lions may live within and around Rancho San Antonio Open Space Preserve. While these lions are usually most active between dusk and dawn, sightings at Rancho San Antonio have been reported year round at all hours of the day. Please visit the Mountain Lion page on our web site to learn more about Mountain Lions, what to do if you see one, and how to stay safe while out on the trails.
Find out more



Mountain Lion Activity at Rancho San Antonio

https://www.openspace.org/where-to-go/nature/mountain-lions

Mountain lions have been observed in Rancho San Antonio Open Space Preserve. Though seldom seen, they also roam most Midpen preserves.

Image



Mountain Lion Attack Prompts Closure at Rancho San Antonio Preserve

By **Marianne Favro** • Published February 17, 2020 • Updated on February 18, 2020 at 4:50 am

https://www.nbcbayarea.com/news/local/south-bay/mountain-lion-attack-prompts-closure-at-rancho-san-antonio-preserve/2235791/

Thousands of people hoping to hike at Rancho San Antonio during the President's Day holiday were turned away Monday after a mountain lion attacked a 6-year-old girl over the weekend. Marianne Favro reports.

Thousands of people hoping to hike at Rancho San Antonio in Cupertino during the President's Day holiday were turned away Monday after a mountain lion attacked a 6-year-old girl over the weekend.

The mountain lion pounced on the little girl, injuring her calf. Fortunately she is going to be OK. The attack happened Sunday morning about a mile from the entrance.

Rangers suspect a mountain lion caught on camera by trail surveillance just before 5 a.m. Monday is the same one that pounced on the girl.

"The mountain lion came out of bushes and grabbed her calf," California Dept. of Fish and Wildlife Capt. Todd Tognazzini said.

The girl was walking a trail with six adults and three other kids. Fortunately, a family friend acted quickly, punching the mountain lion in the ribs until it ran off.

Rangers treated the girl at the preserve and said her family drover her to a nearby hospital, where she received tetanus and rabies shots as a precaution. She did not need stitches.

On Monday, Rancho San Antonio remain closed while wardens using specially trained dogs used by the Puma Project to search for the mountain lion.

Sunday's incident is the first mountain lion attack on a person ever reported at the preserve.

"If you see a mountain lion, make yourself big. Make a lot of noise, back away slowly, don't turn and run, fight back if attacked," said Brad Pennington, a ranger with the Mid-Peninsula Regional Open Space District.

If wardens find a mountain lion, they plan to shoot it with a tranquilizer gun and confirm if it's the one that attacked the girl by matching DNA from the big cat with DNA from the victim's clothing.

Officials said if the DNA is a match, Dept. of Fish and Wildlife will likely euthanize the mountain lion as they have done in the past.

Ranch San Antonio will be closed again Tuesday if wardens are unable to find the mountain lion.

Back in August, Rancho San Antonio was was closed for a short time because some mountain lions were exhibiting unusual behavior.

The California Department of Fish and Wildlife has only confirmed 17 mountain lion attacks on humans in the last 100 years.

Mountain lion spotted in San Francisco's Pacific Heights neighborhood captured by animal control

By Jose Fabian, Tim Fang

Updated on: January 27, 2026 / 9:33 PM PST / CBS San Francisco
https://www.cbsnews.com/sanfrancisco/news/mountain-lion-spotted-near-lafayette-park-in-san-francisco/?intcid=CNM-00-10abd1h

A mountain lion recently spotted in San Francisco's Pacific Heights has been captured Tuesday, after it was seen around the neighborhood and at a nearby park.

Officials with the city's Animal Care and Control found the animal near California and Octavia streets Tuesday morning. The animal was contained and the agency was working with the San Francisco Zoo on next steps.

"I'm glad they're they know where it is. I mean, mostly for ourselves, but also for the animal," Abram Cortez, a neighborhood resident, told CBS News Bay Area.

Around 11 a.m., crews were on scene as they were attempting to capture the mountain lion.

The Santa Cruz Puma Project was also called to help. It was founded in 2008 in partnership with UC Santa Cruz to research how mountain lions and their habitats are impacted by people and housing construction.

One of the biologists who responded was Richie King, who had interacted with this lion before.

"On the way out, someone texted me and said, 'Oh, he's got an ear tag on.' And I was like, 'Is it orange? And is it in his left ear?' And they were like, 'Yep.' And I was like, it's that same guy," King told CBS News Bay Area.

King was part of the team that originally tagged this mountain lion when he was 5 weeks old in the Rancho San Antonio area. Last September, the same mountain lion was spotted in a backyard in Saratoga.


Animal control officers and San Francisco police as they were attempting to capture a mountain lion found in the Pacific Heights neighborhood of San Francisco, Jan. 27. 2026.CBS

He was tranquilized then and relocated to the area around the Lexington Reservoir. Then, within the last few months, King said he must have made his way north to get into the city.

"I don't think he's seeking out these areas. For the most part, he's being pushed around by other males who have these home ranges that aren't letting him go in there. Really, he doesn't have much of a choice about where he's going and he just happens to end up in these bad situations," King said.

King said the lion is in good health and looks like he's been eating well.

Shortly after noon, the captured mountain lion, which was in an enclosure, had been loaded onto a pickup. They did put a GPS tracking collar on him this time, and he will be released back out into the wild in an open space far away from people.

Animal Care and Control San Francisco had warned residents on Monday about the mountain lion, which was spotted near Lafayette Park Sunday night.

"It's likely that the mountain lion got lost while dispersing, is confused, and will soon find its way south and out of San Francisco," Animal Care and Control said at the time.

Madrey Hilton told CBS News Bay Area in an interview Monday that she saw the mountain lion between Sacramento and Gough streets as she was driving to work and recorded the encounter.



A mountain lion was seen in San Francisco on Sunday, Jan. 25, 2026.Madrey Hilton

"It was super big too, so I knew it wasn't like just a stray cat or anything, and it kind of walked up the road, like towards like where my car is," Hilton said. "And so immediately I got out my phone to record because I wanted to send a video to my friends."

When encountering a mountain lion, residents are advised not to go near the mountain lion, and if they see it, slowly back away — Do not run. And people with children should pick them up and keep their pets on leashes.

If a mountain lion approaches, people should make themselves "big" by waving their arms, yelling and throwing something, and again, do not run.

Katie Nielsen contributed to this report.

Mountain View Police Capture, Tranquilize Mountain Lion

By Terry McSweeney, Bob Redell and Lisa Fernandez • Published May 6, 2014 • Updated on May 7, 2014 at 5:27 pm https://www.nbcbayarea.com/news/local/report-of-mountain-lion-sighting-in-mountain-view/2074429/

After a nearly five-hour standoff with a mountain lion in Mountain View on Tuesday night, wardens ended up trapping and tranquilizing the big cat inside the parking garage of a typically quiet Silicon Valley apartment complex.

After all the commotion, the 2-year-old male was set free on the Peninsula just before midnight, Fish and Game Lt. Andrew Hughan said.

The drama began after residents, including some children, reported seeing a mountain lion wearing a radio-type collar around its neck in the community about 6 p.m., according to Mountain View police Sgt. Saul Jaeger.

"I was skating and then I just saw the mountain lion in a garage," said Victor Lopes, a young boy. "Me and my friends started running."

People took photos and showed them to police, who realized this was the real thing.

Then, for hours, police, wardens and residents surrounded the garage of a building in the 2000 block of California Street. The scene was tense, like a "standoff," said Mountain View Police Capt. Chris Hsiung, referring to the cat cowering underneath a car in the apartment garage as everyone looked on.

- **PHOTOS: Mountain Lion Captured in Mountain View**

Fish and Game wardens, along with police from Palo Alto, Sunnyvale and Los Altos, raced to help. All held weapons poised, ready to pull the trigger if the cat decided to attack, which it didn't.

Mountain View police asked residents to stay at home, and took to social media, creating the hashtag #MVPuma, to keep residents a blow-by-blow of what was going on.

Just about 11 p.m., Hughan said wardens tranquilized the mountain lion. Within an hour, the cat was set free somewhere in San Mateo County.

It turns out, the cat, which broke away from its mother, was being formally studied as "mountain lion 46M" and tracked by the Santa Cruz Puma Project, a study group at UC Santa Cruz and the California Dept. of Fish and Game.

Many were thankful the capture and release ended so peacefully.

"Thank you, thank you, thank you for not hurting him!" Laurel Jack wrote on Facebook. "It's not the animals fault we have invaded their territories."

NBC Bay Area's Shelby Hansen and Kristofer Noceda contributed to this report.

(1/3) MOUNTAIN LION UPDATE: Animal Control is on-scene. We are working on getting in touch with Fish & Game. Animal Control is on-scene. — Mountain View Police (@MountainViewPD) May 7, 2014

(2/3)Thx to one of our followers, we reached out to Santa Cruz Pumas to determine if they might know of mountain lion who looks to be tagged — Mountain View Police (@MountainViewPD) May 7, 2014

(3/3)Please shelter in place until we give you the all-clear. Call 911 if you see the mountain lion. Thank you! #MVpuma — Mountain View Police (@MountainViewPD) May 7, 2014

#MVpuma: Officers on-scene remaining calm to ensure mountain lion also remains calm. Please help us out! pic.twitter.com/H00HiT8YCx — Mountain View Police (@MountainViewPD) May 7, 2014

#MVpuma safe! pic.twitter.com/vtHSGVhKC9 — Mountain View Police (@MountainViewPD) May 7, 2014

Electronically Submitted
fgc@fgc.ca.gov

January 26, 2026

California Fish and Game Commission
P.O. Box 944209
Sacramento, CA 94244

Re: Final Consideration of Petition to List the Southern California / Central Coast Mountain Lion Distinct Population Segment Under the California Endangered Species Act

Dear Commissioners:

California Farm Bureau Federation ("Farm Bureau") appreciates the opportunity to comment on the Commission's final consideration of whether to list the proposed Southern California / Central Coast mountain lion Distinct Population Segment ("DPS") under the California Endangered Species Act ("CESA").

California Farm Bureau is California's largest farm organization, comprised of 54 county Farm Bureaus currently representing approximately 28,000 agricultural, associate, and collegiate members in 57 counties. Farm Bureau strives to protect and improve the ability of farmers, ranchers, and foresters engaged in production agriculture to provide a reliable, safe, and affordable supply of food and fiber through responsible stewardship of our natural resources.

Farm Bureau members live and work in the areas most directly affected by mountain lion presence, depredation incidents, and the increasing human–lion interactions documented in recent years. Based on the Department's Status Review, public-safety data, and the lived experience of agricultural producers, Farm Bureau, and the undersigned County Farm Bureaus, opposes the proposed listing. In the alternative, if the Commission chooses to proceed, any listing must be strictly limited to the originally petitioned geographic area.

The Population Estimate in the Status Review Is Too Uncertain to Support a Threatened Listing

The Department's population estimate is not sufficiently reliable to justify a threatened listing under CESA. The Status Review estimates there are approximately 4,172 mountain lions statewide, but the Department also acknowledges that the true number could be as low as 3,645 or as high as 4,750. (Status Review, Exec. Summary, p. viii.) This swing of more than 1,000 mountain lions shows how uncertain the estimate really is. The same level of uncertainty appears within the petitioned region, where the Department estimates 1,449 individuals but concedes that the true number could fall anywhere between 1,272 and 1,638. (*Id.*)

The Status Review confirms that these estimates rely on a relatively new scat-based spatial capture–recapture ("SCR") model (Status Review, pp. 22–24, 25-27), which is sensitive to uneven sampling effort, detection probability, and terrain. The Review specifically cautions against interpreting these model outputs as evidence of population decline. (Status Review, p. 39.) Earlier statewide estimates, including those from 1989, fall within or above the Department's current numbers (Status Review, pp. 22–24), undermining any suggestion that the DPS is trending toward endangerment.

The Commission Must Not Expand the Listing Area Beyond the Petitioned Boundary

CESA is a petition-driven statute, and the Commission's authority is limited to evaluating the geographic area defined in the petition itself. To the extent the Department's Status Review removes certain areas such as the southeastern desert regions and intensively farmed Central Valley lands those removals are appropriate and consistent with the Review's findings on habitat suitability and genetic data. (Status Review, pp. 84–85.)

However, the Department also proposes expanded boundaries that extend beyond the petitioned ESU. The Review admits the proposed DPS boundary is "modified from the ESU boundary proposed in the petition" (Status Review, p. 73) and merely "largely coincides" with the petitioned area. (Status Review, Exec. Summary, p. ix) These descriptions mask material expansions into regions never identified in the petition or evaluated during the candidacy period.

The Department's alternative boundary route following Highway 14, Highway 138, Highway 18, Highway 62, Joshua Tree National Park, I-10, and Highway 86 pulls in new communities and agricultural landscapes without statutory notice or procedural safeguards. (Status Review, pp. 84–85.) These expansions violate CESA's requirement that the Commission evaluate the petitioned action, not create a new listing proposal at the eleventh hour.

Moreover, the Status Review concedes that several newly included regions lack adequate genetic sampling and that lion population membership "cannot be determined" based on the available data. (Status Review, p. 102.) Expanding a DPS of this magnitude based on unverified assumptions is scientifically and procedurally inappropriate.

For these reasons, while Farm Bureau does not oppose the removal of areas lacking habitat or biological support, the Commission must ensure that no new areas are added and that any listing is confined strictly to the originally petitioned geography.

Prey Declines, Not Extinction Risk, Are Driving Dangerous Increases in Human–Lion Conflict

The Status Review confirms that deer make up roughly 70 percent of a mountain lion's diet within the DPS. (Status Review, p. 7.) At the same time, multiple deer populations in Southern California and the Central Coast have undergone documented declines due to drought, wildfire, and habitat fragmentation. (Status Review, pp. 44, 47–50.) As lions lose access to their primary

food source, they increasingly turn to livestock, pets, and even people. These conflicts arise not because the mountain lion is nearing extinction, but because prey shortages are pushing lions into human-inhabited areas. Without stabilizing prey populations, conflict pressure will continue to rise regardless of listing status.

In August 2025, a Central Coast farm lost 15 alpacas in a single night when multiple mountain lions breached the property and killed the animals. (SF Gate, *15 alpacas dead, 3 cougars on the loose: NorCal ranch under siege*, August 22, 2025.) The scale of the attack demonstrates both the growing boldness of lions searching for food and the inability of traditional deterrents to prevent mass depredation events when natural prey is depleted.

In another incident, an 11-year-old girl was attacked in her own yard in Malibu after a lion approached the child in the backyard. (ABC7 News, *Mountain lion attacks 11-year-old girl in backyard of Malibu home*, August 11, 2025.) This is precisely the type of preventable encounter that becomes more likely when hungry lions shift into residential areas.

Similarly, in March 2024, a California hiker was killed by a mountain lion in El Dorado County while walking with his family. (NBC News, *Mountain lion that killed man and injured his brother is euthanized in California*, March 23, 2024.) This tragic fatality is a stark reminder that mountain lion conflicts pose genuine risks to human life especially in regions where prey shortages push lions into closer proximity with people.

Beyond these severe incidents, numerous documented encounters have involved lions entering neighborhoods, approaching schools, stalking pets, and roaming near barns, equestrian facilities, and rural homes. These conflicts arise because the State has failed to manage prey populations, forcing lions to seek food wherever they can find it.

These cases illustrate a clear and troubling pattern: prey scarcity is driving dangerous lion behavior, increasing the likelihood of attacks on livestock, pets, and people. A CESA listing will not improve this situation. Instead, it will restrict the very tools that landowners and public-safety officials rely upon to protect the public during high-risk encounters. Until the State meaningfully addresses declining deer herds, habitat fragmentation, and the resulting ecological imbalance, listing the mountain lion will worsen, not alleviate, these threats to both rural communities and the lions themselves.

The Five-Year Delay in Completing the Status Review Undermines Any Assertion of Immediate Threat

The petition to list this DPS was submitted in 2019 and accepted for candidacy in April 2020. The Department did not complete its Status Review until December 2025, after a five-year delay. (Status Review, Petition History, pp. 1–3.) During that entire period, the species remained in candidate status, and no emergency regulations, emergency closures, or interim conservation measures were undertaken by the Department.

If the mountain lion DPS were truly at risk of imminent extinction, the Department would not wait five years without acting. The Legislature designed CESA as a protective, rapid-response

framework for species at genuine risk. A delay of this length is inconsistent with any claim that conditions are deteriorating rapidly or that the DPS faces an urgent threat requiring immediate listing.

Moreover, the record shows no significant new information or new decline during the five-year period that would justify a sudden shift from prolonged inaction to urgent listing. The Department's own Status Review acknowledges that the new population estimates "should not be interpreted to mean the population has declined since 1989." (Status Review, p. viii.) Habitat conditions, prey availability, and connectivity concerns cited in the petition have existed for decades and were not triggered or materially worsened during the time the Department took to complete its analysis.

The unexplained delay also creates practical and procedural concerns. Communities, landowners, and counties within the petitioned geography have been required to operate for half a decade under the uncertainty of candidate status. The Department's decision to wait until 2025 to finalize its review despite no statutory requirement to do so suggests a lack of immediacy inconsistent with the heightened protections sought at this stage.

A CESA Listing Will Increase Depredation Conflicts and Create Public-Safety Risks

Depredation and human–lion conflicts are already a leading source of mountain lion mortality and a major concern for rural communities. The Status Review notes that human–wildlife conflict has "profound impacts on the conservation and management of the species" (Status Review, p. 32) and documents 3,637 reported mountain lion incidents between 2010 and 2020. (*Id*. at p. 33.) These include depredations, public-safety concerns, nuisance interactions, and repeated sightings near homes, barns, and schools.

Depredation reports have trended upward for nearly 50 years (Status Review, p. 33) with sheep and goats accounting for 59.4 percent of confirmed depredations, large livestock for 13.1 percent, and pets for 10.4 percent. (*Id*.) These data demonstrate that agricultural operations and the rural families who live on them bear the brunt of conflict pressure.

Meanwhile, the State has significantly narrowed available response tools. In 2020, CDFW expanded its non-lethal-first policy to the entire state, restricting lethal authority even in repeated predation scenarios. (*Id*.) Additionally, depredation permits are limited to one mountain lion per incident regardless of how many lions participate in attacks. (*Id*.)

The Status Review itself recognizes that it is "unlikely that the number of conflicts will decline" going forward. (*Id*. at p. 39.) Yet a CESA listing will impose the strict take prohibitions of Fish and Game Code section 2080, further constraining the State's ability to act swiftly when lions kill livestock, return repeatedly to the same property, or enter residential areas.

The result is a dangerous and foreseeable outcome: more lions entering agricultural and residential areas, more livestock losses, more high-risk encounters near homes and schools, and fewer tools available to address escalating threats.

Conclusion

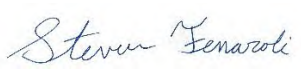
CFBF respectfully urges the Commission to decline to list the Southern California / Central Coast mountain lion DPS under CESA. The Status Review presents highly uncertain population estimates, scientifically unsupported boundary expansions, clear evidence of prey-driven conflict, and a five-year administrative delay fundamentally at odds with any claim of immediate or worsening extinction risk.

Moreover, a CESA listing would increase conflict by removing essential management tools, even as the Department's own data show rising depredations, thousands of reported incidents, and no expectation that conflicts will decline. Without addressing prey availability, habitat fragmentation, and the Department's limited ability to respond to dangerous situations, listing the mountain lion will exacerbate not alleviate risks to rural communities, livestock, and the lions themselves.

If the Commission nevertheless proceeds, any listing must be strictly confined to the originally petitioned boundary.

CFBF appreciates your consideration and remains committed to working collaboratively on wildlife-management strategies that protect public safety, support agricultural communities, and ensure long-term ecological balance.

Respectfully submitted,



Steven Fenaroli
California Farm Bureau

Additionally signed,

Amador County Farm Bureau
Contra Costa County Farm Bureau
El Dorado County Farm Bureau
Kern County Farm Bureau
Lake County Farm Bureau
Merced County Farm Bureau
Monterey County Farm Bureau
Plumas-Sierra County Farm Bureau
Riverside County Farm Bureau
Sacramento County Farm Bureau
San Joaquin Farm Bureau
San Luis Obispo County Farm Bureau
San Mateo County Farm Bureau
Santa Clara County Farm Bureau
Santa Cruz County Farm Bureau
Solano County Farm Bureau
Sonoma County Farm Bureau
Stanislaus County Farm Bureau
Tuolumne County Farm Bureau

CALIFORNIA CATTLEMEN'S ASSOCIATION

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SERVING THE CATTLE COMMUNITY SINCE 1917

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Submitted via email to fgc@fgc.ca.gov

January 29, 2026

Erika Zavaleta, President
California Fish and Game Commission
715 P Street, 16th Floor
Sacramento, CA 95814

Re: Consideration whether listing of a southern California/central coast evolutionarily significant unit of mountain lion (*Puma concolor*) as endangered under the California Endangered Species Act is warranted

President Zavaleta:

The California Cattlemen's Association appreciates the opportunity to provide feedback as the California Fish and Game Commission considers "whether listing the southern California/central coast evolutionarily significant unit of mountain lion (*Puma concolor*) as endangered under the California Endangered Species Act is warranted." CCA is a statewide trade association representing more than 1,700 cattle producers who pride themselves on the stewardship of California's land, water, and wildlife resources. In recent years, ranchers throughout the state – including within the proposed ESU territory of the Central Coast and Southern California – have complained of increasing attacks upon livestock by mountain lions. Ranchers have also raised concerns that the Department of Fish and Wildlife's bureaucratic and onerous policies regarding the issuance of take permits for mountain lions which kill or injure livestock have denied ranchers their legal right to such permits under Proposition 117 (1990).

For the reasons detailed below, CCA urges the Commission to find that CESA listing of mountain lions within the Central Coast and Southern California is not warranted. Should the Commission nevertheless elect to grant mountain lions threatened or endangered status, however, CCA requests that the Commission adopt regulations or findings clarifying that under no circumstances shall the species' CESA status interfere with property owners' legal right to obtain a mountain lion take permit under Proposition 117.

As we wrote in detail in April of 2020, CCA firmly believes that listing of the species as threatened is not warranted.[1] As we asserted then, the petition (and Department's status review) erred in examining threats to the species in too narrow a range, there is little indication that the species' population or viability are threatened, and CESA listing is contrary to Proposition 117. We now renew those objections as laid out in our April 2, 2020 letter to the Commission, attached as Appendix A.

[1] Letter from Michael Miiller, Director of Government Relations, California Association of Winegrape Growers *et al.*, to Eric Sklar, President, California Fish and Game Commission (Apr. 2, 2020).

RICK ROBERTI
PRESIDENT
LOYALTON

BEV BIGGER
TREASURER
VENTURA

BILLY GATLIN
EXECUTIVE VICE PRESIDENT
TEMPLETON

JAMES HENDERSON
SECOND VICE PRESIDENT
WOODLAKE

STEVE LAMBERT
SECOND VICE PRESIDENT
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MIKE WILLIAMS
FIRST VICE PRESIDENT
ACTON

MIKE SULPIZIO
FEEDER COUNCIL CHAIR
BRAWLEY

ANTHONY STORNETTA
SECOND VICE PRESIDENT
ATASCADERO

JACK HOEKSTRA
FEEDER COUNCIL VICECHAIR
CALIPATRIA

The Commission Should Issue Regulations or Findings Harmonizing any CESA Listing with Proposition 117, or Direct the Department to Do So

As outlined in our April 2, 2020 letter, the rigid take prohibitions in CESA are seemingly incompatible with the explicit take authorizations of Proposition 117. In response to these concerns, then-CDFW-Director Chuck Bonham remarked that the Department's legal "obligation would be to reconcile and harmonize" the statutes.[2] In a follow-up letter to the Department (attached as Appendix B), CCA took umbrage with the Director's suggestion that the conflicting statutes could be harmonized but nevertheless asked that the "Department clarify that depredation permits will continue to issue in accordance with Fish & Game Code § 4803 (and related provisions of Proposition 117) despite the species candidacy."[3]

Unfortunately, CCA received no written response to this request. While it appears that the Department has continued to issue limited take permits under its restrictive permitting process for the Central Coast and Southern California throughout candidacy, the Department does not appear to have issued clear guidance outlining its perception of how CESA and Proposition 117 ought to properly be harmonized.

Troublingly, the status review does not detail how the Department harmonizes these statutes or whether – and under what circumstances – the Department will continue to satisfy its obligations under Proposition 117 to issue take permits within the Central Coast and Southern California in the future. The only guidance the status review does provide, that CDFW will authorize take as authorized by "both" CESA and Proposition 117,[4] is troubling because it suggests that Department will continue to allow its interpretation of "take" under CESA to control over the proper interpretation of "take" dictated by Proposition 117, which is problematic for the reasons discussed below.

To address the seeming inconsistency between CESA listing and Proposition 117, in the event the Commission finds that listing is warranted, it ought to adopt additional regulations or explicit findings clarifying that take will continue to be authorized in full accordance with Proposition 117 despite the species' listing status.

Both the Status Review and Department Practice Misinterpret "Take" Within the Meaning of Proposition 117

The Department's status review accurately notes that Proposition 117 "prohibits the take, possession, transport, import, or sale of a mountain lion or mountain lion products with limited

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[2] Charlton Bonham, Director, California Department of Fish and Wildlife, in Video recording: Meeting of April 15-16, 2020, held by the California Fish & Game Commission, at 8:16:02 (Apr. 16, 2020) (*available at* https://videobookcase.org/california/fish-game-commission/2020-04-15-16/).

[3] Letter from Kirk Wilbur, Vice President of Government Affairs, California Cattlemen's Association, to Charlton Bonham, Director, California Fish and Game Commission (Apr. 17, 2020) (*emphasis omitted*).

[4] CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE, A STATUS REVIEW OF THE PETITIONED SOUTHERN CALIFORNIA/CENTRAL COAST EVOLUTIONARILY SIGNIFICANT UNIT (ESU) OF MOUNTAIN LION (*PUMA CONCOLOR COUGUAR*) IN CALIFORNIA (Dec. 2025) at 83.

exceptions."[5] However, the status review inaccurately interprets "take" under Proposition 117 to have the same meaning as under Fish & Game Code Section 86: "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill."[6] This definition does not, however, reflect an accurate meaning of "take" as that term is used under Proposition 117.

While Section 86 provides a *general* definition for "take" under the Fish & Game Code, section 2 provides that such general definitions shall "govern the construction of this code" only "Unless the provisions or the context otherwise requires."[7] The provisions and context of Proposition 117 do, indeed, require otherwise. For instance, 'pursuit' – an identified form of "take" under Section 86 – is not a "take" under Proposition 117, as that measure makes reference to "the pursuit and taking of [a] depredating mountain lion."[8] The rule against surplusage, a canon of statutory interpretation adopted by the California Supreme Court, requires that "Interpretive constructions which render some words surplusage ... are to be avoided."[9] Were "take" under Proposition 117 to be defined as it is under Section 86, the word "pursuit" under Section 4805 would be rendered mere surplusage (as "taking" would include such "pursuit"), violating the rule against surplusage.

At a minimum, then, "pursuit" of a mountain lion cannot legally be understood to be a "take" within the meaning of Proposition 117. (Indeed, both Sections 4806 and 4807 provide powerful persuasive authority that "take" within the meaning of Proposition 117 ought to properly be understood as "capturing, injuring, or killing" a mountain lion.)

This observation that "take" does not include "pursuit" under proposition 117 is not mere nitpicking, but rather ought to have serious, practical management implications. Within the Central Coast and Southern California, Department policy states that a take permit responsive to an initial depredation by a mountain lion should be "nonlethal" and authorize the requesting party to merely "pursue/haze the mountain lion."[10] 'Hazing' is not a "take" under either Section 86 or Proposition 117, and, as demonstrated above, neither is 'pursuit.' As such, these initial permits authorized by the Department violate the agency's legal obligation to issue take permits under Proposition 117, which states that "the department ***shall*** promptly issue a permit to take [a] depredating mountain lion" if the agency is "satisfied that there has been a depredation by [that] mountain lion."[11]

In addition to explicitly harmonizing CESA and Proposition 117, as requested above, CCA requests that the Commission direct CDFW to revise its policies to require authorization of "take" within the meaning of Proposition 117, rather than under the definition in Section 86 – at a minimum authorizing management beyond pursuit and hazing.

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[5] *Id.* at 3.
[6] Cal. Fish & Game Code § 86.
[7] *Id.* at § 2.
[8] *Id.* at § 4805.
[9] *See, e.g.,* Dyna-Med v. Fair Emp. & Hous. Comm'n, 43 Cal.3d 1379, 1397 (1987)
[10] CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE, DEPARTMENTAL BULLETIN 2017-07 (Dec. 15, 2017) at 5.
[11] Cal. Fish & Game Code § 4803 (*emphasis added*).

Conclusion

CCA appreciates the opportunity to address the Commission as it considers the Department's recommendation to list Central Coast and Southern California populations of mountain lions as threatened. CCA respectfully requests that the Commission reject the Department's recommendation, retaining mountain lions' status as a specially protected mammal species rather than elevating the species to threatened (or endangered) status. Should the Commission nevertheless opt to list mountain lions under CESA, we urge the Commission to provide regulations, findings, or guidance requiring that mountain lion take permits continue to issue as required Proposition 117. Regardless of the Commission's CESA determination, we finally request that the Commission clarify that permits authorizing mere pursuit and hazing do not comply with the Department's legal obligation under Proposition 117 to issue take permits and direct the Department to remedy this defect.

Sincerely,



Kirk Wilbur
Vice President of Government Affairs

Appendix A

Submitted via email to fgc@fgc.ca.gov

April 2, 2020

Eric Sklar, President
California Fish and Game Commission
1416 9th Street, Room 1320
Sacramento, CA 95814

Re: Mountain lion CESA petition

President Sklar:

The above-listed organizations appreciate the opportunity to address the Commission as it considers "A Petition to List the Southern California/Central Coast Evolutionarily Significant Unit (ESU) of Mountain Lions as Threatened under the California Endangered Species Act (CESA)" submitted by the Center for Biological Diversity and the Mountain Lion Foundation (Petitioners).

Our organizations represent the farmers and ranchers, labor, businesses, homebuilders, and land developers who would be most significantly impacted by the proposed listing. We are concerned that the petition lacks sufficient scientific basis to meet the burden of proof that the petitioned action may be warranted, and we are troubled that the petition fails to more fully account for mountain lions' full range and population throughout the state. Our organizations also believe the petitioned action would unjustifiably burden construction, development, livestock production, and the workforce dependent on those industries. Finally, our organizations believe that listing mountain lions in the Central Coast and Southern California as threatened under CESA would be illegal, and that **a finding that the petitioned action "may be warranted" would itself be an immediate, significant violation of California law under Proposition 117.** For these reasons, we urge the Commission to find that the petition does not provide sufficient information to indicate that the petitioned action may be warranted.

GENERAL OBJECTIONS

Our organizations are concerned that the petition focuses too narrowly on mountain lions' range limited to the Central Coast and Southern California. While we are aware that caselaw such as *California Forestry Association v. California Fish and Game Commission* permits the Commission to define "range" as a species' California range (and thus a "significant portion…of its range" under Fish and Game Code § 2062 as a subset of the species' California range), it does not require that the Commission focus on extraordinarily-narrow ranges within the State. In *California Cattlemen's Association v. California Fish and Game Commission*, we objected to the Commission disregarding the robust, recovering population of gray wolves nationwide and instead focusing on the limited, emerging population of gray wolves in California. Here, the

focus is even narrower: not only have Petitioners overlooked the robust population of mountain lions nationwide, they have ignored the robust population of mountain lions *statewide*, refining their focus more and more narrowly until they have honed in on a region small enough that its mountain lion population might justify listing. We urge the Commission to look holistically at mountain lions' status statewide, and to reject the petition on the grounds that mountain lions are not threatened based on a statewide analysis.

Even if the Commission adopts Petitioners' narrow range focus, Petitioners have failed to meet their burden of proof that mountain lions are threatened. The Commission has authority to list a species or subspecies as threatened, but determines whether to designate a species as a candidate for listing by evaluating whether the petition provides "*sufficient information* to indicate that the petitioned action may be warranted."[1] However, the Department's evaluation of the petition makes numerous references to the insufficiency of available data regarding mountain lion population and abundance[2] (for instance, the Department's analysis notes that "Studies are needed to more accurately determine regional and statewide mountain lion population size and trend"[3]). Anecdotally, it appears that existing models underestimate the population abundance of mountain lions in the Central Coast and Southern California—virtually any rancher in the region can pull up numerous mountain lion photos captured by trail cameras, for instance, many of those of uncollared lions.

Fortunately, efforts are being undertaken to improve data on mountain lion abundance and population: as the Department's evaluation notes, "Studies by the Department and other cooperators are in process to update the estimate" of statewide and regional populations.[4] We urge the Commission to reject the petition unless and until the updated data and statistical analyses justify such listing. Listing the proposed ESU prior to such updated analyses—or even finding that listing "may be warranted" and thereby imposing regulatory burdens that attend a species' candidacy—would be premature at best and reckless at worst.

CONCERNS SPECIFIC TO THE PUBLIC WORKS, INFRASTRUCTURE, AND HOMEBUILDING SECTORS

The petitioned action would significantly burden—and in some instances, outright prohibit—new construction development. For *all* new development proposals in the Central Coast and Southern California, for instance, the petition proposes "Requir[ing] analysis of region-wide wildlife connectivity" as a prerequisite to the issuance of permits for such development.[5]

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[1] CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE, EVALUATION OF A PETITION FROM THE CENTER FOR BIOLOGICAL DIVERSITY AND THE MOUNTAIN LION FOUNDATION TO LIST THE SOUTHERN CALIFORNIA/CENTRAL COAST EVOLUTIONARILY SIGNIFICANT UNIT (ESU) OF MOUNTAIN LIONS AS THREATENED UNDER THE CALIFORNIA ENDANGERED SPECIES ACT (Jan. 31, 2020) at 5 (*emphasis added*) [*hereinafter* CDFW PETITION EVALUATION].
[2] *Id.* at 9-13, 18-19.
[3] *Id.* at 13.
[4] *Id.* at 19.
[5] CENTER FOR BIOLOGICAL DIVERSITY, A PETITION TO LIST THE SOUTHERN CALIFORNIA/CENTRAL COAST EVOLUTIONARILY SIGNIFICANT UNIT (ESU) OF MOUNTAIN LIONS AS THREATENED UNDER THE CALIFORNIA ENDANGERED SPECIES ACT (CESA) 71 (June 25, 2019) [*hereinafter* PETITION].

Additionally, the petition suggests outright "Prohibit[ing] large-scale development in primary travel corridors and habitat linkages."[6]

CESA listing is not warranted because projects–large and small–are already subjected to numerous environmental reviews including the California Environmental Quality Act. And, in various regions of California, large-scale planning efforts already adequately ensure protection of Central Coast and Southern California populations of mountain lions. For instance, CEQA requires analysis of whether a project may "substantially reduce the habitat of a…wildlife species [or] cause a fish or wildlife population to drop below self-sustaining levels"[7] *regardless* of whether that species is designated as threatened or endangered under CESA. Additionally, as the petition itself notes, there are a number of Natural Community Conservation Plans (NCCPs) and Habitat Conservation Plans (HCPS) in place throughout the Central Coast and Southern California which explicitly provide for the protection of mountain lions and the conservation of mountain lions habitat.

CESA listing of mountain lions would result in additional regulatory burdens for public agencies, builders, and developers without meaningfully increasing protections for mountain lions. The result, unfortunately, would be to disincentivize future voluntary efforts akin to existing NCCPs and HCPs that rely on local government and landowner participation and perhaps to disincentive construction and development outright in jurisdictions already struggling to meet the housing needs of their communities.

Californians currently identify homelessness, housing availability, and housing affordability as top policy priorities. Even in the midst of the COVID-19 crisis, those issues remain top-of-mind for California residents, Governor Gavin Newsom, and California legislators. Given the housing crisis in California, the Commission should not be considering regulatory proposals which will merely serve to *increase* obstacles to necessary construction and development and directly impact the jobs associated with those projects. Consequently, the Commission should reject the petition.

CONCERNS SPECIFIC TO THE LIVESTOCK SECTOR

A. CESA LISTING JEOPARDIZES RANCHERS' ABILITY TO PROTECT THEIR LIVESTOCK AND THREATENS THE VIABILITY OF RANCHES

Mountain lions throughout the Central Coast and Southern California routinely prey upon livestock. The impacts of depredation can be severe for an individual rancher, particularly when mountain lions chronically prey upon an individual herd. While ranchers diligently tend to their herds and often implement deterrents to haze mountain lions away from their ranches, depredations nevertheless occur. Fortunately, Fish and Game Code §§ 4801-4809 (codified by 1990's Proposition 117) recognize the importance of ranchers' ability to protect their livestock and include provisions which allow ranchers to take mountain lions that injure or kill livestock. However, under CESA, these important livestock protection provisions would be eliminated.

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[6] *Id.*
[7] 14 CCR § 15065(a)(1).

Mountain lions are the second most prolific killers of cattle in California, killing 34.3 percent of all cattle killed by predators and 18.7 percent of calves killed by predators.[8] By comparison, coyotes—which are far more abundant and receive no special protections under California law—account for only slightly more depredations of cattle at 34.9 percent.[9] Additionally, in 2015 at least 387 sheep and 132 lambs were killed by mountain lions statewide,[10] resulting in losses of approximately $107,201.[11] These totals do not include livestock injured but not killed by mountain lions, nor do they include the costly and burdensome tools used by producers to protect their livestock from depredating mountain lions.

Mountain lion depredations can be devastating for impacted producers. One beef producer in Southern California, for instance, reported losing 22 calves to two mountain lions between 2014 and 2016. Given the small profit margins of most cattle ranches, such losses can jeopardize the continued viability of cattle ranching, which can have cascading impacts on rural economies.

In circumstances in which mountain lions are not caught-in-the-act of depredation, take of mountain lions is typically a last resort for livestock producers. Most producers will not seek a take permit after a single depredation event, but rather seek to dispatch a problem lion only after depredation has become chronic. For instance, the rancher referenced above lost *22* calves before finally making the determination that lethal control was necessary. Even in circumstances in which depredation permits are sought and obtained, only a minority of those permits result in take of a mountain lion.[12]

Finally, the take of a mountain lion often comes down to an animal welfare question for ranchers. In instances of lethal depredation, surviving members of the herd may exhibit signs of severe trauma, and animals injured-but-not-killed by mountain lions suffer extensively from their injuries. Particularly where depredations are chronic, take of mountain lions is necessary to ensure the health and well-being of livestock throughout California.

B. RECENT DEPARTMENT ACTIONS SEVERELY DIMINISH PETITIONERS' ARGUMENT THAT EXISTING REGULATORY MECHANISMS ARE INADEQUATE

In arguing the "Inadequacy of Existing Regulatory Mechanisms," the Petition details Departmental Bulletin 2017-07, which established a 'three-strikes' policy for mountain lions in the Santa Ana and Santa Monica mountain ranges. Under the policy, reporting parties may only seek non-lethal take permits after the first two instances in which a mountain lion preys upon livestock, only obtaining a lethal take permit upon a third depredation.

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[8] UNITED STATES DEPARTMENT OF AGRICULTURE NATIONAL AGRICULTURAL STATISTICAL SERVICE, DEATH LOSS IN U.S. CATTLE AND CALVES DUE TO PREDATOR AND NONPREDATOR CAUSES, 2015 at 57 tbl.D.1.c. and 65 tbl.D.2.d. (2017).

[9] *Id*. at 55 tbl.D.1.c.

[10] Unfortunately, NASS's statistics do not break out data to the county level, only to the state level.

[11] UNITED STATES DEPARTMENT OF AGRICULTURE NATIONAL AGRICULTURAL STATISTICAL SERVICE, SHEEP AND LAMB PREDATOR AND NONPREDATOR DEATH LOSS IN THE UNITED STATES, 2015, at 12tbl.A.2.a.; 14 tbl.A.2.b; and 40 tbl.C.9. (2015).

[12] CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE, ANNUAL MOUNTAIN LION DEPREDATION SUMMARY TABLE (2011-2019) (*available at* https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=177513&inline).

According to Petitioners, this regulatory mechanism is inadequate because it "does not apply to other vulnerable populations, like the [San Gabriel/San Bernardino Mountains], [Eastern Peninsular Range], [Central Coast-North], and [Central Coast-Central] mountain lions."[13]

As of February 13, 2020, however, the 'three-strikes' policy is applicable throughout the Central Coast and Southern California boundaries identified within the Petition, including all "vulnerable populations" identified above.[14] Application of the 'three-strikes' policy throughout the Central Coast and Southern California is a regulatory mechanism which *significantly* curtails the availability of lethal depredation permits for mountain lions, greatly diminishing the merit of Petitioners' argument that existing regulatory mechanisms are insufficient to protect the species.[15]

C. CESA LISTING OF MOUNTAIN LIONS IS ILLEGAL UNDER PROPOSITION 117

1. Petitioners fail to establish that CESA protection is consistent with Proposition 117

Commission action listing mountain lions as threatened under CESA would be inconsistent with Proposition 117. While the Petition summarily concludes that "CESA protections for Southern California and Central Coast mountain lions are consistent with and supplemental to those established by Proposition 117,"[16] it provides little analysis in support of this conclusion. The scant two paragraphs of examination merely overview the fact that both CESA and Proposition 117 have "take prohibitions" (first paragraph) and that "Both CESA and Proposition 117's take prohibitions are subject to certain exceptions" (paragraph 2).[17]

Petitioners' analysis in support of their conclusion that CESA protection is consistent with Proposition 117 is misleading at best. Petitioners allege that exceptions to take prohibitions in CESA and Proposition 117 "are sufficiently similar that *in most cases* take of mountain lions properly authorized by Proposition 117 *could be* consistent with CESA's exceptions for wildlife management activities or law enforcement purposes."[18] While this analysis accurately reflects § 4801 of the Fish and Game Code enacted by Proposition 117, it ignores §§ 4802-4807, which pertain to take authorization for mountain lions depredating livestock and which comprise the bulk of the Proposition's operative provisions regarding mountain lion management.

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[13] PETITION, *supra* note 5, at 55.
[14] "Amendment to DB2017-07 Boundaries and Regional Guidance Team Requirements," Memorandum from Charlton H. Bonham, Director, California Department of Fish and Wildlife, to Deputy Directors, Regional Managers, Branch Chiefs, and Law Enforcement Division Assistant Chiefs, California Department of Fish and Wildlife (Feb. 13, 2020) (*available online at* https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=177324&inline).
[15] It should be noted that we firmly believe the 'three strikes' policy is illegal under Proposition 117. In the event that the Commission is not persuaded by our analysis of Proposition 117, however, the 'three strikes' policy provides an independent basis for rejecting the Petition.
[16] PETITION at 69.
[17] *Id*.
[18] *Id.* (*emphasis added*).

Disappointingly, the Department's evaluation of the Petition, which concludes that "there is sufficient scientific information available at this time to indicate the petitioned action may be warranted,"[19] fails to meaningfully examine Petitioners' claims relative to Proposition 117, instead merely parroting the warrantless assertions advanced by Petitioners.[20]

2. CESA protection for mountain lions would violate numerous provisions of Proposition 117

Proposition 117 enacted Chapter 10 (then comprising §§ 4800-4809)[21] to Part 3 of Division 4 of the California Fish and Game Code. Section 4800(d) of the Fish and Game Code specifies that "Section 219 does not apply to this chapter"[22] and that "Neither the commission nor the department shall adopt any regulation that conflicts with or supersedes a provision of this chapter."[23] CESA listing for Southern California and Central Coast mountain lions would constitute the adoption of a regulation which "conflicts with or supersedes" various provisions of Chapter 10; as such, listing Southern California and Central Coast mountain lions as threatened under CESA would be in clear violation of Proposition 117.

Proposition 117 dictates that "If satisfied that there has been depredation by a mountain lion as reported, the department shall promptly issue a permit to take the depredating mountain lion."[24] The only precondition to issuance of a take permit for mountain lions, then, is confirmation by the department that "livestock or other property is being or has been injured, damaged, or destroyed by a mountain lion."[25] CESA, by contrast, imposes numerous preconditions on the issuance of a take permit, specifically that "The take is incidental to an otherwise lawful activity,"[26] that the impacts of the take be minimized and fully mitigated,[27] and that the applicant

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[19]Memorandum from Charlton Bonham, Director, California Department of Fish and Wildlife, to Melissa Miller-Henson, Executive Director, California Fish and Game Commission (Jan. 31, 2020).

[20] CDFW PETITION EVALUATION, *supra* note 1, at 33 (stating that "*The Petition asserts* that CESA listing would build upon protections established by Proposition 117" (*emphasis added*) and "*the Petition states* that Proposition 117 is to be 'liberally construed to further its purposes'" (*emphasis added*)).

[21] An additional code section within Chapter 10, Section 4810, was added with the passage of AB 1784 in 2012.

[22] While statutes typically control over conflicting regulations, Fish and Game Code § 219 provides for exceptions to this general rule in circumstances where either (a) the superseding regulation is "necessary for the protection of fish, wildlife, and other natural resources under the jurisdiction of the commission," or (b) "The commission determines that an emergency exists…[which] is an immediate threat to the population or habitat of any species." By dictating that § 219 does not apply to Chapter 10, Proposition 117 ensured that its provisions would not be altered as a result of a commission decision that protection of wildlife resources was "necessary" or a commission determination that an "emergency exists" relative to a species' population or habitat. The petitioned action seeks just such a commission determination, in clear contravention of the express intent of § 4800(d).

[23] CAL. FISH & GAME CODE § 4800(d).

[24] *Id.* at § 4803.

[25] *Id.* at § 4802.

[26] *Id.* at § 2081(b)(1). While the term "incidental" is not defined in California statute or regulations, analogous federal regulations define "incidental taking" as taking that is "incidental to, and not the purpose of, the carrying out of an otherwise lawful activity." 50 C.F.R. § 17.3. The California Department of Fish and Wildlife's interpretation of that term appears to be consistent with the federal definition. *See, e.g.*, CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE, CHOOSING THE RIGHT PERMIT (2018), https://www.wildlife.ca.gov/Conservation/CESA/Permits ("Take will be incidental to, and not the purpose of, carrying out an otherwise lawful activity."); CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE, INCIDENTAL TAKE PERMITS (2018), https://www.wildlife.ca.gov/Conservation/CESA/Incidental-Take-Permits ("Incidental Take Permits allow a

ensure all funding for such mitigation efforts.[28] Under Proposition 117, the take of a depredating mountain lion is not merely incidental to a lawful activity, but rather is precisely the lawful activity which is the express purpose of obtaining the permit. By limiting the purposes for which an individual may seek a take permit, CESA listing of mountain lions would constitute a "commission...regulation that conflicts with or supersedes a provision of" Chapter 10, and would violate Proposition 117. Additionally, CESA protection for mountain lions would conflict with Proposition 117 by imposing numerous additional conditions upon permitted take beyond those contemplated by Proposition 117.

By limiting take of mountain lions to circumstances in which such take is "*incidental* to an otherwise lawful activity," extending CESA protections to mountain lions would also conflict with § 4804 of Proposition 117. Implicit in the concept of *incidental* take is that no *particular* member of a species is *targeted* for take, but rather that unidentified members of the species may be taken by the "otherwise lawful activity." Proposition 117, however, envisions the *targeted take* of *individual* mountain lions. For instance, § 4804 seeks to "ensure that only the depredating mountain lion will be taken," and implementing regulations refer to "the particular mountain lion believed to be responsible for damage to livestock or domestic animals."[29] By limiting take to circumstances where it is merely "incidental to an otherwise lawful activity," then, extending CESA protections to mountain lions would not only conflict with the take authorization provisions of § 4803, but also the targeted pursuit provisions of § 4804. Again, such conflicts between CESA and Proposition 117 render Commission action to list mountain lions as threatened a violation of § 4800(d) enacted by Proposition 117.

Proposition 117 authorizes "the department or the animal damage control officer [to] orally authorize the pursuit and taking of [a] depredating mountain lion" in order to effectuate "immediate authorization."[30] Neither CESA nor its implementing regulations have an analogous provision allowing for oral authorization to take a threatened species.[31] Rather, CESA and its implementing regulations dictate strict requirements for a permit application not found in Proposition 117 or its implementing regulations.[32] Commission action listing mountain lions as endangered under CESA would impose permit-application processes and conditions which would negate the oral authorization provisions of Proposition 117, conflicting with the provisions of Chapter 10 and thereby violating Proposition 117.

Proposition 117 authorizes *immediate* take of "Any mountain lion that is encountered while in the act of pursuing, inflicting injury to, or killing livestock, or domestic animals."[33] CESA, by

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permittee to take a CESA-listed species if such taking is incidental to, and not the purpose of, carrying out an otherwise lawful activity.").

[27] CAL. FISH & GAME CODE § 2081(b)(2).

[28] *Id.* at § 2081(b)(3).

[29] 14 CCR § 402(a) (*emphasis added*).

[30] CAL. FISH & GAME CODE § 4805.

[31] *See generally id.* at §§ 2080-2085; 14 CCR §§ 783.0-783.8.

[32] *Compare* 14 CCR § 783.2(a)(1)-(11) (detailing information required in an application for an incidental take permit under CESA), *with* 14 CCR § 402 (authorizing the department to "orally authorize…take of a mountain lion" "Whenever immediate action will assist in the pursuit of the particular mountain lion believed to be responsible for damage to livestock or domestic animals").

[33] CAL. FISH & GAME CODE § 4807(a).

contrast, prohibits any take of a listed species unless done subsequent to issuance of a take permit or pursuant to a memorandum of understanding.[34] Because CESA has no provision for immediate take of a listed species "encountered while in the act of" depredation, listing mountain lions as threatened under CESA would *entirely negate* the effect of § 4807(a). Negating a provision of the law is a clear "conflict" with Proposition 117 in violation of Fish and Game Code § 4800(d).

3. Merely accepting the petition would violate Proposition 117

The Commission must find that the petition does not provide sufficient information to indicate that the petitioned action may be warranted lest the Commission violate § 4800(d) by establishing the mountain lion as a "candidate species."

Accepting the petition and finding "that the petition provides sufficient information to indicate that the petitioned action may be warranted" would immediately establish mountain lions as a "candidate species" for listing.[35] Candidate species are given the full range of protections afforded to threatened or endangered species under CESA.[36] Thus, merely accepting the petition will result in the numerous violations of § 4800(d) (enacted by Proposition 117) detailed above. Not only may the Commission not ultimately list Southern California and Central Coast mountain lions as threatened, then, but the Commission is legally bound to *reject* the petition.

4. Proposition 117's proponents and California voters did not contemplate CESA protection for mountain lions

The California Endangered Species Act was adopted in 1984. Proposition 117 was put before the voters of California in 1990. The proponents of Proposition 117 were certainly aware of CESA when they drafted Proposition 117, and had they intended to extend to mountain lions the protections of CESA, they could have included a provision within Proposition 117 doing so. But the proponents elected *not* to list mountain lions as threatened under CESA when they drafted Proposition 117, and voters did not contemplate CESA protections for mountain lions when they approved Proposition 117 as written in 1990.

Proposition 117's proponents and California's voters elected *not* to list mountain lions as threatened when they approved Proposition 117 in 1990, and neither Petitioners nor the Commission may seek to overturn the will of the voters by approving the petitioned action.

5. Liberal construction of Proposition 117 does not justify CESA protection

Petitioners allege that "To the extent there is any tension between the provisions in Proposition 117 and CESA, Proposition 117 is to be 'liberally construed to further its purposes.' (Prop. 117 § 9.) Because Proposition 117 and CESA both have similar purposes, Proposition 117 should be

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[34] *Id.* at § 2081.
[35] *Id.* at § 2074.2(e)(2).
[36] 14 CCR § 783.1(b).

construed to be consistent with CESA."[37] Petitioner's assertion that Section 9 of Proposition 117 justifies the petitioned action is simply without merit.

While liberal construction is intended to further the 'spirit' or purpose of a law, no statute can be so liberally-construed as to negate its explicit, unambiguous provisions.[38] As detailed above, granting CESA protection to mountain lions would negate numerous express provisions of Proposition 117. While liberal construction may be justified to further the purposes of Proposition 117 where provisions of the Proposition are ambiguous, interpreting the Proposition so liberally as to negate, at a minimum, §§ 4802, 4803, 4805, and 4807(a) *in their entirety* would be absurd.

Where liberal construction of a statute is exercised, it is employed "'so as to suppress the mischief at which [the statute] is directed.'"[39] In determining the mischief at which a statute is directed, "The printed ballot arguments may be used to determine the object and intent" of a Proposition.[40] The "Argument in Favor of Proposition 117" printed in the 1990 Primary Voter Guide makes clear the 'object and intent' of the special-status designation for mountain lions:

> In order to protect this last magnificent predator, Proposition 117 OUTLAWS THE TROPHY HUNTING OF MOUNTAIN LIONS.
> Mountain lions have not been trophy hunted since GOVERNOR RONALD REGAN signed a bill protecting this elusive animal. We need Proposition 117 to continue that protection.
> Mountain lions hunting is cruel and unnecessary. A pack of hounds is set on the trail of the big cat until the exhausted lion seeks refuge in a tree. The trophy-hunter (who sometimes is brought in from hundreds of miles away after paying a huge fee to the houndsman) then walks over and blasts the lion off the limb at point-blank range. When nursing mothers are shot, the kittens starve. *THIS IS NOT SPORT; THIS IS SLAUGHTER*.[41]

The intent of Proposition 117 was to extend a prohibition on *trophy hunting* of mountain lions, *not* to outlaw *any and all take* of mountain lions. While the Commission should liberally construe Proposition 117, where ambiguous, to prohibit *trophy hunting* of mountain lions, then, it would be a misapplication of principles of statutory interpretation to liberally construe Proposition 117 to prohibit *any* take of mountain lions, as it is clear that this was not the intent of Proposition 117 upon its proposal in 1990.

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[37] PETITION at 70.

[38] In examining other remedial Fish and Game Code provisions afforded liberal construction, courts have noted that such liberal construction is only to be resorted to "'when [the statute's] meaning is doubtful, so as to suppress the mischief at which it is directed.'" In re Makings, 200 Cal. 474, 478-479 (Cal. 1927) (*quoting* 23 CAL.JUR. 801); *see also* Young v. Dep't of Fish & Game, 124 Cal.App.3d 257, 270-271 (Cal. Ct. App. 1981) (*quoting In re Makings*); Siskiyou Co. Farm Bureau v. Dep't of Fish & Wildlife, 237 Cal.App.4th 411, 427 n.6 (Cal. Ct. App. 2015) (noting that liberal construction is "relevant only in cases of demonstrated ambiguity").

[39] In re Makings, 200 Cal. 474, 478-479 (Cal. 1927) (*quoting* 23 CAL.JUR. 801).

[40] Young v. Dep't of Fish & Game, 124 Cal.App.3d 257, 273 (Cal. Ct. App. 1981).

[41] John Van de Kamp, Attorney General; Ed Davis, State Senator; and Richard Katz, State Assemblymember, "Argument in Favor of Proposition 117" *in* CALIFORNIA SECRETARY OF STATE, CALIFORNIA BALLOT PAMPHLET: PRIMARY ELECTION 42 (June 5, 1990) (*emphasis in original*).

Additionally, in arguing that Proposition 117 should be "liberally construed to further its purposes," Petitioners ignore that protection of livestock and domestic animals *is* a purpose of Proposition 117. That purpose is clearly enshrined in §§ 4802 and 4807(a), both of which explicitly provide for take of a specific depredating animal in order to safeguard livestock. Moreover, that purpose is evidenced by the "Argument in Favor of Proposition 117" published in the 1990 Primary Voter Guide, which sought to sway voters to support the Proposition by, among other things, expressing an intent to "PROTECT[] THE PUBLIC SAFETY by permitting the taking of any lion which threatens livestock or people."[42]

While protection of mountain lions was indeed *a* purpose of Proposition 117, it was not the only purpose of the Proposition, and it was more specifically intended to protect mountain lions *from trophy hunting*. Petitioners may not rely on the 'liberal construction' clause in Section 9 to negate the express terms and additional purposes of Proposition 117.

6. Petitioners' arguments that CESA listing can be harmonized with Proposition 117 are fundamentally flawed

In response to our assertion that CESA listing is inconsistence with Proposition 117, Petitioners and other supporters of the petition have sought to harmonize the two statutory schemes in written and oral testimony presented at the Commission's July 2019, December 2019, and February 2020 hearings. Unfortunately, a careful analysis of these claims demonstrates that CESA prohibition of take cannot be harmonized with Proposition 117's explicit take provisions.

a. Fish and Game Code § 2081(a)

Petitioners and other supporters of the petition have contended that there is no conflict between Proposition 117 and CESA listing[43] because Fish and Game Code § 2081(a) provides that "the department may authorize individuals…to import, export, take, or possess any endangered species, threatened species, or candidate species for scientific, educational, or management purposes."[44]

We first note that there is apparent conflict in the CESA take provision and the Proposition 117 take provisions because the former provides for discretionary permit issuance ("may authorize") while the latter provides for mandatory permit issuance ("shall promptly issue a permit").

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[42] *Id.*

[43] *See, e.g.,* PETITION at 69 ("Under CESA, CDFW may authorize that a person, agency, or institution take a listed species 'for scientific, educational, or management purposes.' (Cal. Fish & Game Code § 2081(a).) … These exceptions are sufficiently similar that in most cases take of mountain lions properly authorized by Proposition 117 could be consistent with CESA's exceptions for wildlife management activities or law enforcement purposes."); Letter from Sabrina Ashjian, California State Director, The Humane Society of the United States, to Eric Sklar, President, California Fish and Game Commission and Esther Burkett, California Department of Fish and Wildlife (Jan. 16, 2020) [*hereinafter* "HSUS Letter"] ("CESA expressly authorizes the Department to issue take permits allowing non-governmental 'individuals' to take listed species 'for…management purposes.' Cal. Fish and Game Code § 2081(a). The depredation-related Proposition 117 take allowances that CCA and CFBF point to as the source of irresolvable conflict would, in fact, likely qualify as the issuance of permits 'for…management purposes' and thus would also fall into an exception under CESA's take prohibition.").

[44] CAL. FISH & GAME CODE § 2081(a).

More importantly, however, this argument fails to acknowledge that § 2081(a) does not operate independently, but rather has been interpreted by California courts as being further constrained by § 2081(b),[45] which requires that "The take is incidental to an otherwise lawful activity"[46] and that "The impacts of the authorized take shall be minimized and fully mitigated."[47] Despite the provisions of § 2081(a), then, listing the proposed ESU as threatened would, at a minimum, violate § 4804's provision for *targeted* take of depredating mountain lions, rendering the listing decision illegal under § 4800(d).

b. "Nonlethal forms of take" and Fish and Game Code § 4801.5

Petitioners have stated that "nonlethal forms of take such as hazing, if done properly and judiciously, could very well be consistent with the conservation mandate of CESA. Consequently, we see no conflict whatsoever between the two statutes."[48] Firstly, we note that while hazing *is* recognized as a "nonlethal procedure" for *removing* or taking a mountain lion, **hazing is not a 'take.'**[49] It is noteworthy that Petitioners have not identified a *take* provided for by Proposition 117 that would be consistent with CESA protections.

While Petitioners have failed to identify any take which would be permitted under CESA, they appear to acknowledge that *lethal* take, at a minimum, *would* be prohibited under a CESA listing.[50] Petitioners argue, however, that CESA's prohibition of lethal take is not in conflict with Proposition 117 because "Prop. 117 does not require lethal permits."[51] In support of this contention, Petitioners allege that "Section 4801.5, an amendment to the provisions of Prop. 117 that passed with over 80% support in the legislature in 2014,[52] expressly states that 'nonlethal procedures shall be used when removing or taking any mountain lion that has not been designated an imminent threat to public health or safety.'"[53]

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[45] *See* Watershed Enforcers v. Department of Water Resources, 185 Cal.App.4th 969, 975 (Cal. Ct. App. 2010) ("But a section 2081, subdivision (a) taking is subject to stringent conditions, as set forth in subdivision (b)(1) and (2)."). The Humane Society of the United State's contention that "CCA and CFBF's focus on the more burdensome CESA 'incidental take' permit process under Section 2081(b) is a red herring" because "the take permit provision that would actually operate to harmonize CESA with Proposition 117 is the 'management purposes' take permit under Section 2081(a)" (HSUS Letter, *supra* note 43) is explicitly contradicted by such judicial interpretations of § 2081.

[46] CAL. FISH & GAME CODE § 2081(b)(1).

[47] *Id.* at (b)(2).

[48] Brendan Cummings, Center for Biological Diversity, in Video recording: Meeting of February 21, 2020, held by the California Fish & Game Commission, at 1:10:48 (Feb. 21, 2020) (*available at* http://videobookcase.org/california/fish-game-commission/february-21-2020/) [*hereinafter* CUMMINGS].

[49] California Fish & Game Code § 4801.5(a) provides that "nonlethal procedures shall be used when *removing or taking* any mountain lion that has not been designated as an imminent threat to public health or safety" (*emphasis added*). "Hazing" is identified as a form of "nonlethal procedure[]" under § 4801.5(c). Hazing is *not* identified as a "take," however, either under Fish and Game Code § 86 ("'Take' means hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill.") or under Proposition 117. Presumably, then, hazing is a form of nonlethal procedure directed at "removing" a mountain lion, but hazing *does not* constitute take.

[50] *See, e.g.,* CUMMINGS, *supra* note 48 (acknowledging that "it's difficult to see how lethal depredations permits would be consistent with CESA's conservation mandate").

[51] *Id.*

[52] SB 132 (Hill) was chaptered in 2013 and took effect in 2014.

[53] CUMMINGS, *supra* note 48.

In quoting § 4801.5, however, Petitioners have omitted the introductory clause of the section: "*Unless authorized in this chapter*."[54] Under certain circumstances, lethal take is authorized within Proposition 117, providing an exception to § 4801.5's directive that nonlethal procedures shall be used. Firstly, § 4805 authorizes "killing" as among the range of options available in circumstances when livestock have been "injured, damaged, or destroyed." Secondly, § 4809 states that "Mountain lions authorized to be taken pursuant to this chapter shall be taken by the most effective means available to take the mountain lion," and the only limitation placed on those 'most effective means' is that "no mountain lion shall be taken by means of poison, leg-hold or metal jawed traps, and snares." Section 4809 implicitly permits the killing of mountain lions, then, where killing is the "most effective means available to take the mountain lion."

Had the Legislature intended to prohibit lethal take in all instances in which a mountain lion is not "designated an imminent threat to public health or safety," it could have omitted the phrase "Unless authorized in this chapter," and/or explicitly clarified the prohibition via amendments to §§ 4804 and 4809. It did not do so. Additionally, that the Department has continued to issue lethal depredation permits in the six years since § 4801.5 took effect is evidence that the Department understands Proposition 117—inclusive of § 4801.5—to permit lethal take in certain circumstances outside those in which mountain lions are deemed an imminent threat to public health or safety.

Even if lethal take is not *required* under Proposition 117, as Petitioners contend, lethal take is *allowed* under the Proposition. CESA protection would *disallow* lethal take, however, thereby creating a conflict with Proposition 117 in direct violation of § 4800(d).

7. Petitioners' remedy is in the Legislature, not the Commission

Proposition 117 dictated in explicit terms the circumstances under which it could be amended: "this act shall be amended only by a statute approved by a vote of four fifths of the members of both houses of the Legislature." In explicitly providing that Fish and Game Code § 219 did not apply to Chapter 10 of Part 3 of Division 4 of the Fish and Game Code, Proposition 117 made it clear that the Commission is not authorized to alter the legal status or the legal protections afforded to mountain lions. Petitioners cannot make an end-run around Proposition 117 by seeking threatened status under CESA via the Commission; Petitioners must go through the legislature to obtain the ends sought by the petition.

CONCLUSION

Our associations appreciate the opportunity to address the Commission on this important matter. We believe that the wide array of policy considerations detailed above warrant the Commission's denial of the petition. Most importantly, perhaps, we believe that designating mountain lions in the Central Coast and Southern California as a 'candidate species' would violate Proposition 117. Consequently, **the Commission *must* find "that the petition does not provide sufficient information to indicate that the petitioned action may be warranted"** pursuant to Fish and Game Code § 2074.2(e)(1) lest it run afoul of the law.

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[54] CAL. FISH & GAME CODE § 4801.5(a) (*emphasis added*).

Sincerely,



Michael Miiller
Director of Government Relations
California Association of Winegrape Growers



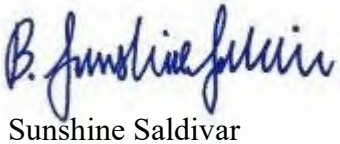
Nick Cammarota
Senior Vice President and General Counsel
California Building Industry Association



Kirk Wilbur
Vice President of Government Affairs
California Cattlemen's Association



Valerie Nera
Policy Advocate
California Chamber of Commerce



Sunshine Saldivar
Associate Counsel
California Farm Bureau Federation

Appendix B

CALIFORNIA CATTLEMEN'S ASSOCIATION

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SERVING THE CATTLE
COMMUNITY SINCE 1917

PHONE: (916) 444-0845
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Submitted via email to director@wildlife.ca.gov

April 17, 2020

Charlton Bonham, Director
California Department of Fish and Wildlife
1416 9th Street, 12th Floor
Sacramento, CA 95814

Re: Harmonizing Mountain Lion Management Under CESA and Proposition 117

Director Bonham:

I appreciate your comments at yesterday's Fish and Game Commission meeting that you do not see an inherent conflict between CESA and Proposition 117, and that your door is open to stakeholders to "make it work" now that mountain lions in the Central Coast and Southern California are a candidate species for CESA listing. I would welcome the opportunity to 'meet' with you (via phone, given our new social-distancing reality) in the coming days or weeks to discuss our concerns about mountain lion candidacy and how the Department can address those concerns. My phone number is [**redacted**], and I will gladly take your call whenever you are available.

In the coming weeks, expect a letter from me laying out our concerns about the separate—but certainly related—"three-strikes policy." For now, however, I would like to address some of your statements at yesterday's Commission hearing.

First, you mentioned at the beginning of the agenda item that the Department has a "legal obligation to harmonize conflicting laws." You further argued that there is no "automatic conflict" between CESA and Proposition 117, and that the Department's "obligation would be to reconcile and harmonize" those statutory schemes.

I write you today to request clarification regarding that harmonization. **We ask that the Department clarify that depredation permits will continue to issue in accordance with Fish and Game Code § 4803 (and related provisions of Proposition 117) despite the species' candidacy**. Section 4803 states that "If satisfied that there has been depredation by a mountain lion as reported, the department shall promptly issue a permit to take the depredating mountain lion." At least two factors justify issuance of take permits despite CESA listing. First, § 4800(d) states that "Neither the commission nor the department shall adopt any regulation that conflicts with or supersedes a provision of" Proposition 117, so the Commission's decision to extend candidacy to mountain lions may not preclude take permits issued in accordance with Proposition 117. Secondly, as you are well-aware, a latter-in-time statute typically controls over an earlier conflicting statute; to the extent that CESA (codified in 1984) and Proposition 117 (codified in 1990) conflict, then, the provisions of Proposition 117 should control.

MARK LACEY
PRESIDENT
INDEPENDENCE

ROB VON DER LIETH
TREASURER
COPPEROPOLIS

BILLY GATLIN
EXECUTIVE VICE PRESIDENT
SACRAMENTO

JOHN HAMMON
SECOND VICE PRESIDENT
EXETER

STEVE ARNOLD
SECOND VICE PRESIDENT
SANTA MARGARITA

TONY TOSO
FIRST VICE PRESIDENT
HORNITOS

TREVOR FREITAS
FEEDER COUNCIL CHAIR
TIPTON

GREG KUCK
SECOND VICE PRESIDENT
MONTAGUE

JESSIE LARIOS
FEEDER COUNCIL VICECHAIR
BRAWLEY

It is worth noting that the above-requested clarification would also necessitate a revision of the Department's "three-strikes policy" (which, again, I will address in more detail in a later letter). While you and I may disagree over whether Proposition 117 requires the *availability* of lethal take permits, it is clear that § 4803 requires the issuance of a permit for *some form* of "take." It is also clear that "hazing" is not a "take" under either § 86 or Proposition 117, and that—at a minimum—permits issued pursuant to the "first strike" of the "three-strikes" policy thus violate § 4803's mandate that "If satisfied that there has been depredation by a mountain lion as reported, the department shall promptly issue a permit to take the depredating mountain lion." **In addition to clarifying that depredation permits will continue to issue, then, we ask that the Department revise its policy to omit non-take permits issued in response to livestock depredations.**

Second, just prior to the Commissioners' vote on the agenda item, you argued that you see a "logical fallacy" in our concerns about the conflict between CESA and Proposition 117. After quoting § 4801.5, you argued that our concerns "assume[] a conflict that doesn't exist" because "nowhere else [in Proposition 117] does it say whether a permit will be for lethal or nonlethal actions."

With due respect, that argument misses the point, and I am concerned that it may have misled the Commissioners just before they took their vote. The question is not over *lethal vs. nonlethal take*, but rather Proposition 117's *required issuance of take permits* vs. CESA *prohibition upon* [non-incidental] *take*.

Fish and Game Code § 2080 states that "No person…shall…take…a threatened species." Note that it *does not* say that "No person shall *lethally* take a threatened species." The distinction over lethal and nonlethal take is irrelevant to the question of whether there is a conflict between Proposition 117 and CESA.

There *is* a real conflict between the two statutory schemes, and it is not merely "assumed," but rather explained in painstaking detail in our letters to the Commission. Sections 2080 (of CESA) and 4803 (of Proposition 117) are particularly illustrative of this clear conflict: Section 4803 states that "If satisfied that there has been depredation by a mountain lion as reported, the department shall promptly issue ***a permit to take*** the depredating mountain lion" (*emphasis added*) while § 2080 states that "No person…shall…***take***…a threatened species" (*emphasis added*). Note that neither statute makes any distinction between *lethal* and *nonlethal* take—that distinction is irrelevant to whether a statutory conflict exists. Rather, Proposition 117 *explicitly* ***requires*** issuance of a take permit, while CESA *explicitly* ***prohibits*** take. That is not an "assumed" conflict, it is an explicit conflict. And where an explicit conflict exists, § 4800(d) controls.

Finally, during yesterday's hearing you referenced Tricolored blackbird as a circumstance in which the Department was able to harmonize CESA with the concerns of the ranching community. While the Tricolored blackbird Voluntary Local Program (VLP) is indeed a laudable example of the Commission and Department working to address ranchers' concerns with regard to a CESA-listed species, it is not relevant to the current discussion. The VLP only covers

incidental take, which is permissible under CESA. Proposition 117 is not concerned with incidental take, but rather with targeted take of problem lions. As we noted in our April 2 letter to the Commission,

> By limiting take of mountain lions to circumstances in which such take is "incidental to an otherwise lawful activity," extending CESA protections to mountain lions would also conflict with § 4804 of Proposition 117. Implicit in the concept of incidental take is that no particular member of a species is targeted for take, but rather that unidentified members of the species may be taken by the "otherwise lawful activity." Proposition 117, however, envisions the targeted take of individual mountain lions. For instance, § 4804 seeks to "ensure that only the depredating mountain lion will be taken," and implementing regulations refer to "the particular mountain lion believed to be responsible for damage to livestock or domestic animals." By limiting take to circumstances where it is merely "incidental to an otherwise lawful activity," then, extending CESA protections to mountain lions would not only conflict with the take authorization provisions of § 4803, but also the targeted pursuit provisions of § 4804. Again, such conflicts between CESA and Proposition 117 render Commission action to list mountain lions as threatened a violation of § 4800(d) enacted by Proposition 117.

Unfortunately, the Tricolored blackbird example is not instructive here, as take of mountain lions under Proposition 117 will never be "incidental" as allowed under CESA and the Tricolored blackbird VLP.

Again, I appreciate your commitment to harmonizing CESA with Proposition 117. I look forward to discussing this matter with you as soon as possible, as yesterday's decision by the Commission (to say nothing of the three-strikes policy, including its application *outside* of the ESU boundary) has created a great deal of uncertainty for ranchers seeking to protect their livestock from mountain lions, particularly lions which are chronic depredators of livestock.

Sincerely,



Kirk Wilbur
Vice President of Government Affairs

CC: Melissa Miller-Henson, Executive Director, FGC, fgc@fgc.ca.gov
Stafford Lehr, Deputy Director, Wildlife and Fisheries Division, CDFW, stafford.lehr@wildlife.ca.gov
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Kari Lewis, Chief, CDFW Wildlife Branch, kari.lewis@wildlife.ca.gov
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TEJON RANCH
COMPANY

January 29, 2026

Erika Zavaleta
California Fish and Game Commission
715 P Street
Sacramento, CA 95814

RE: PROPOSED LISTING OF MOUNTAIN LION (ITEM 17)

Dear President Zavaleta and Commissioners:

Executive Summary

Tejon Ranch Company offers written comment for the Commission's February 11–12, 2026 meeting regarding the petition to list mountain lion (*Puma concolor*) as a threatened or endangered species under the California Endangered Species Act ("CESA"). These comments supplement Tejon Ranch's August 27, 2020, submission made to the Department of Fish of Wildlife ("CDFW") during the preparation of the Status Review.

Tejon Ranch supports science-based wildlife conservation and recognizes that certain mountain lion populations in California face localized pressures associated with habitat fragmentation, transportation infrastructure, and human-wildlife conflict. In contrast to the petition for listing, CDFW's Status Review and listing recommendation place disproportionate emphasis on "development" as a primary driver of risk. Tejon Ranch requests that the Commission ensure that these inaccuracies in the Status Review are corrected as part of any action on the petition:

- CDFW's Status Review and listing decision includes lands that are not habitat based upon CDFW's own habitat mapping included in the Status Review, and fails to consider genetic and distribution information provided in our August 27, 2020, submission directly linking the mountain lions using Tejon Ranch lands to the healthy and genetically diverse Western Sierra Nevada population, although that information is more updated than the information relied upon in the Status Review.
- CDFW's Status Review and recommendation fail to adequately account for the scale and effectiveness of existing conservation measures already in place to protect mountain lion and other species, particularly those implemented at a landscape level by large private landowners, such as Tejon Ranch.
- Tejon Ranch has a long history of working collaboratively with state and federal agencies and leading conservation organizations to protect sensitive habitat types and species, and

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www.tejonranch.com

Tejon Ranch Co. (NYSE:TRC) – a diversified real estate development and agribusiness company.

to promote wildlife connectivity. On our own accord, Tejon Ranch permanently conserved approximately 240,000 acres (about 90 percent of Tejon Ranch, which is roughly the size of the city of Los Angeles and approximately 98 percent of this open space includes high quality mountain lion habitat) through binding agreements, state-funded conservation easements, and state and federally approved habitat management and conservation planning. These measures directly address the mountain lion stressors identified in CDFW's analyses, including habitat loss, fragmentation, and connectivity barriers, which should be acknowledged in the Status Review and recognized in the listing determination.

Tejon Ranch is disappointed that CDFW's analysis does not acknowledge the roles attributed to landscape level conservation plans, particularly given the long-term population stability acknowledged in the status review when defining the proposed DPS/ESU boundary. Tejon Ranch functions primarily as a managed connectivity corridor facilitating movement between larger, more robust mountain lion populations, rather than as an isolated breeding ground. CDFW's Status Review insufficiently acknowledges the historical role that habitat and species protections instituted as a part of ranchland management have played in stabilizing California's mountain lion population within the region encompassing Tejon Ranch. Accordingly, any listing determination should be narrowly tailored to localized population-level vulnerabilities, while valuing existing and successful conservation programs, wildlife corridors, and management practices – both historically implemented and more recently established by the Ranch.

Historic Conservation at Tejon Ranch

For more than 175 years, Tejon Ranch has stewarded one of California's most significant landscapes, spanning the Tehachapi Mountains and linking the southern Sierra Nevada, Central Valley, and South Coast regions. More than 15 years before "Room to Roam" (AB 1889, Friedman) became California law, Tejon Ranch acted voluntarily to incorporate wildlife connectivity into its land use planning by ensuring that development protects against habitat fragmentation, promotes biodiversity and support climate resilience. Through an historic conservation framework struck in 2008, Tejon Ranch committed 240,000 acres to permanent open-space conservation, representing the largest private land conservation commitment in California. Today, Tejon Ranch's commitments are legally enforceable and implemented through multiple, complementary mechanisms, including:

- The 2008 Tejon Ranch Conservation and Land Use Agreement with nationally recognized conservation organizations;
- Conservation easements acquired with substantial investment by California, including Wildlife Conservation Board funding, specifically to preserve habitat and regional wildlife linkages;
- A state approved multi-species habitat management plan and companion federally approved multi-species habitat conservation plan that preserve large, contiguous habitat blocks and ensure long-term wildlife movement; and

- Project-level conditions of approval and mitigation measures adopted following extensive CEQA review by CDFW, which preserve open space and habitat connectivity, preserve safe and effective wildlife movement corridors (including movement through existing and planned transportation infrastructure), prohibit harmful practices such as anticoagulant rodenticides, and reduce human-wildlife conflict.

CESA requires that listing determinations be based on the best available science and that the Department consider the effects of existing management and conservation efforts when evaluating whether a species should be considered as threatened or endangered. For Tejon Ranch, these existing measures are not speculative; they are implemented or set forth in binding CDFW permits, conservation easements, and CEQA mitigation and monitoring programs, are consistently monitored, and are already functioning successfully at a landscape scale today.

Habitat Fragmentation and Connectivity in CDFW Regions 4 and 5

CDFW has prioritized barriers to wildlife connectivity and the role of major transportation corridors such as Interstate 5, and State Routes 58 and 138 in constraining mountain lion movement and gene flow in CDFW Regions 4 and 5. Importantly, Tejon Ranch's conservation and development framework responds to the barriers identified in the Status Review. All existing and future development, which is planned for just 10 percent of Tejon Ranch is designed to preserve all wildlife under crossings and culverts along I-5 to maintain east-west movement opportunities through Tejon Ranch where they currently exist. Currently, the California Aqueduct, significant water infrastructure owned and operated by the state of California, redirects wildlife movement away from SR-138 in the high desert Antelope Valley. There is no planned development adjacent to SR-58. Further, large, contiguous open-space habitat blocks and linkages on Tejon Ranch align with the greater Tehachapi linkage areas identified in connectivity studies, including those relied upon by CDFW, and provide functional habitat and movement pathways adjacent to these infrastructure constraints.

CDFW's own 2022 study, the "Restoring California's Wildlife Connectivity" report, identifies transportation infrastructure – and not highly planned development that implements conservation together with connectivity best practices and measures within conserved landscapes – as the dominant constraint to connectivity for mountain lion. CDFW's Status Review and mountain lion listing recommendation should be corrected to specifically recognize that Tejon Ranch's massive and enforceable conservation measures maintain and enhance large blocks of occupied habitat, as well as connectivity for the species throughout the portion of the Ranch that supports suitable mountain lion habitat adjacent to the transportation barriers CDFW identified.

Boundary of DPS is Broader than CDFW's Analysis and Scientific Data Support

The DPS boundary is modified from the petitioned ESU boundary, with certain modifications explained while others are not. While the lack of detail in the study makes it difficult to evaluate,

it appears that the proposed DPS boundary wraps in a large portion of the south San Joaquin Valley in the vicinity of Tejon Ranch, including farmland and flatlands that are not suitable mountain lion habitat due to the absence of denning features, cover/shelter, and ongoing availability of prey, primarily elk and deer. The boundary should be aligned to encompass known suitable mountain lion habitat based on best available science, including recent habitat assessments and surveys conducted for the area in compliance with CEQA, the California and federal Endangered Species Acts, and other environmental regulatory requirements. The result should be a revised boundary in the South San Joaquin Valley to align with the Mountain Lion Range identified on Figure 2 of the Status Review document and encompassing known suitable mountain lion vegetational habitat and terrain within the vicinity of Tejon Ranch.

Additionally, genetic data from lions in this area as depicted on Figure 9 demonstrate that the lions in the southern San Joaquin Valley area are Western Sierra Nevada dominant, which is determined to be non-endangered. The overly broad listing designation reduces the value and veracity of the DPS and unnecessarily results in a cloud of regulatory uncertainty on lands that are not relevant to the goals of the proposed DPS or the protection of the species.

Development within a Conservation-First Landscape

Tejon Ranch's development is intentionally limited, carefully sited, and comprehensively avoids, minimizes, and mitigates the potentially adverse habitat and species effects of development occurring on a small fraction of Tejon Ranch adjacent to existing transportation corridors and job centers. More than 90 percent of the Ranch remains permanently conserved, and within, and adjacent to, approved development communities. This development must incorporate measures requiring the conservation of substantial open space, the protection and enhancement of wildlife movement corridors, creation or maintenance of habitat linkages and road underpasses, and implementation of light restrictions, waste controls, and anti-coagulant prohibitions coupled with education programs for residents to ensure the protection of mountain lions and other species. While the Status Review states that "Development within key connectivity areas such as the Tehachapi Mountains near Interstate 5, if not carefully planned, could further constrain lion movement within a relatively narrow corridor of highly suitable habitat connecting the western Sierra Nevada with the central coast and Southern California (Penrod and Smith 2022)", development at Tejon Ranch has been carefully planned and corridors through project areas are incorporated in such planning and will preserve connectivity to existing undercrossings along the I-5 corridor identified as a barrier.

Regretfully, the CDFW recommendation's broad treatment of "development" fails to distinguish between legacy development and new modern projects implemented within an enforceable conservation framework that was specifically designed to address habitat loss, fragmentation, and human-wildlife conflict. The CDFW Status Review and listing recommendation should be revised to recognize public comments and historical CDFW approvals regarding habitat conservation,

connectivity and avoidance measures committed to by large landowners, particularly those made by Tejon Ranch in coordination with or under the supervision of CDFW. The actions of Tejon Ranch and other large private landowners already conserve large blocks of habitat and enhanced connectivity that measurably decrease habitat fragmentation and improve potential wildlife movement and genetic exchange.

Further, more updated distribution information provided to CDFW but that was not relied upon in its determinations in the Status Review, include the conservation, connectivity, and wildlife movement contributions of existing CDFW approved planning; CEQA and permitting documents for the Tejon Ranch Grapevine and Mountain Village Specific Plans; and relevant information in the CDFW approved Habitat Management Plan and U.S. Fish and Wildlife Service-approved Tehachapi Upland Multi-Species Habitat Plan (TUMSHP), which are adopted habitat management and conservation plans. The avoidance, minimization, and mitigation measures for these conservation-first landscape level plans, which include the establishment of large block open space conservation areas and preserved movement and connectivity corridors that have been approved at the local, state, and federal level in planning and permitting documents, should be considered in all CDFW post-listing CEQA comments and permitting actions. This is critical to ensure recognition that Covered Activities under existing and approved MSAAs, HMPs, NCCPs, MSHCPs and HCPs should continue to be permitted, so long as mountain lion was identified as a conservation planning species, as was the case for Tejon Ranch approved development projects mentioned.

Conclusion

Tejon Ranch respectfully urges the Commission to ensure that its actions fully reflect the statutory requirements of CESA, and the real-world conservation outcomes planned and already achieved through existing conservation, stewardship, and management measures like those implemented at Tejon Ranch. Any science-based decisions should recognize that Tejon Ranch's large-scale, permanent private land conservation efforts already play a critical role in addressing the very threats to the mountain lion identified in the CDFW Status Review and that Tejon Ranch's carefully planned development results in preservation of wildlife movement corridors that support the mountain lion.

We respectfully ask that that the Fish and Game Commission direct CDFW staff to address these points by correcting the Status Review and listing recommendation to ensure that they are part of the record prior to acting. Any listing determination made by the Commission should be calibrated to avoid undermining existing and successful conservation commitments and to encourage, rather than discourage, the type of long-term stewardship that is essential to the protection of mountain lions and California's working landscapes.

Thank you for the opportunity to provide public comment.

Sincerely,



Hugh F. McMahon IV
Executive Vice President, Real Estate
Tejon Ranch Company

Cc: Melissa Miller-Henson, Executive Director, FGC
Valerie Termini, Acting Director, CDFW
Chad Dibble, Deputy Director, CDFW

January 29, 2026

California Fish and Game Commission
715 P Street, 16th Floor
Sacramento CA 95814

Submitted via e-mail: fgc@fgc.ca.gov

SUBJECT: California Fish and Game Commission February 12, 2026 Meeting
Agenda Item #17 – Petition to list the Mountain Lion pursuant to CESA

Dear President Zavelet, Vice President Murray, and Commissioners Hostler-Carmesin, Sklar & Anderson:

The California Building Industry Association (CBIA) and the Building Industry Association of Southern California (BIASC) appreciate the opportunity to provide comments on the upcoming California Fish and Game Commission (Commission) February 12, 2026, Meeting Agenda Item #17 dealing with the petition to list the Mountain Lion as threatened under the California Endangered Species Act (CESA). CBIA is a statewide trade organization representing thousands of member companies, including homebuilders, trade contractors, architects, engineers, designers, suppliers, and other professionals involved in homebuilding, multi-family, and mixed-use development. CBIA members are responsible for nearly 90% of new housing units in California, encompassing a range of projects from charity homes and affordable housing to middle-class market-rate and luxury residences. Our priority issue is to ensure the availability of affordable housing for all Californians.

The BIASC is the voice of the region's building industry, with five chapters offering localized services to building professionals from Ventura to the southern tip of Orange County. Throughout its 100-year history, the association has served its builder and associate members by anticipating, protecting, and promoting their common interests through its many programs, services, councils and committees.

The need for available and affordable housing throughout California is well documented as are the issues that create impediments to achieving this goal. Impediments include new regulations that inhibit our member's ability to provide affordable homes and communities. It is in this context that we provide the following comments:

Mapping Concerns

The Commission should not list the Mountain Lion without emphasizing the fact that the State's habitat mapping is inaccurate and out of date. For example, the California Department of Fish and Wildlife (CDFW) *California Wildlife Habitat Relationships (CWHR) Predicted Habitat Suitability maps* found on the CDFW website (https://wildlife.ca.gov/Data/Analysis/CWHR), show low, medium and high value habitat within densely populated areas of Southern California (See Attachment A, Figure 1). Figure 2 in the CDFW mountain lion listing petition assessment, entitled *A Status Review of the Petitioned Southern California/Central Coast Evolutionarily Significant Unit (ESU) of Mountain Lion (Puma concolor couguar) in California* (December 2025) (Status Review) also shows low, medium and high habitat suitability over densely populated areas (See Attachment A, Figure 2). These populated areas should not be considered mountain lion habitat. Based on internal citations and overlay exercises, it is clear that the Statue Review Figures rely on inaccurate and out of date base maps, including the CWHR Predicted Habitat Suitability Maps.

Therefore, the Status Report does not reflect the building that has occurred in the last 1-2 decades. Consequently, until rectified, these existing statewide maps should not be used post-listing for any regulatory purpose, including for purposes of CDFW comments or recommendations regarding proposed development pursuant to California Environmental Quality Act (CEQA), the Fish and Game Code Streambed Alteration Agreement provision, or the California Endangered Species Act (CESA).

While theoretically a mountain lion could roam anywhere, the focus of this listing should be on the species' suitable habitat. As noted in the Status Review, suitable habitat includes "relatively rugged terrain, riparian areas, and woodland" and - "areas with dense stalking cover and avoid open areas to facilitate hunting success." (Status Review, p. 12). Suitable mountain lion habitat provides denning features, cover/shelter, and ongoing availability of prey (primarily deer and elk), not an urbanized landscape.

Based on prior listings, our concern is that if the maps are not corrected, then in practice, applicants will be forced under the CEQA, the California Fish and Game Code Streambed Alteration Agreement provisions, and/or CESA to conduct mountain lion studies and provide mitigation on projects in areas identified as potentially suitable habitat in the inaccurate maps when the areas proposed for development are not primary or even suitable habitat areas, which would significantly increase project costs and schedules. Therefore, we request that the Commission should direct CDFW to correct the mapping inaccuracies and update all maps regarding mountain lion occurrence and suitable habitat prior to, or as a condition of, the listing of the species, and prior to their use for any regulatory purpose or the preparation of any additional management or recovery planning or documentation. These corrections should also reflect suitable habitat conserved or protected for conservation pursuant to existing Habitat Management Plans, Multi-Species Habitat Conservation Plans, and Natural Community

Conservation Plans that identify the mountain lion as a conservation planning or covered species, such as the Western Riverside MSHCP.

California Environmental Quality Act (CEQA)
The Status Review states:

> *"Additional protection of mountain lions following listing would be expected to occur through state and local agency environmental review under CEQA. CEQA requires affected public agencies to analyze and disclose project-related environmental effects, including potentially significant impacts on wildlife species. The CEQA Guidelines require a mandatory finding of significant impact, thus requiring preparation of an Environmental Impact Report, when a project has the potential to substantially reduce the number or restrict the range of a threatened or endangered species (Cal. Code Regs. 14, 3038 §15065(a)(1)). In common practice, potential impacts to listed species are examined more closely in CEQA documents than potential impacts to unlisted species. Where significant impacts are identified under CEQA, the lead agencies must typically adopt project-specific avoidance, minimization, and mitigation measures to limit impacts to the species. State listing, in this respect, and consultation with the Department during state and local agency environmental review under CEQA would be expected to benefit mountain lions in the petitioned ESU in terms of reducing impacts from individual projects. Absent listing, such protection measures or mitigations might not occur."*

It is important for the Commission to make it clear to CDFW, as a permitting agency under the Fish and Game Code as a responsible and trustee agency under CEQA, and to other state and local lead agencies that potential impacts to mountain lions shall not be based on the current mapping in the Status Review Report. In the absence of clarification from the Commission and corrections to the maps by the Department, CDFW itself, and many lead agencies and/or applicants will require expensive and time-consuming mountain lion studies in areas that are not actually suitable mountain lion habitat, wildlife corridors or other important connectivity linkages. Additionally, the Commission should clarify that cumulative effects should focus on projects within the constrained linkage areas, which should not apply to most projects in suburban areas.

While we concur that projects in suitable habitat areas where mountain lions can viably live and/or within areas proposed for development within a priority movement barrier, CEQA studies and analysis are needed. However, this type of analysis should not be performed across Southern California in already developed areas or areas surrounded by existing development. Attachment B provides some examples of inaccurately mapped areas that should be addressed by CDFW mapping corrections.

Primary Risk

In addition to the mapping concerns, CBIA and BIASC believe it is important for the Commission to highlight key findings regarding the risk of the species which also coincides with our mapping concerns if it does decide to approve the petition as recommended by Department staff. First, the Department's analysis indicates that the primary biological risk to the petitioned Southern California/Central Coast population is genetic isolation resulting from restricted movement between otherwise suitable habitats, not a statewide decline in habitat availability or prey abundance. The report consistently emphasizes that this risk is geographically constrained and driven by specific landscape conditions.

Second, the Status Review identifies existing transportation infrastructure, particularly highways and freeways, as the dominant barrier to dispersal and gene flow where those facilities intersect mountain ridgelines, narrow passes, and known movement corridors. Road mortality and the absence of effective crossing opportunities at these locations are repeatedly cited as the most significant threats to long-term population resilience – not new construction.

Third, the report confirms that most of California's mountain lion population is not threatened and is generally stable, reinforcing that the concerns identified are localized rather than indicative of a statewide species-level decline.

These findings underscore a central conclusion of the Status Review: addressing genetic isolation requires fixing discrete, existing infrastructure barriers at known chokepoints, not constraining or impacting new development across large areas where habitat remains otherwise suitable.

Department staff have indicated that lead agencies may look to the Status Review when conducting CEQA analysis for future projects as discussed previously. However, the report clearly identifies existing state transportation infrastructure, not new development, as the primary driver of genetic isolation. Regulatory approaches that shift responsibility for correcting historic, statewide infrastructure barriers onto individual housing, utility, or industrial projects risk misaligning mitigation requirements with the actual cause of the biological threat.

Habitat Conservation Plans

Finally, CBIA and BIASC believe that the petition and the Department's status review report does not give enough credit for those entities that embarked on the development of large, landscape-based habitat conservation plans and the value those plans can and are providing species like the mountain lion even though some plans may not specifically identify the mountain lion in its plan. The benefits derived by all species based on the willingness of private landowners to participate in such large-scale planning efforts should be highlighted and praised by the Department.

We urge the Department and the Commission to acknowledge the benefits created by existing management efforts and habitat conservation plans and believe that existing and planned development within these plans that clearly take into account habitat connectivity and avoidance measures should be lauded for their forward thinking approach and considered in any Department post-listing regulatory activity as already discussed in the CEQA portion of our comments.

Finally, we are concerned that if the Department fails to acknowledge the value of these types of planning efforts in documents such as the species Status Review report, it will discourage others from entertaining the thought of entering into long-term planning efforts with the Department.

Conclusion

The Status Review notes that "Benson et al. (2019) found that sustaining mountain lion populations in isolated mountain ranges in greater Los Angeles (Santa Monica and Santa Ana Mountains) is feasible with relatively modest increases in landscape connectivity." This statement is reflective of the Department's broader approach to mountain lion protection, as reflected in its actions and activities following the emergency listing of the species 6 years ago and in the Management and Recovery Action Recommendations set forth in Section 10 of the Status Review. Conservation of occupied and related suitable habitat areas and key linkages to provide mountain lion connectivity and genetic diversity are critical to the species, but projects that are not within suitable habitat areas or key linkages should not be required to provide unnecessary habitat assessments, surveys, impacts analyses or avoidance, minimization or mitigation measures under CEQA, Fish and Game Code Streambed Alteration agreement provisions, or CESA..

We would appreciate your willingness to discuss the inaccuracy of the mapping set forth in the Status Review along with our other concerns on the record and to direct the Department to update the mapping prior to its use for any regulatory purpose. The improper use of the Status Review maps will affect all development within the central and southern areas of California identified within the listing boundary by the Status Review. These areas need substantial residential development to combat the housing policy crisis the State currently faces.

Sincerely,



Nick Cammarota
California Building Industry Association



Jeff Montejano
Building Industry Association of Southern California

Attachment A

Figure 1: Status Review: CWHR Predicted Habitat Suitability Map
Figure 2: Status Review: Mountain Lion Range and Habitat Suitability Map

Attachment B

Examples of Mapping Inaccuracies

cc: Valerie Termini, Director (Acting), Department of Fish and Wildlife
Chad Dibble, Deputy Director, Wildlife and Fisheries Division, Department of Fish and Wildlife

ATTACHMENTS

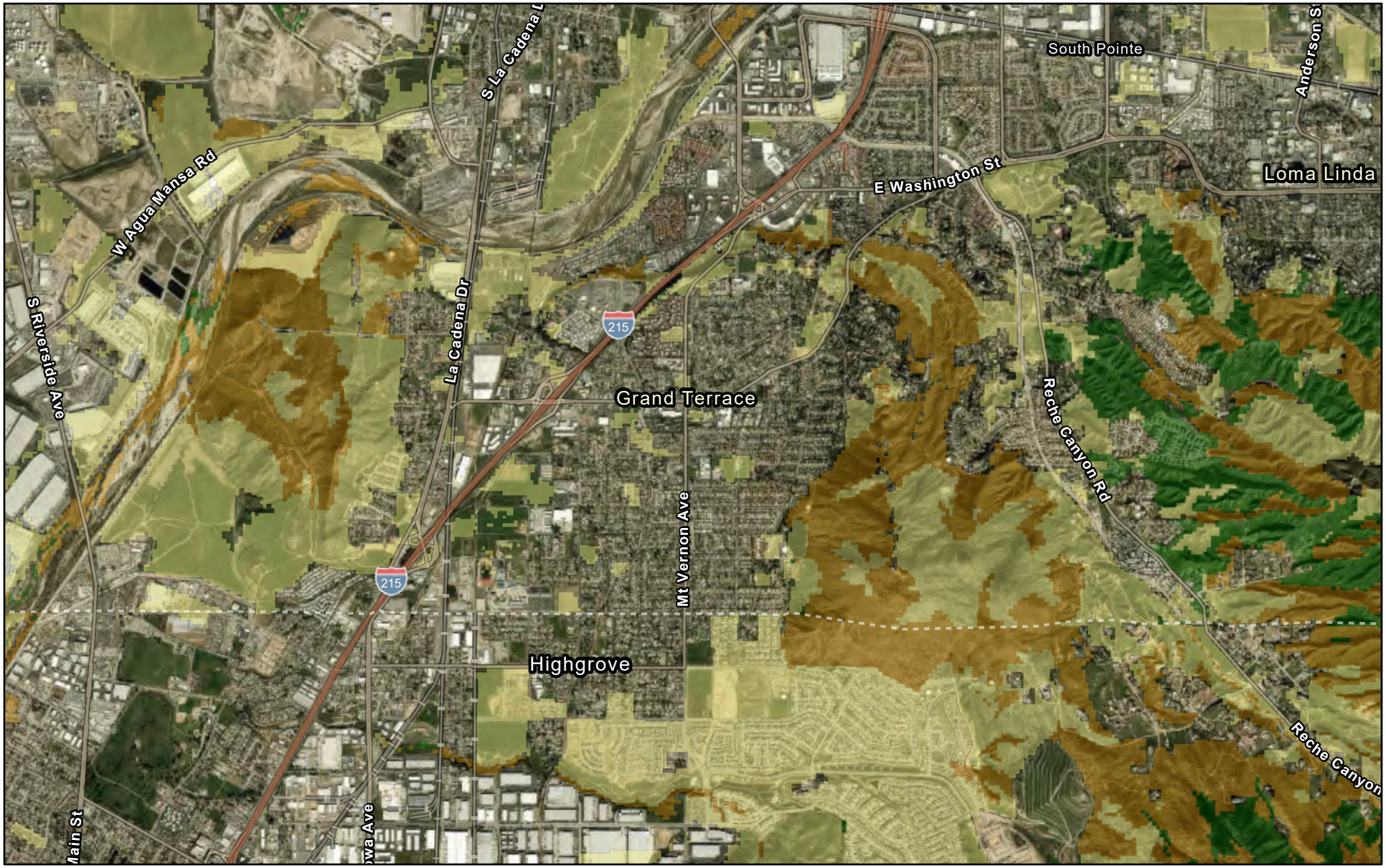
Attachment A	Figure 1: California Wildlife Habitat Relationships (CWHR) Predicted Habitat Suitability Maps Southern California Inland Empire Region
	Figure 2: Status Review of the petitioned Southern California/ Central Coast ESU of Mountain Lion in California California Department of Fish and Wildlife
Attachment B	Examples of Mapping Inaccuracies

ATTACHMENT A

Figure 1: California Wildlife Habitat Relationships (CWHR) Predicted Habitat Suitability Maps Southern California Inland Empire Region

Figure 2: Status Review of the petitioned Southern California/Central Coast ESU of Mountain Lion in California
California Department of Fish and Wildlife

California Wildlife Habitat Relationships (CWHR) Predicted Habitat Suitability Maps Southern California Inland Empire Region



1/27/2026

Mountain Lion Predicted Habitat - CWHR M165 [ds2616]

- HIGH
- MEDIUM
- LOW

World Imagery

Low Resolution 15m Imagery

High Resolution 60cm Imagery

High Resolution 30cm Imagery

Citations

9.6m Resolution Metadata

1:50,000

0 0.35 0.7 1.4 mi

0 0.5 1 2 km

County of San Bernardino, Microsoft, Vantor, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS

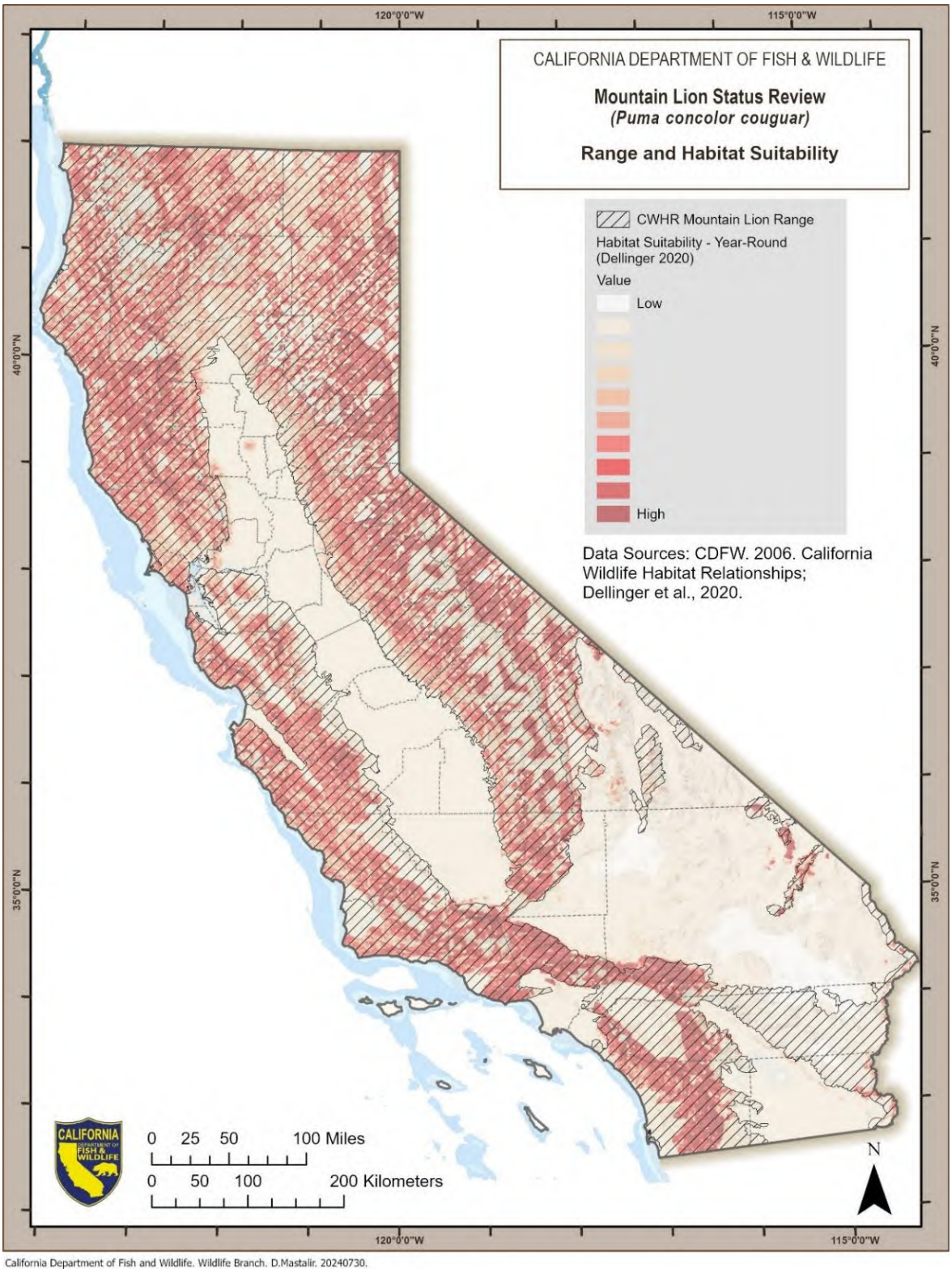
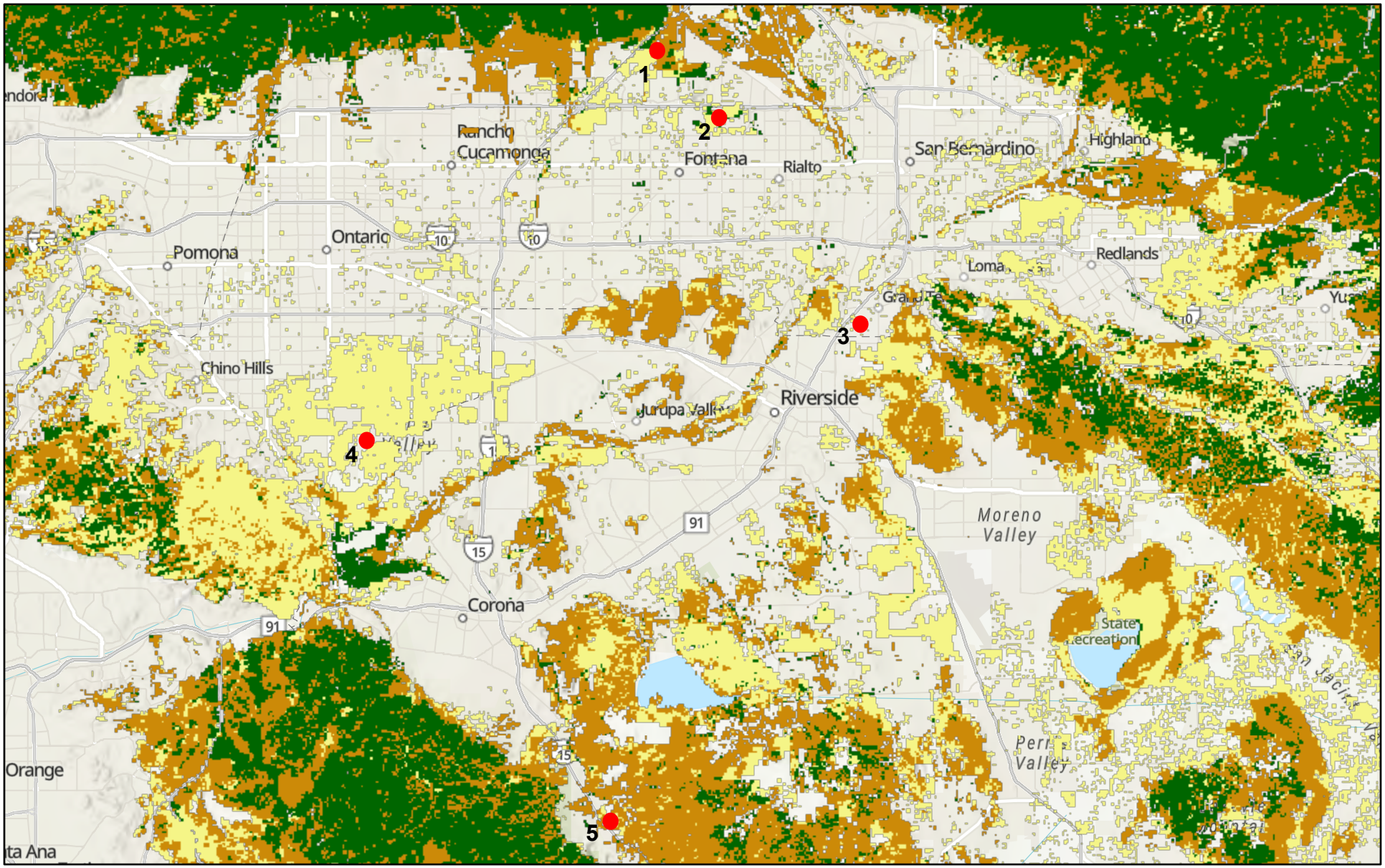


Figure 2. Range and habitat suitability for mountain lions in California. Darker red indicates a higher probability of mountain lion occupancy (Dellinger et al. 2020a). Mountain lions may occasionally occur at low densities outside of this range (most often non-breeding or dispersing individuals).

ATTACHMENT B

Examples of
Mapping
Inaccuracies

Attachment B



1/26/2026

1:370,509

0 2.5 5 10 mi

0 4.25 8.5 17 km

Mountain Lion Predicted Habitat - CWHR M165 [ds2616]

HIGH

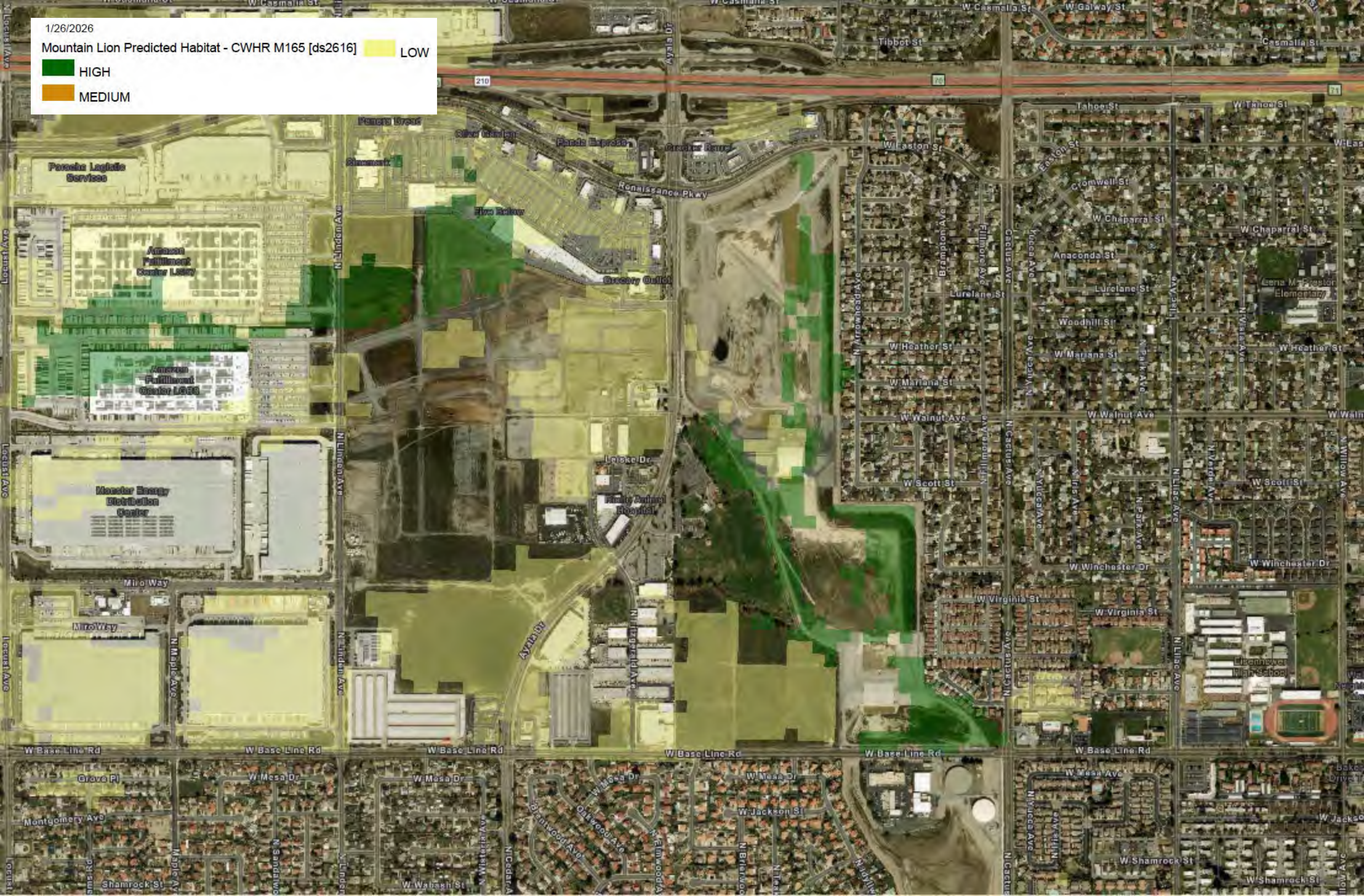
MEDIUM

LOW

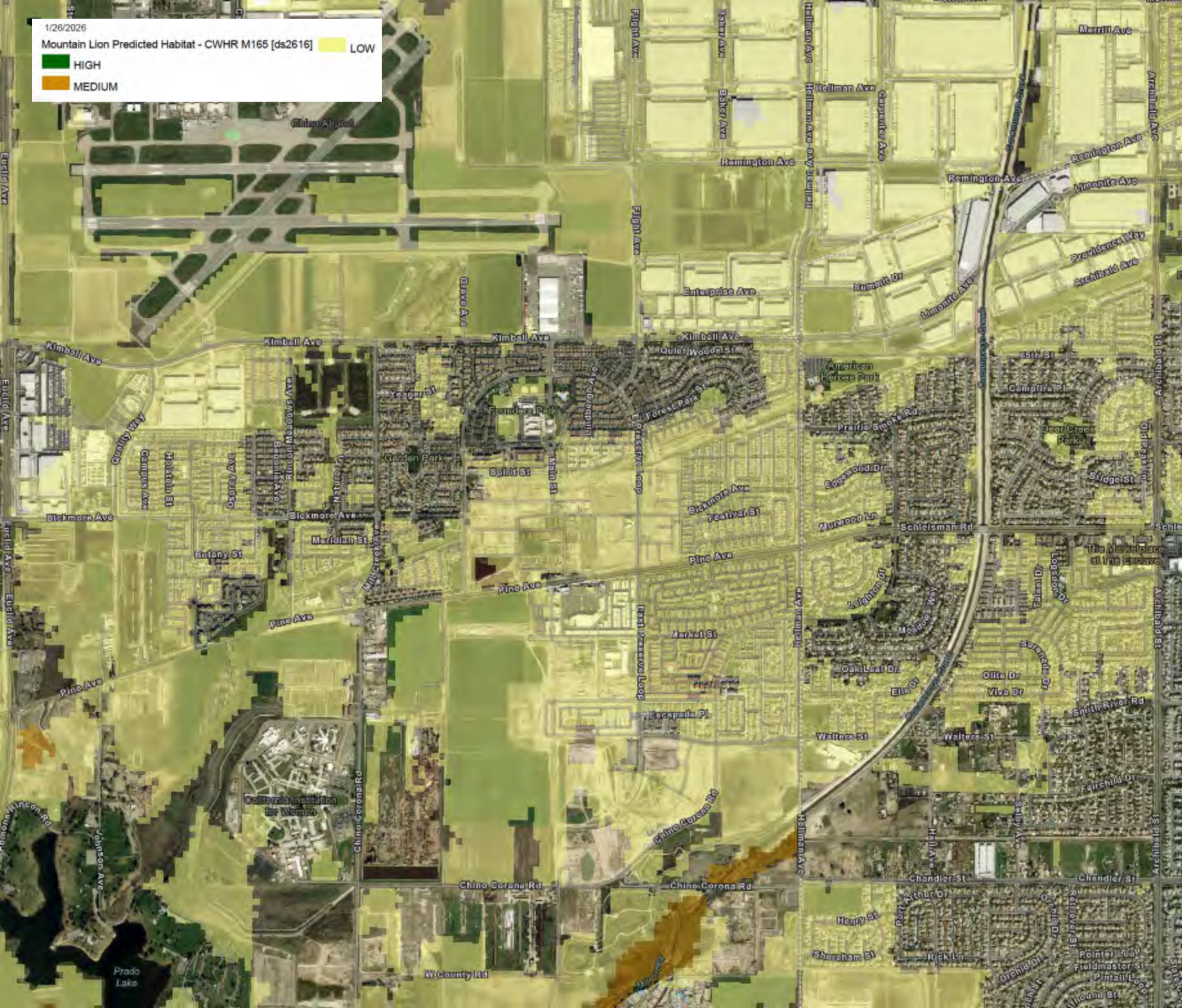
[Map Pages]

Esri, NASA, NGA, USGS, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, (c) OpenStreetMap contributors, and the GIS User Community


1/26/2026
Mountain Lion Predicted Habitat - CWHR M165 [ds2616]
LOW
HIGH
MEDIUM
Coyote Canyon
Citrus Heights North
Summit Heights
Citrus Heights South
Sierra Lakes
Sierra Lakes Golf Course
Rosena Park East
Duncan Canyon Rd
Coyote Canyon Rd
Beech Ave
Summit Ave
Sierra Lakes Pkwy
Casa Grande Ave
W Casa Grande Dr
Three Mile Rd
Lozano St
Yarrow Ln
Gardens St
Oakville St
Wyndham Ln
Lowell St
Bohnert Ave
W Casmalia St
Citrus Ave
Sierra Ave
Cypress Ave
Edward Ave
Lytle Creek Rd
Caterpillar Dr
Fox Ridge Dr
Parry Peak Dr
Kings Peak Dr
Portenza Dr
Wilbert Dr
Knox Ave
Parkside Way
Park House Dr
Fountain Park
Almaden Dr
Escalon Dr
Colonial Dr
Clubhouse Dr
Meadowlark Dr
Eagle Crest Dr
El Rovino Dr
Stonehurst Dr
La Sierra Dr
Ferguson Park
W Calle Vista Dr
W Buena Vista Dr
W Via Bello Dr
W Live Oak Ave
N Riverside Ave
Alder Ave
Palmetto Ave
Pauline Ave
Condor Ave
Magnolia Ave
Agave Ave
Blue Iris St
Thistle St
Palms St
Hickey St
Bridlepath Dr
Deer Dr
S Bridlepath Dr
Buckskin Dr
Saddleback Dr
Rockside Ave
Josephine Rd
Sequoia Ave
Pelham Way
Ridgeview Dr
Reagan Dr
Roosevelt Dr
Knox Ave
Dolphin Dr
Curtis Ave
Purtis Ave
Lytle Creek Rd
Maidel Ave
Cooper Ave
Catawba Ave
Beech Ave
San Sevaine Rd
Half Acre Dr
Larkstone St
Brant Dr
Knox Way
Meadowlark Dr
Sierra Lakes Pkwy
Summit Ave
Beech Ave
Summit Ave
Summit Ave
Summit


1/26/2026
Mountain Lion Predicted Habitat - CWHR M165 [ds2616]
LOW
HIGH
MEDIUM
Porsche Logistic Services
Amazon Fulfillment Center LGB8
Monster Energy Distribution Center
Amazon Fulfillment Center LGB9
Panera Bread
Silver Lake Ln
Panda Express
Discovery Outlook
Renaissance Pkwy
Five Below
Sheetmetal
Leiske Dr
Family Animal Hospital
Ayala Dr
Miro Way
W Base Line Rd
W Mesa Dr
W Jackson St
W Virginia St
W Winchester Dr
W Walnut Ave
W Scott St
W Mariana St
W Heather St
W Chaparral St
W Tahoe St
W Easton St
W Cromwell St
Anaconda St
Lurelane St
Woodhill St
W Casmalia St
W Galway St
Tibbot St
Grave Pl
Montgomery Ave
W Shamrock St
W Wabash St
N Linden Ave
N Maple Ave
N Lilac Ave
N Citrus Ave
N Arrowhead Ave
N Brampton Ave
N Fillmore Ave
N Locust Ave
Lena M. Preston Elementary
Lakeshore Middle School
210
10
71


1/26/2026
Mountain Lion Predicted Habitat - CWHR M165 [ds2616]
LOW
HIGH
MEDIUM
Barton Rd
Barton Rd
Barton Rd
Linda Ct
Rosa Ct
La Cadena Dr
Terrace Ave
Atlantic Northern and Santa Fe Railroad
La Paix St
De Berry St
De Berry St
Mayo St
Mayo St
Van Buren St
Van Buren St
La Loma St
Anderson Ln
Van Buren St
Lark St
Coyote Dr
Trinity Employment Center
Maryknoll Dr
Emerald St
Dove St
Pico St
Pico Park
Tanager St
Tanager St
Tanager St
Raven Way
Raven Way
Ladera St
Ladera St
W Main St
W Main St
W Main St
W Main St
Look In the Bell
Arlington Northern and Santa Fe Railroad
Taylor St
Arlington Terrace High School
Rosedale Ave
Rosedale Ave
Rosedale Ave
Joseph St
Mayo Ave
Mirador Ave
Mirador Ave
Mirador Ave
Flamingo St
Franklin
Kentfield St
Vivienda Ave
Vivienda Ave
Pascal Ave
Pascal Ave
Reed Ave
Reed Ave
Reed Ave
Garden Ave
Garden Ave
Fenwick Ave
Fenwick Ave
Melrose Ave
Melrose Ave
Melrose Ave
Melrose Ave
Stonewood Dr
Stonewood Dr
Wilmington Ave
Wilmington Ave
S La Cadena Dr
S La Cadena Dr
S Grayson Ave
S Grayson Ave
Rosedale Ave
Rosedale Ave
Rosedale Ave
Joseph St
Anderson Ln
Van Buren St
Lark St
Coyote Dr
Maryknoll Dr
Emerald St
Dove St
Pico St
Tanager St
Raven Way
Ladera St
W Main St
Flamingo St
Franklin
Kentfield St
Mirador Ave
Mirador Ave
Mirador Ave
Reed Ave
Reed Ave
Reed Ave
Pascal Ave
Pascal Ave
Vivienda Ave
Vivienda


1/26/2026
Mountain Lion Predicted Habitat - CWHR M165 [ds2616]
LOW
HIGH
MEDIUM
Chino Airport
Remington Ave
Kimball Ave
Bickmore Ave
Pine Ave
Chino Corona Rd
W County Rd
Prado Lake
Flight Ave
Hellman Ave
Baker Ave
Carpenter Ave
Merrill Ave
Archibald Ave
Limonite Ave
Enterprise Ave
Summit Dr
Providence Way
Euclid Ave
Quiet Woods St
Forest Park Dr
Prairie Smoke Rd
Campfire Pl
Bridge St
Schleisman Rd
Festival St
Meridian St
Botany St
Market St
Oak Leaf Dr
Olita Dr
Vico Dr
Escapade Pl
Walters St
South River Rd
Fairchild Dr
Chandler St
Henry St
Shoreham St
Ricklin
Pointer Ct
Fieldmaster St
Pintail Ln
Ground St
Orchid Dr
Park Arthur Dr
Johnson Ave
Pomona Rd
California Institution for Women
Osprey Ave
Holstein St
Compton Ave
Gardenia Ave
Yeager St
Main St
Duesenberg Dr
Loop
Preserve
Creek
Park


1/26/2026
Mountain Lion Predicted Habitat - CWHR M165 [ds2616]
LOW
HIGH
MEDIUM
Clay Canyon Dr
Dawson Canyon Rd
Park Canyon Dr
Lewis Pl
Spanish Hills Dr
Wandering Way
Vista Way
El Hermano Rd
Temescal Hills Dr
Sunset Vista Dr
Overlook Dr
Crestley Dr
Alton Dr
Terramor Dr
Stonehill Dr
Acadia Dr
Temescal Wash
Temescal Canyon Rd
Campbell Ranch Rd
Tomia Farm
Whitney Dawn Cir
Mojeska Summit Rd
Temescal Valley
Stagecoach St
Glenivy Rd
Maitri Rd
Juniper Ct
Bernice Todd Elementary School
Kasota Loop St
Mayhew Canyon Rd
Red Hawk Rd
Lucca Ct
The Springs at Sycamore Creek
De Palma Rd
Bunting Cir
Lee Lake
Trilogy Pkwy

FGC@FGC

From: Philip Salgado
Sent: Sunday, December 14, 2025 10:55 PM
To: FGC
Subject: CESA Mt.lions

My name is Phil Salgado of Morgan Hill California. Ive spent years researching mountain lions in the Santa Cruz mountains. It seems way to soon to list mountain lions as endangered or threatened. Shouldn't you at least wait and see what impacts the wildlife bridge over hw 101 has on their breeding opportunities. And most people don't believe the low numbers in southern California are due to impending extinction but rather habitat loss that can only be fixed by buying back the encroached property and bulldoze back their habitat. Otherwise any other efforts to increase their population is just going to get them hit by cars killed by angry ranchers and pushing them into human areas causing more attacks and killing eachother over territory. It was only 100 years ago the mt.lion was a mesopredator subordinate to the grizzly bear. Mt.lion is not the keystone species that the grizzly bear was. With seed dispersal and digging for roots overturning the soil to retain water to combat drought. What is being done to compensate for the lacking benefits of the mountain lion. Mt.lions are apex predators by default. So if the Mt.lion becomes extinct then what the bobcat becomes keystone species then the fox and raccoon. All of these protection laws just give them more freedom to be dangerous. Their fear of grizzly bears and everything else has dissolved and with nothing to keep them in check this problem can only get worse.

FGC@FGC

From: Kari Capulli
Sent: Monday, January 5, 2026 8:54 AM
To: FGC
Subject: Mountain lion discussion Feb 11 2026

To the fish and wildlife commissioner.
My name is Kari Capulli of Morgan hill ca. My community is in an uproar with pets and livestock depredation mostly sheep and goats according to my neighbors. This is regarding the 3 strike law.Please consider doing away with this horrible law. Our pets are our children not lion food. And if my pet that I've rescued bottle fed from birth and paid all of its vet Bill's and consider it one of my children if that pet somehow survives a mountain lion attack, there is just know way I could allow that same lion to attack my pet again. This is absolutely horrendous. It's too much to ask of pet owners. And yes we bring our animals in at night and have proper outdoor housing. But attacks happen in the daytime as well. Telling us to be aware of our surroundings is unrealistic nonsense. A mountain lion is like a sniper .How do we coexist with snipers that are undetected and leap out of nowhere. The property I live on is 90 years old and sightings are drastically increasing. I'm not talking about doorbell cams or tail cams I'm talking about face to face sightings. All around the Jackson oaks area in morgan hill. Please do not list mountain lions as endangered or threatened as it will only amplify all the existing laws protecting them. Think of us humans above protecting an already protected predator.

FGC@FGC

From: Pam Van Valkenburgh
Sent: Wednesday, January 28, 2026 6:02 PM
To: FGC
Subject: CESA

To Whom It May Concern -

I have been made aware that in February 2026 the California Fish and Game Commission will be considering the addition of mountain lions to the endangered species list. This is an incredibly dangerous and irrational decision. On Thursday 12/18 in Corral De Tierra, Monterey County, sometime after midnight a mountain killed our 275 pound mini horse, Hazel. My husband found her in her pen @7am. Her pen literally shares our backyard fence and she was next to 5 other full size horses not to mention the other 10 horses in surrounding paddocks and pastures. She was the third kill within three days in our community. The same mountain lion killed our neighbors two pets(dog and goat) two nights in a row before it killed Hazel. My husband filed a report with the local Department of Fish and Wildlife biologist and was issued a non-lethal depredation permit. Our non-lethal depredation permit stated, “Use of non-lethal hazing with non-lethal projectiles such as paint balls or standard agricultural hazing rounds to deter mountain lion intrusions until December 20, 2025. Dog can be used to haze mountain lion out of the area.” Due the fact that our mini horse was the 3rd kill within 3 days he told the biologist that type of permit was unacceptable and he needed a lethal depredation permit. The biologist responded by saying lethal depredation permits for mountain lions don’t exist. After our neighbor’s initial kill of their two pets the biologist mentioned to our neighbor that the lion most likely wouldn’t go after a mini horse/ pony or mini donkey but obviously he was WRONG. After the killing of our mini horse, Hazel, kills continued almost nightly, and even with every single one of these kills being reported, the Department of Fish and Wildlife did not taken action. In all, this lion killed 7 pets within 6 nights. I say it KILLED them because it did not eat any of them… it KILLED them. Our neighbor’s dog was taken right off their lit front porch and the next night their goat was taken out of their barn with their other two full size horses, pony and mini donkey in with it. After it killed our mini horse, Hazel, it continued the next night by killing another goat, the night after that two more border collies and the night after that a goat/ sheep hybrid. All were pets, all were in enclosures and/ or close to our homes. Not one of these animals were left out alone in pastures or away from our homes. They were all in enclosures and/ or close to our homes. The mountain lion was not behaving like a typical mountain lion. It was walking up lit driveways, snatched a dog from a lit porch, it was basically in our backyard when it killed our mini horse, her pen is within 30 yards of our house. It was very brazen and not deterred by lights, sounds, people and it had been seen during the daylight hours as well. It’s very unsettling especially since we and our neighbors have young kids. We are not comfortable letting them play around the property alone now even during the day. There are plenty of deer, turkey, general wildlife, etc. for this mountain lion to eat and sustain itself on in our area. Plain and simple: this mountain lion was not acting like a typical mountain lion therefore typical depredation means did not work. Our community needed help out here and for our concerns to be taken seriously and we were failed miserably by the state of California. I’m not, by any means, saying we should make it “open season” on mountain lions. They are beautiful, majestic animals and play a very important role in our ecosystem, but in the event there is a cat like this one, that is acting erratically

and very atypical of normal mountain lion behavior, we have the right to defend ourselves and our animals. Whether that means being issued a LETHAL depredation permit or having the authorities take it seriously and come get the mountain lion. Our community has coexisted with mountain lions for years and has never had any issues that even come close to what we experienced. I hear the arguments, trust me, I'm aware, we do live in their territory. But let's face it, anywhere we live used to be "their territory" before it became the city you live in. There have been lions come into Seaside, Del Rey Oaks, Marina. I saw a dead lion in the middle of Reservation Road that had been hit by a car in Marina the morning before our mini horse, Hazel was killed. The only difference is those lions realize it's not a safe place to hunt and go back because they are elusive and usually they want to stay as far away from humans as possible. Either that or, like the most recent situation in San Francisco when the cat was IMMEDIATELY caught and relocated. Why did it take less than a day for this one to be take seriously but no help to our community WHATSOEVER with the one in our area, which was ACTIVELY KILLING pets and posing a great threat to humans? The particular lion in our area was not behaving like a typical lion and our community is at a loss as to why Fish and Wildlife wouldn't want to trap it and figure out what's wrong with it. The biologist that works for Fish and Wildlife, that my husband had been in constant contact with, even said that it was not acting right and could be injured or something else could be wrong with it. I would have hoped that F&W would want to make sure it doesn't have something that could be spread to other animals or humans and/ or be bred into future lions. Or if it were injured, why wouldn't they want to trap it and help it? I, for sure, don't have all the answers but I am part of a community whose families are unfortunately grieving the senseless losses of their pets, ours included. I fear that if these lions do end up on the endangered species list, the state is just ASKING for people to start taking matters into their own hands. The people of California will know that they will have absolutely no help or support from the State of California if they are dealing with a problematic mountain lion. They aren't going to think twice before protecting their families, animals, livestock, etc. This could potentially lead to the death of even more mountain lions. Our community went through all the right/ legal channels expecting help from our state just to be left with nothing; no help, no support, no answers. Before our state can even BEGIN the process of adding mountain lions to the endangered species list, I sure hope there better be an UNBIASED, professional, accurate count of the lion population and a VERY thorough investigation done into any and all lion vs human encounters and that those be taken seriously. I personally hold the state of California responsible for the deaths of our animals and for the pain and suffering our animals and our families have endured. If our concerns had been taken seriously by Fish and Wildlife from the beginning, a lot of these precious animal's lives would have been spared.

Pam Van Valkenburgh

Sent from my iPhone

FGC@FGC

From: jordon
Sent: Thursday, January 29, 2026 4:12 PM
To: FGC
Subject: Concerns on CESA for mountain lions in the upcoming meeting topic 17

Lack of independent, methodologically diverse peer review and over-reliance on a single population analysis method do not support broad ESU listing

Dear Commissioners,

I submit this comment to raise concerns regarding both the scientific rigor of the peer review process and the population analysis relied upon to support listing of the proposed mountain lion ESU under the California Endangered Species Act (CESA). These issues are interconnected and materially affect whether the administrative record provides a reliable basis for a broad listing determination at this time.

Reference: https://fgc.ca.gov/cesa

As a local outdoorsman who has spent decades in the field along the Central Coast of California, I have personally observed an increase in the frequency of mountain lion encounters in recent years. These observations are not isolated. They are consistent with reports from other outdoorsmen, landowners, park staff, and field users who spend substantial time on the landscape and are well positioned to detect changes in wildlife presence. While such observations are not a substitute for formal population estimates, they represent a relevant line of field-based evidence that should be evaluated alongside other data when assessing population trends.

Scientific peer review is intended to identify weaknesses in reasoning, assumptions, data selection, and interpretation by subjecting an analysis to evaluation by qualified experts who are independent of the work being reviewed and who may bring different methodological perspectives. Independence and methodological diversity are widely recognized as core elements of scientific rigor, because they are how hidden biases, unsupported inferences, and structural limitations are identified and corrected.

Reference: National Academies of Sciences, On Being a Scientist:

https://nap.nationalacademies.org/read/12192/chapter/3

Reference: Committee on Publication Ethics (COPE), Ethical Guidelines for Peer Reviewers:

https://publicationethics.org/resources/guidelines/cope-ethical-guidelines-peer-reviewers

In this case, the peer review process does not appear to meet these accepted standards. Several peer reviewers are also authors of the datasets, analytical methods, or modeling frameworks relied upon in

the status review. While these individuals may be subject-matter experts, reviewing one's own work or closely related work does not constitute an independent test of reasoning. Standard peer-review guidance cautions against conflicts of interest and self-review because they undermine the critical function of peer review.

Reference: COPE, Competing Interests in Peer Review:

https://publicationethics.org/competing-interests

Reference: International Committee of Medical Journal Editors (ICMJE), Conflicts of Interest:

https://www.icmje.org/recommendations/browse/roles-and-responsibilities/author-responsibilities–conflicts-of-interest.html

Methodological diversity is also a recognized component of robust scientific review. Complex ecological questions are typically strengthened when reviewers using different analytical approaches evaluate the same conclusions. When reviewers share the same methods, assumptions, and datasets, the likelihood that core analytical choices will be challenged is substantially reduced.

Reference: U.S. EPA, Peer Review Handbook:

https://www.epa.gov/science-and-technology/peer-review-handbook

The absence of independent, methodologically diverse peer review is particularly significant here because the population assessment relies heavily on a narrow analytical framework. By emphasizing a single population analysis method, the record does not adequately integrate or test conclusions against other available lines of evidence commonly used in wildlife population assessment. Independent reviewers with expertise in alternative approaches—such as observational trend analysis, occupancy modeling, landscape ecology, or applied management datasets—could reasonably have identified limitations or alternative interpretations that were not addressed.

As a result, the analysis gives limited weight to consistent, regionally corroborated evidence indicating stable or increasing mountain lion presence in multiple areas along the Central Coast, including Ventura County, San Luis Obispo County, and Monterey County. Field-based indicators such as increased encounter frequency, broader spatial use, and sustained prey availability are treated as anecdotal rather than evaluated as meaningful population signals. The record does not explain why these independent lines of evidence were discounted, nor does it reconcile them with model-based conclusions.

I don't believe that a CESA requires reliance on a single method or analytical framework, but in fact the opposite. It requires a reasoned evaluation of all relevant scientific information. A scientifically rigorous assessment would examine whether different lines of evidence converge or diverge, and why. The absence of independent reviewers capable of challenging the dominant analytical framework makes it difficult to conclude that such an evaluation occurred.

Reference: https://wildlife.ca.gov/Conservation/CESA/Listing

In contrast, the administrative record contains well-documented and methodologically supported evidence of population risk in the Santa Monica Mountains, where fragmentation, isolation, and genetic

constraints are clearly described and supported by multiple datasets. In that region, concern appears well founded. However, the same depth of evidence and convergence among methods is not demonstrated for other regions included in the proposed ESU.

By applying conclusions derived from a narrow analytical approach across regions with differing landscape conditions and observational signals, the record risks overstating imperilment where available evidence may instead indicate stable or increasing populations. This concern is amplified by a peer review process that did not include independent experts positioned to identify flaws in reasoning, gaps in evidence, or alternative interpretations.

I respectfully request that the Commission consider the following questions before making a listing determination:

- How did the Commission evaluate whether the peer review process met accepted standards of independence and avoidance of conflicts of interest?
- Were experts using different population assessment methods asked to review and challenge the dominant analytical framework?
- How were field-based observational trends, including those reported by outdoorsmen, land managers, and park staff, evaluated and weighted?
- What evidence demonstrates that regions outside the Santa Monica Mountains face population-level risk comparable to that documented there?
- Would a revised peer review process involving independent, methodologically diverse experts materially affect the conclusions?

Until these issues are addressed, I respectfully request that the Commission defer a broad ESU listing and consider whether additional independent peer review and a more integrated, multi-method population assessment are warranted. Ensuring that scientific conclusions are tested through independent and critical review is fundamental to both scientific integrity and the intent of CESA.

References

- Fish and Game Commission CESA process: https://fgc.ca.gov/cesa
- Overview of CESA Listing Process (CDFW PDF): https://nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=193394
- CDFW CESA Listing overview: https://wildlife.ca.gov/Conservation/CESA/Listing
- National Academies of Sciences, On Being a Scientist: https://nap.nationalacademies.org/read/12192/chapter/3
- COPE, Ethical Guidelines for Peer Reviewers: https://publicationethics.org/resources/guidelines/cope-ethical-guidelines-peer-reviewers
- COPE, Competing Interests in Peer Review: https://publicationethics.org/competing-interests
- ICMJE, Conflicts of Interest: https://www.icmje.org/recommendations/browse/roles-and-responsibilities/author-responsibilities–conflicts-of-interest.html

- U.S. EPA, Peer Review Handbook: https://www.epa.gov/science-and-technology/peer-review-handbook

Sincerely

Jordon Reyes

Sent from Proton Mail for iOS.

January 29, 2026

Submitted via email to fgc@fgc.ca.gov

Dr. Erika Zavaleta, President
California Fish and Game Commission
1416 Ninth Street, Suite1320
Sacramento, CA 95814

Re: Mountain Lion CESA Petition: Agenda Item #17 of the February 12, 2026 California Fish and Game Commission Meeting

Dear President Zavaleta and Commissioners:

On behalf of the Center for Biological Diversity (Center), I am writing to strongly urge you to follow the recommendation of the California Department of Fish and Wildlife (CDFW) to formally list the Central Coast and Southern California distinct population segment (DPS) of mountain lions as threatened under the California Endangered Species Act (CESA).

The Center for Biological Diversity (Center) is a non-profit, public interest environmental organization dedicated to the protection of native species and their habitats through science, policy, and environmental law. The Center has over 1.8 million members and online activists throughout California and the United States. The Center and its members have worked for many years to protect imperiled wildlife and open space, air and water quality, and overall quality of life for people in California.

We commend CDFW staff for their thorough and thoughtful status review, for taking the time to understand the science, and for listening to the external reviewers and subject matter experts when undertaking this complex and critically important issue. We also thank the dedicated researchers who have spent many years investigating these majestic cats so that we can better understand the barrage of threats they face as they navigate our human-modified landscapes.

Science clearly shows that lack of wildlife connectivity is driving Central Coast and Southern California mountain lions towards extinction. Roads and poorly planned development present significant barriers to movement, which have led to high levels of inbreeding and poor genetic health (Benson et al., 2019; Ernest et al., 2003, 2014; Gustafson et al., 2018, 2021; Huffmeyer et al., 2021). Compounding habitat fragmentation and genetic isolation, human-caused mortalities—including vehicle strikes, depredation kills, rodenticide poisoning, poaching, disease, and wildfire—are the leading cause of death for mountain lions across California (Benson et al., 2020, 2023; Nisi et al., 2023; Vickers et al., 2015). Edge effects of roads and development can also injure, sicken, or cause costly behavioral shifts in these big cats (Barrientos et al., 2023; Nickel et al., 2021; Nisi et al., 2022; Smith et al., 2017; Suraci et al., 2019; Wang et al., 2017; Wilmers et al., 2013; Yovovich et al., 2020). If we do nothing, we could lose some of the populations within the proposed DPS within decades (Benson et al., 2019).

These wide-ranging cats require room to roam away from human-disturbed areas and in connected, intact, heterogeneous habitats (Dickson et al., 2005; Dickson & Beier, 2002; Kertson et al., 2011; Zeller et al., 2017). As discussed in CDFW's status review and in many of the external reviewers' comments, connectivity and gene flow are essential among and between the populations within the proposed DPS as well as between the proposed DPS and the relatively robust Western Sierra Nevada population. The Tehachapis and the Transverse Ranges (including the San Emigdio, Sierra Pelona, San Gabriel, and San Bernardino Mountains) are exceptionally crucial: in these areas existing habitat must be preserved and connectivity must be enhanced to ensure gene flow between the Central Coast populations, the Southern California populations, and the Western Sierra Nevada population. These areas are critical for statewide connectivity and healthy mountain lion populations, and the Center is thrilled to see that mountain lions in these geographic areas are included in the proposed DPS.

CESA protections allow for hope. Permanent protections under CESA could help steer California towards protecting and enhancing wildlife connectivity to ensure that Central Coast and Southern California mountain lions will have a chance to thrive alongside us. The Center appreciates CDFW's management and recovery action recommendations. Proactive efforts should include the following:

- Preserving high quality mountain lion habitat in important connectivity areas;
- Restoring degraded habitats that are beneficial for wildlife movement;
- Identifying appropriate locations and building wildlife crossings at priority barriers, including those identified by CDFW and other experts (*e.g.*, I-5 between Grapevine and Castaic);
- Requiring land use and planning agencies to identify important wildlife connectivity areas in their jurisdictions and implement wildlife-friendly infrastructure and design;
- Restricting the use of the most harmful rodenticides on the landscape, including ensuring that the California Department of Pesticide Regulation does not expand the use of anticoagulant rodenticides as they are currently proposing in their new regulations;
- Investing in safe coexistence strategies that minimize conflicts with domestic animals, including public education and outreach and committing resources to facilitate the use of conflict prevention measures (e.g., using predator-proof enclosures at night); and
- Continuing important research and monitoring that informs how we can minimize human-caused mortalities and improve our ability to safely coexist.

We urge the commission to direct CDFW to develop and implement a recovery plan that includes the above suggestions and CDFW's recommended management and recovery actions (CESA; Fish & G. Code, §2079.1).

Although the Center is disappointed that portions of the desert in southeastern California were excluded from the DPS, we understand that data limitations may justify their exclusion. We hope that CDFW commits resources to studying mountain lions in that area to fill data gaps, particularly given that connectivity to the south will likely be hindered by border wall construction. Mountain lions in the desert could be imperiled and/or they could serve as an

important connection with mountain lions along the Colorado River and in Arizona. Understanding their status would help inform management and recovery actions.

CESA protections will help protect and recover the species and support the state's rich biodiversity, landscapes, and culture. As a keystone species and ecosystem engineer, mountain lions play an important role in the food chain and predator-prey dynamics. Their kills provide a reliable food source for numerous scavengers and other wildlife, including bears, raptors, and beetles (Barry et al., 2019; Elbroch et al., 2017; Labarge et al., 2022; Ruth & Elbroch, 2014). And their presence as a wide-ranging top predator has been shown to modify the behavior of their prey and mesocarnivores, which can help to promote watershed health and maintain diverse habitats that support native wildlife and plants (Ripple et al., 2014; Ripple & Beschta, 2006, 2008). Local extinction of mountain lions could have cascading consequences that result in the loss of a beloved species, degraded ecosystems, and decreased biodiversity.

We urge the Commission to grant CESA protections to the Central Coast and Southern California DPS of mountain lions and officially recognize that habitat connectivity is paramount to prevent extinction. At a time when the federal administration is rolling back protections of imperiled species and lands, California can provide a bright spot of hope for nature and reaffirm their status as an environmental leader.

Thank you for the opportunity to submit comments on CDFW's status review of Southern California and Central Coast mountain lions. Please do not hesitate to contact the Center with any questions at the email listed below.

Sincerely,



Tiffany Yap, DEnv/PhD
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Center for Biological Diversity
2100 Franklin St. Suite 375
Oakland, CA 94612
(510) 844-7139
tyap@biologicaldiversity.org

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Mountain Lion FOUNDATION
NATIONAL WILDLIFE FEDERATION
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WCN
Wildlife Conservation Network
SIERRA CLUB CALIFORNIA
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...the voice of the chaparral
ANIMAL LEGAL DEFENSE FUND
SCIL
Social Compassion in Legislation
DEFENDERS OF WILDLIFE
OPEN SPACE AUTHORITY
SANTA CLARA VALLEY
FELIDAE CONSERVATION FUND
WESTERN WATERSHEDS PROJECT
Animal Welfare Institute
LAUREL CANYON ASSOCIATION
THE SAN DIEGO RIVER PARK FOUNDATION
San Diego Humane SOCIETY
INSPIRE COMPASSION
LAUREL CANYON LAND TRUST
BIG SUR LAND TRUST
IN DEFENSE OF ANIMALS
CALIFORNIA WILDLIFE CENTER
Urban Wildlife Research Project
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Santa Clara Valley BIRD ALLIANCE
Protect San Benito
DIRECT ACTION EVERYWHERE
CONSERVATION SOCIETY OF CALIFORNIA
OAKLAND ZOO
TAKING ACTION FOR WILDLIFE
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CLAW
CITIZENS FOR LOS ANGELES WILDLIFE
green foothills
WildEarth GUARDIANS
A FORCE FOR NATURE
MIDPENINSULA REGIONAL OPEN SPACE
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San Bernardino Valley Audubon Society
COASTAL RANCHES CRC CONSERVANCY
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SAVE OPEN SPACE & AGRICULTURAL RESOURCES
ECOLOGISTICS
PASO PACIFICO
THE INSTITUTE FOR HISTORICAL ECOLOGY
Humane World for Animals
KS CONNECTIVITY
epic environmental protection information center
WAFWW
UN4LA
LOS PADRES FORESTWATCH
Save Mount Diablo
PRESERVE • DEFEND • RESTORE • EDUCATE • ENJOY
WildFutures
WILDLIFE CONSERVATION STRATEGIES
Chileno Valley NEWT BRIGADE
Protecting Rights of Passage
VOTERS FOR ANIMAL RIGHTS
Pathways for Wildlife
SWC EARTH
Transition Habitat CONSERVANCY
TEMESCAL CANYON ASSOCIATION
VENTURA LAND TRUST
California Wildlife Foundation

January 29, 2026

Dr. Erika Zavaleta, President
California Fish and Game Commission
1416 Ninth Street, Suite1320
Sacramento, CA 95814

Submitted via email to fgc@fgc.ca.gov

Re: Mountain Lion CESA Petition: Agenda Item #17 of the February 12, 2026 California Fish and Game Commission Meeting

Dear President Zavaleta and Commissioners,

Thank you for the opportunity to provide comments on the California Department of Fish and Wildlife's (CDFW's) status review of the petition to list Southern California and Central Coast mountain lions under the California Endangered Species Act (CESA).

The 70 undersigned organizations, which represent millions of supporters throughout California, strongly support CDFW's recommendation to list a distinct population segment (DPS) consisting of the six petitioned genetically isolated populations of mountain lions as threatened. We urge the Commission to grant formal protections to these iconic cats so that we can move forward to reduce the threats they face and give them a fighting chance to survive and inspire generations to come.

We commend CDFW staff for their thorough review and for following the science. We also thank the external reviewers and the many scientists who have investigated this elusive species and shared a greater scientific understanding of how mountain lions live and move through the landscape and how our development and actions threaten their long-term survival. Listing the Southern California and Central Coast mountain lions DPS as threatened under CESA would rightfully acknowledge that people are driving these populations towards extinction *and* we have the power to reverse course.

Lack of connectivity is the primary threat to Southern California and Central Coast mountain lions. Humans have extended roads and development into mountain lion habitat with little regard for their biological and movement needs, which has led to the formation of dangerously isolated populations with poor genetic health and high levels of human-caused mortalities, including car strikes, depredation kills, rodenticide poisonings, disease, wildfires and more.[1,2] Since these populations were granted CESA candidacy status in 2020, scientists have continued to document mounting evidence of their imperilment, including ongoing genetic drift,[3]

[1] Gustafson, Kyle D., et al. "Genetic source–sink dynamics among naturally structured and anthropogenically fragmented puma populations." *Conservation Genetics* 20.2 (2019): 215-227.
[2] Benson, John F., et al. "The ecology of human-caused mortality for a protected large carnivore." *Proceedings of the National Academy of Sciences* 120.13 (2023): e2220030120.
[3] Gustafson, Kyle D., et al. "Multi-population puma connectivity could restore genomic diversity to at-risk coastal populations in California." *Evolutionary applications* 15.2 (2022): 286-299.

reproductive signs of inbreeding depression,[4] and high levels of rodenticide exposure.[5] If nothing is done to preserve and enhance connectivity among and between the petitioned populations of the DPS and throughout the state, we could lose some of these populations within our lifetimes.[6]

Protecting mountain lions will benefit not only the species itself, but also the many wildlife and plants that are the cornerstone of California's landscape and culture. As a keystone species, healthy mountain lion populations support high levels of biodiversity. Their kills provide a reliable food source for numerous scavengers and opportunists, from bears and foxes to raptors and beetles. And their presence as a wide-ranging top predator has been shown to modify the behavior of their prey and smaller carnivores, which can help to promote watershed health and maintain diverse habitats that support native wildlife and plants. Loss of the species could potentially lead to degraded ecosystems and decreased biodiversity.

CESA protections will help address the many threats these mountain lions face. State agencies will have a legal mandate to protect mountain lions, which, as the status review highlights, should include the following overarching goals:

- Maintaining and enhancing landscape connectivity between robust core populations and the smaller, more isolated populations within the proposed threatened Central Coast and Southern California DPS
- Protecting important patches of remaining habitat within the DPS from development and enhancing degraded habitats where feasible
- Reducing human-related mortality rates within the populations of the DPS

We appreciate CDFW's management and recovery action recommendations, and we encourage the department to develop and implement a recovery plan that includes preserving intact connected landscapes, building more wildlife crossings at existing barriers, integrating wildlife connectivity into land-use planning, restoring degraded habitats that are beneficial for mountain lion movement, restricting the use of deadly rat poisons, providing depredation prevention resources to homeowners with farm animals and pets in mountain lion habitat, and continuing important research and monitoring.

We strongly urge the California Fish and Game Commission to follow the Department's recommendation to grant the Southern California and Central Coast mountain lion DPS permanent protections as a threatened species under CESA.

Thank you,

Tiffany Yap, DEnv/PhD
Urban Wildlands Science Director
Center for Biological Diversity

Byron Weckworth
Chief Conservation and Advocacy Officer
Mountain Lion Foundation

[4] Huffmeyer, Audra A., et al. "First reproductive signs of inbreeding depression in Southern California male mountain lions (Puma concolor)." *Theriogenology* 177 (2022): 157-164.
[5] CDFW. "Pesticide Exposures & Mortalities in Non-target Wildlife 2024 Annual Report." (2025).
[6] Benson, John F., et al. "Extinction vortex dynamics of top predators isolated by urbanization." *Ecological Applications* 29.3 (2019): e01868.

Beth Pratt
California Regional Executive Director
National Wildlife Federation

Jennifer Hauge
Senior Legislative Affairs Manager
Animal Legal Defense Fund

Johanna Hamburger
Director and Senior Attorney
Animal Welfare Institute

Rachel Saunders
Vice President of Conservation
Big Sur Land Trust

Richard Halsey
Director
California Chaparral Institute

Andrew Christie
President
California Land Watch

Jenn Guess
Executive Director
California Wildlife Center

Janet Cobb
Executive Officer
California Wildlife Foundation/California Oaks

Tom Freeman
President
Canyon Back Alliance

Ken Owen
Executive Director
Channel Islands Restoration

Sally Gale
Founder
Chileno Valley Newt Brigade

Neal Sharma
Director, California Wildlife Program
Wildlife Conservation Network

Tony Tucci
Chair & Co-founder
Citizens for Los Angeles Wildlife (CLAW)

Candice Meneghin
Executive Director
Coastal Ranches Conservancy

Korinna Domingo
Executive Director
Cougar Conservancy

Pamela Flick
California Program Director
Defenders of Wildlife

Kitty Jones
Core Organizer
Direct Action Everywhere & Berkeley Animal Rights Center

Stacey Hunt
CEO
Ecologistics, Inc.

Tom Wheeler
Executive Director
Environmental Protection Information Center (EPIC)

Zara McDonald
CEO, Biologist
Felidae Conservation Fund

Gerry Hans
President
Friends of Griffith Park

Alice Kaufman
Policy and Advocacy Director
Green Foothills

Karin Argano
Executive Director
Greenspace the Cambria Land Trust

Claire Schlotterbeck
Executive Director
Hills For Everyone

Jenny Berg
California State Director
Humane World for Animals

Lisa Levinson
Campaigns Director
In Defense of Animals

Rick Lanman MD
President
Institute for Historical Ecology

Spencer Lennard
Director
KS Connectivity

Jamie T. Hall
President
Laurel Canyon Association/ Laurel Canyon Land Trust

Benjamin Pitterle
Director of Advocacy
Los Padres ForestWatch

Kirk Lenington
Natural Resources Department Manager
Midpeninsula Regional Open Space District

Amy Gotliffe
Vice President of Conservation
Oakland Zoo/Conservation Society of California

Sarah Otterstrom, Ph.D.
Executive Director
Paso Pacifico

Tanya Diamond
Co-Principal: Wildlife Ecologist-GIS Analyst
Pathways for Wildlife

Gordon Clark
President
Peninsula Open Space Trust

Robin Bertolucci
Co-Founder
Poison Free Conejo Valley

Kian Schulman
Director
Poison Free Malibu

Brooks Fahy
Executive Director
Predator Defense

Van Collinsworth
Director
Preserve Wild Santee

Mary Hsia-Coron
Coordinator
Protect San Benito County

Lisa Owens Viani
Director
Raptors Are The Solution

Drew Feldmann
Conservation Chair
San Bernardino Valley Audubon Society

Julianna Tetlow
Sr. Director of Government Relations
San Diego Humane Society/Project Wildlife

Andrea Mackenzie
General Manager
Santa Clara Valley Open Space Authority

Juan Pablo Galvan Martinez
Senior Land Use Manager
Save Mount Diablo

Kristeen Penrod
Director
SC Wildlands

Shani Kleinhaus
Environmental Advocate
Santa Clara Valley Bird Alliance

Linda Parks
Executive Director
Save Open Space and Agricultural Resources (SOAR)

Mercedes Macias
Senior Policy Strategist
Sierra Club California

Jack Eidt
Co-Founder
SoCal 350 Climate Action

Nickolaus Sackett
Director of Legislative Affairs
Social Compassion in Legislation

James Alexakis
President
Temescal Canyon Association

Dana Stangel
Executive Director
Teranga Ranch Wildlife

Penelope Maldonado
Executive Director
The Cougar Fund

Ann Van Leer
Executive Director
The Escondido Creek Conservancy

Rob Hutsel
President & CEO
The San Diego River Park Foundation

Sam Easley
Executive Director
Transition Habitat Conservancy

Quinton Martins
Director & Principal Investigator for the Living with Lions Project
True Wild Conservation

Casey Maddren
President
United Neighborhoods for Los Angeles

Chiara Ricotta
Director of Outreach
Student Wellness Commission Earth, UCLA

Bill Leikam
President & Cofounder
Urban Wildlife Research Project

Melissa Baffa
Executive Director
Ventura Land Trust

Allie Taylor
President
Voters For Animal Rights

Laura Cunningham
California Director
Western Watersheds Project

Lindsay Larris
Strategic Partnership Director
WildEarth Guardians

Sharon Negri
Director
WildFutures

Mari Galloway
California Program Director
Wildlands Network

Valarie Ianniello
President
Women United For Animal Welfare
(WUFAW)

FUNDED BY MEASURE PH VOTER APPROVED
Andrea Gullo
Executive Director

Puente Hills Habitat Preservation Authority

Endowment Provided by the Puente Hills Landfill

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Hacienda Heights

January 15, 2026

Erika Zavaleta, President
California Fish and Game Commission
P.O. Box 944209
Sacramento, CA 94244-2090
fgc@fgc.ca.gov

Subject: Letter of support for listing a distinct population segment of mountain lion in southern and central coastal California as a threatened species under the California Endangered Species Act

Dear President Zavaleta and Members of the Commission:

The Puente Hills Habitat Preservation Authority (Habitat Authority) writes to express SUPPORT for listing a distinct population segment of mountain lion in southern and central coastal California as a threatened species under the California Endangered Species Act.

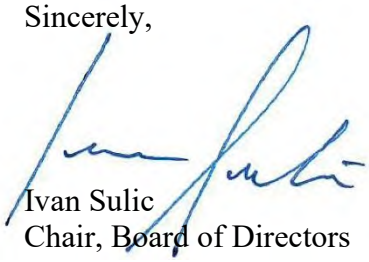
The Habitat Authority is a joint powers authority established pursuant to California Government Code Section 6500 *et seq*. with a Board of Directors representing the City of Whittier, County of Los Angeles, Sanitation Districts of Los Angeles County, and a representative from the community of Hacienda Heights. According to its mission, the Habitat Authority is dedicated to the acquisition, restoration, and management of open space in the Puente Hills for preservation of the land in perpetuity, with the primary purpose to protect the biological diversity. Additionally, the agency endeavors to provide opportunities for outdoor education and low-impact recreation. The Habitat Authority owns and/or manages over 3,890 acres which comprise the Puente Hills Preserve in which over $100 million of public funds have been invested.

The Habitat Authority's Puente Hills Preserve is the western anchor of the Puente-Chino Hills Wildlife Corridor, which is biologically connected in the east to Chino Hills State Park and the Santa Ana Mountains. We are very concerned about recent research findings indicating severe inbreeding issues with the population of mountain lions inhabiting the Santa Ana Mountains, as this is the source population for individuals that utilize the Puente-Chino Hills Wildlife Corridor and contribute to the ecological balance of Habitat Authority-managed publicly owned open space. Mountain lions have been the focus of considerable regional investment and collaborative efforts aimed at maintaining habitat connectivity to ensure ecosystem integrity. Failure to adequately protect this species, given the myriad threats outlined in the Petition, will undermine those significant efforts.

In December 2025, the California Department of Fish and Wildlife (Department) completed its status review and determined that the mountain lion population composed of the six petitioned genetic populations is discrete, significant, and imperiled; therefore, it recommended that the Commission list a distinct population segment (DPS) of mountain lions, largely coinciding with the petitioned area, as threatened. We strongly agree with the Department's determination and recommendation.

The Habitat Authority respectfully requests that the members of the Commission consider the Department's recommendation and make a final determination in favor of listing mountain lion as a threatened species at their upcoming February meeting.

Sincerely,



Ivan Sulic
Chair, Board of Directors

C: Habitat Authority Board of Directors and Advisory Committee

Transmitted Via Email

GENERAL MANAGER
Ana M. Ruiz

BOARD OF DIRECTORS
Craig Gleason
Yoriko Kishimoto
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Curt Riffle
Karen Holman
Margaret MacNiven
Zoe Kersteen-Tucker

January 26, 2026

Dr. Erika Zavaleta, President
California Fish and Game Commission
1416 Ninth Street, Suite1320
Sacramento, CA 95814

Submitted via email to fgc@fgc.ca.gov

Re: Agenda Item #17 – CESA Petition for southern California/central coast evolutionarily significant unit of mountain lion - SUPPORT

Dear President Zavaleta and Commissioners,

On behalf of the **Midpeninsula Regional Open Space District (Midpen)**, I am writing to urge you to **support** listing the Central Coast and Southern California mountain lion populations as Threatened under California law. Comprised of over 72,000 acres of acquired and protected open space on the San Francisco Peninsula, Midpen is one of the largest regional open space districts in California, serving almost 770,000 constituents. Our braided mission is to acquire and preserve in perpetuity open space and agricultural land of regional significance, to protect and restore the natural environment, to preserve rural character and encourage viable agricultural use of land resources, and to provide opportunities for ecologically sensitive public enjoyment and education.

These mountain lions face well-documented and increasing threats from habitat loss, fragmentation, and isolation. Scientific research clearly shows that without stronger protections - particularly for critical habitat and wildlife connectivity - these populations will continue to decline, with serious consequences for their long-term survival and for the health of California's ecosystems. Midpen is doing its part to help reduce mountain lion mortalities and restore their genetic diversity in the Santa Cruz Mountains through the construction of a major wildlife crossing at Highway 17.

I strongly encourage the Commission to follow the best available science and the recommendation of the California Department of Fish and Wildlife by approving this listing. Protecting habitat and ensuring connectivity across

landscapes is essential to maintaining resilient mountain lion populations and preventing further genetic isolation.

Thank you for your leadership and for considering the science-based actions needed to safeguard California's wildlife for future generations.

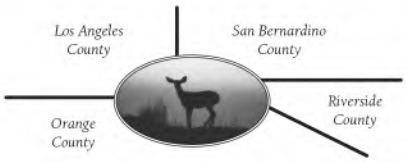
Sincerely,



Kirk Lenington, Natural Resources Department Manager

Hills For Everyone

Southern California comes together at the Puente-Chino Hills



January 28, 2026

Letter submitted electronically to: fgc@fgc.ca.gov

Melissa Miller-Henson
California Fish and Game Commission
715 P Street, 16th Floor
Sacramento, CA 95814

RE: Support for Listing of the Central Coast and Southern California Mountain Lion

Dear Ms. Miller-Henson,

Hills For Everyone (HFE) submits these comments to the California Fish and Game Commission to support the listing of the Central Coast and Southern California Mountain Lion, which we understand to be decided at the February 11 or 12, 2026 Commission board meeting. We are pleased to see the Commission consider this long-awaited protection for one of California's most elusive felines.

By way of background, HFE is a 47-year-old non-profit organization that established Chino Hills State Park (CHSP) and is still working to conserve the remaining natural lands in the Puente-Chino Hills Wildlife Corridor at the juncture of Los Angeles, Orange, San Bernardino, and Riverside Counties. We have avidly worked to protect mountain lion habitat since the early 1980s—even protecting State Parks' first wildlife underpass at the 91 Freeway and Coal Canyon in 2001. CHSP connects to the Santa Ana Mountains and supports the network of protected lands for this top predator.

HFE believes the evolutionarily distinct populations of the Central Coast and Southern California mountain lion is worthy of listing as threatened under the California Endangered Species Act (CESA). Mountain lions in Southern California and the Central Coast, specifically, face a convergence of human-induced threats: habitat fragmentation and loss; road mortality and barriers to movement; toxic rodenticides and other contaminants; inbreeding and loss of genetic diversity; and wildfire and climate-related stressors.

These threats will drive these populations toward collapse. Just in the last week, another mountain lion was killed in the Santa Ana Mountain foothills along Santiago Canyon Road. Current regulatory mechanisms have clearly been insufficient to counter these cumulative threats, as evidenced by the ongoing decline in connectivity and the elevated extinction risk documented for several subpopulations.

As apex predators and a keystone species, mountain lions play a disproportionate role in maintaining ecological balance across Southern California's coastal, chaparral, foothill, and desert ecosystems. By regulating deer and other herbivore populations, they help prevent overbrowsing, support vegetation regeneration, and stabilize food webs, which in turn benefits a wide range of plant and animal species.

We urge the Commission to follow the best available science and the recommendation of the Department of Fish and Game. Protecting these populations, and the habitats and wildlife corridors they rely on, is essential to maintaining healthy, climate-resilient ecosystems across our region. Chronic isolation has already produced documented signs of inbreeding depressions, including physical deformities in certain lions confined by major freeways and urban development.

If the listing is approved by the California Fish and Game Commission, it would help safeguard essential habitat, speed up wildlife crossing projects, and strengthen long-term conservation planning to ensure these iconic cats can survive and roam freely once again. Cougars are the Puente-Chino Hills Wildlife Corridor's top predator. We need them to maintain the suite of species that belong in the hills.

Best-available science clearly demonstrates that Southern California and Central Coast mountain lion populations are small, genetically isolated, and at increasing risk of local extinction within the next few decades without additional human support. The California Department of Fish and Wildlife's recent status review concludes that roughly 1,400 mountain lions in these regions face grave threats from habitat fragmentation, high road mortality, toxic exposure to anticoagulant rodenticides, inbreeding, and increasingly severe wildfires, and therefore warrant listing as Threatened under CESA.

We urge the Commission to support listing the Central Coast and Southern California Mountain Lion.

Sincerely,

Claire Schlotterbeck

Claire Schlotterbeck
Executive Director

FGC@FGC

From: Jeanne Renner
Sent: Wednesday, January 28, 2026 12:59 PM
To: FGC
Subject: Mountain Lion Protection

Friends of the Whittier Hills
PO Box 247
Whittier, CA 90608
(562) 696-8740
friendsofwhittierhills@gmail.com

January 28, 2026

Erika Zavaleta, President
California Fish and Game Commission
PO Box 944209
Sacramento, CA 94244-2090

Re: ***Support*** for Mountain Lions as a threatened species under the California Endangered Species Act

Dear President Zavaleta & Members of the Commission:

The Friends of the Whittier Hills association is writing to ***support*** the listing of a distinct population segment of mountain lions in southern and central coastal California as a threatened species under the California Endangered Species Act.

Recent research shows that there are severe inbreeding issues with the mountain lions in the Santa Ana Mountains, some of whom have been using the nearby Puente-Chino Wildlife Corridor in the Whittier hills. Mountain lions are extremely threatened by habitat fragmentation, vehicle strikes, and rodenticide use.

These magnificent creatures deserve to thrive. We plan to continue the work of our 44-year-old conservation association in the years ahead. Please vote to list these mountain lions as a threatened species at your February meeting.

Yours truly,

Jeanne L. Renner, President

--

CITIZENS FOR LOS ANGELES WILDLIFE
CLAW
PO Box 50003 Studio City, CA 91614
805-225-5766 info@clawonline.org www.clawonline.org

January 28, 2026

Erica Zavaleta, President
California Fish and Game Commission
1416 Ninth Street, Suite 1320
Sacramento, CA 95814
Via: fgc@fgc.ca.gov

RE: Support of Report Recommendation to List Southern and Central CA Mountain Lions as "Threatened"

Dear President Zavaleta and Commissioners:

Citizens for Los Angeles Wildlife (CLAW) is a non-profit environmental organization concerned with the well-being of wildlife and their habitat in the city of Los Angeles and beyond. A citizenry of more than 5,000 individuals support our organization's multiple calls for practices and policy to benefit biodiversity in LA City, County, California, and the globe. CLAW adds our voice of strong support to the chorus of organizations recommending protection for the Southern California and Central Coast mountain lions under the California Endangered Species Act (CESA).

In 2020, when protection was first being considered, we commented on the threats facing our local mountain lion population. The threats we listed at that time included habitat loss and fragmentation, wildfires, secondary rodenticide poisoning, genetic drift, and human-related activity such as car accidents and depredation permits. Despite being granted protection that year as a candidate for CESA protection, scientists continue to document genetic drift,[1] reproductive signs of inbreedingdepression,[2] and high levels of rodenticide exposure.[3] Furthermore, in that time we have witnessed the catastrophic fires in the mountain lion ranges of the Pacific Palisades and Altadena, not

[1] Gustafson, Kyle D., et al. "Multi-population puma connectivity could restore genomic diversity to at-risk coastal populations in California." *Evolutionary applications* 15.2 (2022): 286-299.

[2] Huffmeyer, Audra A., et al. "First reproductive signs of inbreeding depression in Southern California male mountain lions (Puma concolor)." *Theriogenology* 177 (2022): 157-164.

[3] CDFW. "Pesticide Exposures & Mortalities in Non-target Wildlife 2024 Annual Report." (2025).

to mention the death of the iconic mountain lion known as P-22, who, as discovered in his 2023 necropsy, had been exposed to five different rodenticides, and hit by a vehicle.

CESA protection is necessary for protecting the dwindling population of mountain lions in the designated regions. An extirpation of this keystone species would have cascading effects on the local ecosystems. As an apex predator, these mountain lions provide feeding opportunities for scavengers and smaller carnivores, and maintain balanced populations and behaviors in prey species, which in turn helps to maintain a healthy plant community.

We would like to emphasize that strong enforcement of the protections granted to mountain lions will be necessary. Since candidacy for the mountain lions was granted in 2020, we have seen multiple state-wide attempts to reduce habitat protection by weakening the California Environmental Quality Act (CEQA), expanding usages of anticoagulant rodenticides, and the continued issuance of lethal depredation permits.[4] Once a "threatened" status is officially designated, we urge regulators to make every possible effort to protect habitat, discontinue rodenticide usage, and reduce lethal outcomes of human-mountain lion conflict.

Thank you for taking this important step at a critical time in California's natural history, protecting wildlife for generations to come.

Sincerely,



Tony Tucci, Chair

[4] California Department of Fish and Wildlife. "Mountain Lion Take within the Southern California/Central Coast Evolutionarily Significant Unit (ESU) (2020-2024)." *Memorandum*, Jan. 2025, nrm.dfg.ca.gov/FileHandler.ashx?DocumentID=233014.

CLAW is a public benefit non-profit 501(c)(3) environmental organization that works to protect and restore the environments of wildlife of Los Angeles and California from dwindling open spaces. Our mission is to promote, educate and protect the fundamental importance of wildlife, wildlife habitats and wildlife corridors everywhere.

January 28, 2026

Dr. Erika Zavaleta, President
California Fish and Game Commission
1416 Ninth Street, Suite1320
Sacramento, CA 95814

Submitted via email to fgc@fgc.ca.gov

Dear President Zavaleta and Commissioners,

I appreciate you allowing comments to be submitted to you on the California Department of Fish and Wildlife's (CDFW's) status review of the petition to list Southern California and Central Coast mountain lions under the California Endangered Species Act (CESA).

I strongly support CDFW's recommendation to list the six petitioned genetically isolated populations of mountain lions as threatened. I urge the Commission to grant the formal protections of threatened listing under CESA to those populations.

As one of the peer reviewers of CDFW's original response to the CESA petition, I feel that CDFW staff did a thorough job in the review and its revision, and they followed the extensive science that has been published in the professional literature on mountain lions in California and elsewhere.

I fully support the management and recovery recommendations that are in the status review that CDFW has submitted to your Commission. I request that you accept those recommendations in their entirety, and encourage CDFW to develop and implement a recovery plan that includes measures to improve connectivity between the six identified subpopulations, preserve additional intact habitat, and continue research and management efforts to reduce sources of mortality.

Thank you and please contact me if you have questions,



T. Winston Vickers, DVM, MPVM
Retired Director of the UC Davis Wildlife Health Center California Mountain Lion Project
twinstonvickers@gmail.com, 949-929-8643

FGC@FGC

From: Shari Dalal
Sent: Sunday, January 18, 2026 7:53 PM
To: FGC
Subject: Agenda Item- Mountain Lions (Central Coast and Southern California)
Attachments: IMG_9040.jpeg

Dear California Fish and Game Commission,

I strongly urge the California Fish and Game Commission to list the Central Coast and Southern California mountain lion populations as Threatened and protect their remaining critical habitat and wildlife corridors.

In the Santa Ana Mountains, roughly ten mountain lions have already died, most from vehicle strikes, particularly along Ortega Highway, with additional fatalities on Santiago Canyon Road and nearby toll roads. There are no wildlife crossings, no warning signs, and no modern safety tools—such as AI-based wildlife detection and driver alert systems, Wildlife Defense Systems, or Puma Guard—despite these being known movement corridors.

These deaths are preventable. Habitat fragmentation forces mountain lions onto dangerous roads, and without enforceable protections and required mitigation—including crossings, fencing, signage, speed reduction, and available technology—these isolated populations will continue to decline.

The losses are ongoing and urgent. Please approve the Threatened listing and require immediate habitat protection and roadway safety measures before more mountain lions are killed.

Thank you for your consideration.

FGC@FGC

From: Carey Strombotne
Sent: Tuesday, January 20, 2026 4:56 PM
To: FGC
Subject: Agenda Item- Mountain Lions Central Coast and Southern California

Dear President and Members of the California Fish and Game Commission:

I am writing to urge the Commission to take decisive action to protect mountain lion populations in Southern California and along the Central Coast. These populations are at a critical tipping point. Ongoing habitat loss, extreme fragmentation, vehicle strikes, and expanding development pressures are rapidly pushing already isolated mountain lion populations toward irreversible decline.

Mountain lions are a keystone species essential to the ecological health and balance of California's landscapes. The loss of viable mountain lion populations would have cascading consequences for biodiversity, ecosystem function, and overall environmental resilience. The science is clear: without immediate and sustained protections, these populations will not recover.

Maintaining the mountain lion's status as a threatened species is not only appropriate, it is absolutely necessary. This designation provides the minimum level of protection required to prevent further population collapse. Weakening or removing this status would accelerate local extirpation, particularly in Southern California, where genetic isolation and mortality rates are already dangerously high.

Equally urgent is the protection and restoration of healthy habitat and functional wildlife corridors. Mountain lions require large, connected landscapes to disperse, maintain genetic diversity, and adapt to changing environmental conditions. Freeways, dense development, and infrastructure have created near-complete barriers between populations, resulting in inbreeding, increased mortality, and heightened conflict with humans. Without immediate action to preserve and enhance connectivity, these populations will not survive.

Wildlife corridors through protected open space, habitat linkages, and dedicated wildlife crossings are not optional mitigation measures. They are essential life-support systems for mountain lions. Protecting and restoring connectivity across Southern California and the Central Coast must be treated as an urgent conservation priority.

I strongly urge the Commission to rely on the newest and best available science when making decisions that affect mountain lion populations. This includes current genetic research, movement and mortality data, population viability modeling, and adaptive management strategies that account for climate change and increasing human pressures. Science-based decision making must remain the foundation of all policies affecting this species.

The choices made by the California Fish and Game Commission in this moment will determine whether mountain lions continue to exist as viable, wild populations in large portions of the state. I respectfully but urgently ask the Commission to uphold strong protections, prioritize habitat conservation and connectivity, and act decisively to ensure the long-term survival of California's mountain lions.

Thank you for your leadership and for your commitment to protecting California's wildlife and natural heritage.

Sincerely,

Carey Strombotne

FGC@FGC

From: Farmer
Sent: Monday, January 26, 2026 5:08 PM
To: FGC
Subject: Mountain Lion listing as Threatened Species

We belong to the Farm Bureau and they just contacted us to write to you about your consideration of listing mountain lions as a threatened species. Unlike some Farm Bureau members, we support the added protections such a listing would bring in Southern California. We farm in the wild in an area surrounded by open, unfarmed land, which is prime grounds for mountain lion habitat. We understand that predation from lions can occur, although such events are extremely rare, but highly reported. We have learned to live and farm with the "wild", not in conflict with it, although this means we are at risk of losing livestock. We understand this and view it as a business cost - not something Fish and Wildlife needs to protect our agri-business from.

So as Farm Bureau members we urge you to list mountain lions at a threatened species.

Nicolette Ausschnitt & Steve Krieg
Petit Teton Farm

FGC@FGC

From: Kristen Ochoa
Sent: Tuesday, January 27, 2026 1:43 PM
To: FGC
Subject: Support for our San Gabriel Mountains Pumas

Dear Dr. Erika Zavaleta,

My name is Kristen Ochoa and I am the founder of the Chaney Trail Corridor Project. I am writing to you to ask that the California Fish and Game Commission accept CDFW's recommendation to list Southern California and Central Coast mountain lions as threatened under the California Endangered Species Act.

We are trying to save a 78 acre piece of land here in Altadena; we want it protected as a wildlife corridor. This is needed now more than ever after the Eaton Fire. We have been documenting mountain lions in our area with the hope of protecting the habitat.

I've called on our supporters to send in emails, so hopefully you will receive a few. Altadena, despite everything we've been through, remains connected to and committed to our wildlife.

With many thanks for your work.

-Kristen

Kristen Ochoa MD, MPH

Director
Chaney Trail Corridor Project
Website iNaturalist Project Instagram

Health Sciences Clinical Professor
UCLA David Geffen School of Medicine
kochoa@ucla.edu Publications Linkedin


REVEAL
TACTACAM
69F 21℃ 10/07/2024 20:48:47

FGC@FGC

From: amanda smith
Sent: Tuesday, January 27, 2026 12:24 PM
To: FGC
Subject: Please Protect Southern and Central Coast Mountain Lions

Dear Dr. Erika Zavaleta, President of the California Fish and Game Commission:

I am writing to request that the California Fish and Game Commission accept the California Department of Fish and Wildlife's recommendation to list Southern California and Central Coast mountain lions as threatened under the California Endangered Species Act.

Mountain lions are part of the ecosystem of the Chaney Trail Corridor in Altadena and the Angeles National Forest, where the community is working to protect undeveloped wildland. Listing mountain lions as threatened will help us protect their habitat and facilitate their movement, aiding in their recovery and long-term survival in our region.

Respectfully Submitted.

FGC@FGC

From: Ruta Soltanpour
Sent: Monday, January 12, 2026 12:43 PM
To: FGC
Subject: Agenda Item – Mountain Lions (the Central Coast and Southern California)

Dear Commissioners,

I am writing to urge you to support listing the Central Coast and Southern California mountain lion populations as Threatened under California law.

These mountain lions face well-documented and increasing threats from habitat loss, fragmentation, and isolation. Scientific research clearly shows that without stronger protections—particularly for critical habitat and wildlife connectivity—these populations will continue to decline, with serious consequences for their long-term survival and for the health of California's ecosystems.

I strongly encourage the Commission to follow the best available science and the recommendation of the California Department of Fish and Wildlife by approving this listing. Protecting habitat and ensuring connectivity across landscapes is essential to maintaining resilient mountain lion populations and preventing further genetic isolation.

Thank you for your leadership and for considering the science-based actions needed to safeguard California's wildlife for future generations.

Sincerely,

Ruta Soltanpour

FGC@FGC

From: John Teevan
Sent: Monday, January 12, 2026 8:16 PM
To: FGC
Subject: Approve the listing and protect the habitat and wildlife corridors mountain lions need to survive

I am writing to urge the Commission to approve the listing and protect the habitat and wildlife corridors mountain lions need to survive

That would include the following actions:

- Listing the Central Coast and Southern California mountain lions as **Threatened**;
- Assessing the importance of protecting critical habitat and wildlife connectivity; and
- Following the best available science and CDFW's recommendation

Thank you for considering my comments.

Sincerely,
--
John P Teevan III

RANCHO MISSION VIEJO

Via Email to fgc@fgc.ca.gov
January 27, 2026

California Fish and Game Commission
1416 Ninth Street, Room 1320
Sacramento, CA 95814

Reference: Agenda Item #17 - Mountain Lion

Subject: Rancho Mission Viejo Comments

Dear Members of the California Fish and Game Commission:

Rancho Mission Viejo (RMV) provides the following comments on the Status Review of the Petitioned Southern California/Central Coast Evolutionary Significant Unit (ESU) of Mountain Lion (*Puma concolor couguar*) in California ("Status Review Report") as you consider whether to list the Mountain Lion under the California Endangered Species Act (CESA) as recommended in the Petition to List One or More Evolutionary Significant Units of Mountain Lion in Southern and Central Coastal California as Threatened or Endangered under the CESA ("Petition").

Rancho Mission Viejo (RMV or Ranch) is located in southern Orange County and is owned and managed by the O'Neill family. The Ranch is bound by the existing communities of Rancho Santa Margarita, Mission Viejo, San Juan Capistrano and the undeveloped Cleveland National Forest and MCB Camp Pendleton. Various habitat types including but not limited to coastal sage scrub, chaparral, grassland, oak woodland and riparian are present on the Ranch. Since 1882, the O'Neill family has been a responsible steward of the Ranch. We have, and continue to actively manage the Ranch to protect the resources on it. We intend to continue this tradition of stewardship into the future through implementation of the Southern Subregion Habitat Conservation Plan (SSHCP), approved by U.S. Fish and Wildlife Service (USFWS) on January 10, 2007.

RMV is the principal permittee under the SSHCP. In summary, the SSHCP Conservation Strategy provides a comprehensive, habitat-based approach to the protection of Covered Species and their habitats by focusing on the lands and aquatic resource areas essential for the long-term conservation of the Covered Species and by providing for appropriate management for those lands. The SSHCP Habitat Reserve ultimately will conserve approximately 32,818 acres in southern Orange County, comprised of historic RMV lands and three County of Orange regional/wilderness parks.

We have previously commented on the petition to list the mountain lion and explained how the SSHCP Habitat Reserve, a product of existing regulatory mechanisms and management efforts, benefits the mountain lion, and in particular the Santa Ana Mountain (SA) population (see RMV, March 30, 2020, attached). As described in the March 2020 comment letter, the 2004 Draft Southern NCCP/HCP Planning Guidelines included the mountain lion as a "planning species." The Planning Guidelines were prepared by an inter-agency working group made up of representatives from USFWS, California Department of Fish and Game, U.S. Army Corps of Engineers, the County of Orange, RMV, and consultant support staff.

Establishment and management of the SSHCP Habitat Reserve addresses several of the management and recovery recommendations contained in the Petition and the Status Review Report, including: 1) Habitat Protection, 2) Crossing Infrastructure, 3) Rodenticides and Pesticides, and 4) Other Protective Measures and Management. We wish to update the Commission on our progress on habitat protection and our successes with crossing infrastructure. We also wish to offer specific comments on the Status Review Report.

Habitat Protection Update

In our letter of March 30, 2020, we provided detailed information to the Commission on how RMV thoroughly considered the available information regarding mountain lion habitat use and movement in the SSHCP planning area. As described previously, 89 percent of the SSHCP Habitat Reserve/Supplemental Open Space occurs in three large, contiguous and functionally connected Habitat Blocks: Eastern Block (23,210 acres), Western Block (7,300 acres) and the Arroyo Trabuco Block (1,900 acres).

We wish to update the Commission on the progress of dedication of RMV lands in the Eastern and Western blocks to the SSHCP Habitat Reserve. Exhibit A depicts Currently Enrolled and Future Habitat Reserve Lands. At this time, RMV has dedicated all of San Juan Creek and the majority of Verdugo Canyon within RMV ownership to the Habitat Reserve thereby permanently protecting these lands in the Eastern Block. RMV has also completed its dedication of Chiquita Ridge and Canyon, and Chiquadora Ridge in the Western Block. Furthermore, additional lands in the Trampas Sub-basin have also been enrolled thus expanding habitat for east-west habitat

connectivity via Linkage K that could be used by mountain lions. To date RMV has conserved 8,704 acres of inter-connected habitat via recordation of the SSHCP Conservation Easement. CDFW is a third party beneficiary of this easement. The County of Orange previously enrolled O'Neill Regional Parks, Riley and Caspers Wilderness Parks in the SSHCP Habitat Reserve. Combined 20,343 acres of the planned 32,818 acres are permanently protected and managed.

Crossing Infrastructure Update

The Petition and the Status Review Report recommend designing and building wildlife crossings in strategic locations to improve wildlife connectivity, including overcrossings, underpasses, culverts, and exclusionary fencing to guide wildlife to safer crossings. As described above, the SSHCP incorporated planning principles that included the mountain lion as a planning species dating back to 2004.

In 2020 we described to the Commission how the SSHCP requires that each road crossing of identified wildlife linkages be designed to maximize the likelihood of long-term connectivity and contiguity. To date, the Cow Camp Road bridge over Chiquita Creek and Cow Camp Road bridge over Gobernadora Creek have been constructed. The Chiquita bridge spans more than 1,400 feet across the confluence of Chiquita and San Juan creeks and is 50-60 feet high. The Gobernadora bridge spans 1,360 feet across Gobernadora Creek and is also 50-60 feet high. In addition, RMV has constructed Gibby Bridge over San Juan Creek to replace an Arizona style crossing. All three bridges provide for the continuous connection between identified linkages and are highly suitable for unrestricted mountain lion passage.

Los Patrones Parkway, a four-lane arterial roadway, was constructed with two large wildlife undercrossings to facilitate wildlife movement, including mountain lion, in the Western Block, and wildlife exclusion fencing to keep wildlife off the roadway. Camera studies continue to document use of these undercrossings by mountain lion, as well as numerous mule deer. See Exhibit B.

Comment on Status Review Report

The Status Review Report discusses four HCP/NCCP's that include the mountain lion as a Covered Species (see page 62) but fails to acknowledge other approved landscape level conservation and management plans, such as the SSHCP. These plans conserve large, relatively unfragmented habitat blocks and linkages that provide both high quality "live in" and movement habitat for wildlife including mountain lion, while still meeting the need for additional housing and infrastructure to support the state's population. These habitat blocks and linkages, which are protected through legally enforceable permit requirements, conditions of approval and/or conservation easements, ensure that large scale planned developments are consistent with the continued existence of the mountain lion. As noted above, in the case of the SSHCP, CDFW is a

third party beneficiary to the SSHCP conservation easement with the power to enforce its terms. Furthermore, the SSHCP like other approved landscape level plans, is subject to annual reporting requirements that ensure proper implementation. RMV has been submitting annual compliance and effectiveness reports for the SSHCP to CDFW since 2007. This lack of acknowledgement of benefits to the mountain lion from other approved landscape level conservation and management plans, like the SSHCP, is a serious shortcoming of the status report that needs to be rectified.

Summary and Conclusion

RMV understands the current and future risk to the SAM mountain lion population, primarily due to the inherent small population size and adverse effects of inbreeding and human-caused mortality. For this reason, RMV has made a substantial effort toward conserving mountain lion habitat in the SA range through:

a. Including mountain lion in the SA range as a planning species in the original design of the SSHCP Habitat Reserve;

b. The preservation and management of large, relatively unfragmented habitat blocks and linkages that provide both high quality "live-in" and movement habitat for mountain lion;

c. The provision of large bridge and culvert crossing structures that will accommodate mountain lion passage;

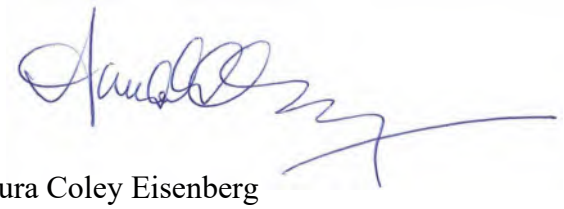
d. The provision of exclusionary fencing in areas where wildlife such as mountain lion may attempt at-grade road crossings; and

e. The practice of not allowing use of anticoagulant rodenticides within the Habitat Reserve, and only using other approved biocides (e.g., herbicides) in a targeted way to support implementation of the SSHCP Adaptive Management and Monitoring Program.

Therefore, RMV believes that the SSHCP adequately addresses the needs of the mountain lion within its portion of the SA population. If the mountain lion is listed under CESA, the SSHCP Conservation Strategy should be recognized as contributing to the protection and management of the SAM population, and that the SSHCP Covered Activities likely would not result in a "take" pursuant to California Fish and Game Code Section 86 therefore a Section 2081(b) Incidental Take Permit would not be required for such Covered Activities.

RMV appreciates the opportunity to provide these comments. Should you have any questions regarding our comments, please feel free to contact me at (949) 240-3363 Ext. 297 or via email at lcoleyeisenberg@ranchomv.com.

Sincerely,



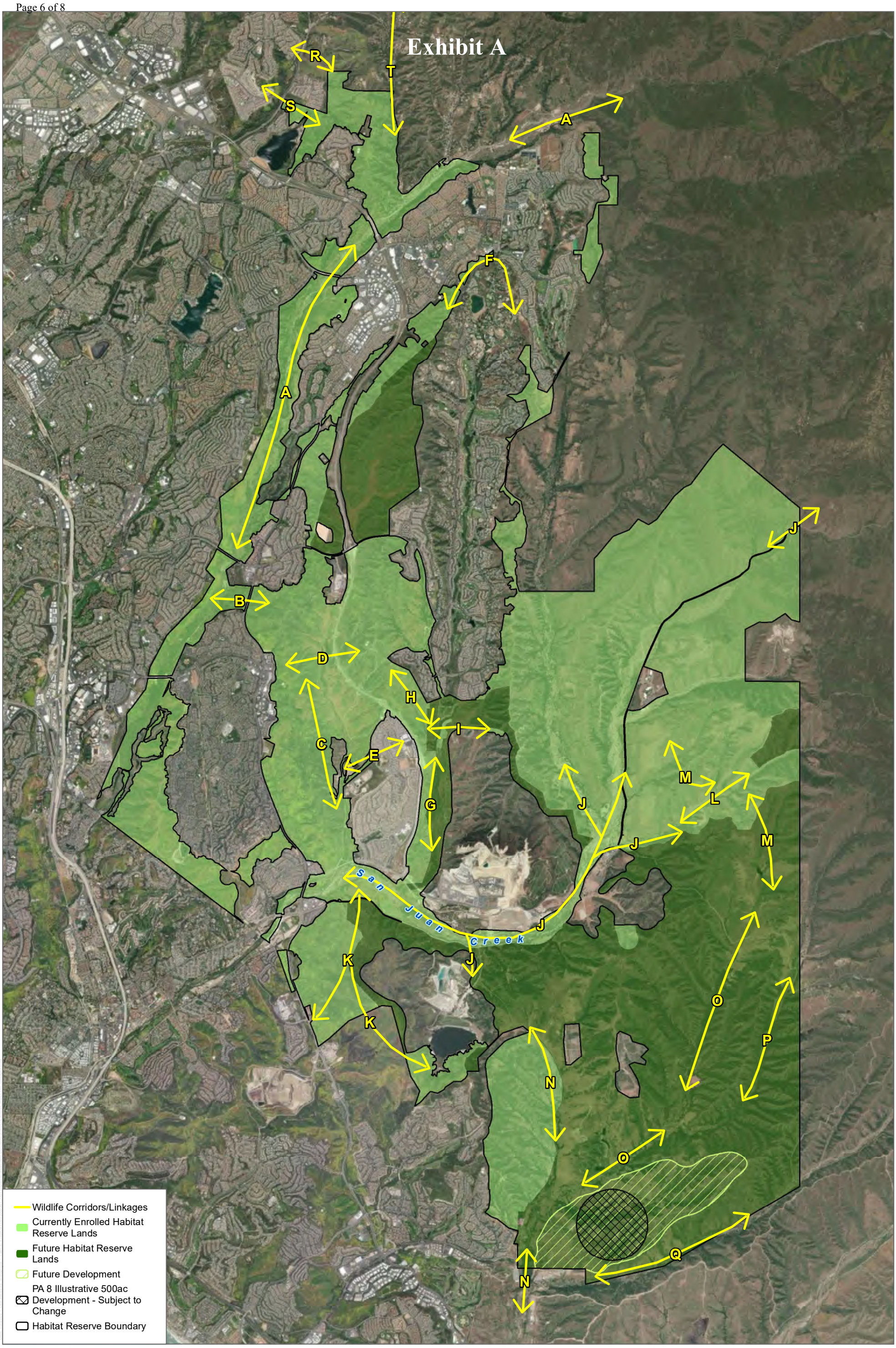
Laura Coley Eisenberg
Senior Vice President, Regulatory Compliance & Open Space Management

Attachments:

Exhibit A: Currently Enrolled and Future SSHCP Habitat Reserve Lands

Exhibit B: Wildlife Use of Los Patrones Parkway Wildlife Undercrossings

March 30, 2020, Rancho Mission Viejo Letter of Comment



SOURCE: ESRI 2024

DUDEK 0 2,950 5,900 Feet

EXHIBIT A

Habitat Reserve with Wildlife Corridors/Linkages

Rancho Mission Viejo

Exhibit B

Los Patrones Parkway Wildlife Undercrossing #1





Los Patrones Parkway Wildlife Undercrossing #2





RANCHO MISSION VIEJO

March 30, 2020

VIA EMAIL

California Fish and Game Commission
1416 Ninth Street, Room 1320
Sacramento, CA 95814

Reference: Agenda Item 32: Mountain Lion CESA Petition

Subject: Rancho Mission Viejo Comments

Dear Members of the California Fish and Game Commission:

Rancho Mission Viejo (RMV) provides the following comments for your consideration as you determine whether listing under the California Endangered Species Act (CESA) is warranted for the mountain lion as recommended in the Petition to List One or More Evolutionary Significant Units of Mountain Lion in Southern and Central Coastal California as Threatened or Endangered under the CESA ("Petition").

Rancho Mission Viejo (RMV) is located in Southern Orange County and is owned and managed by the O'Neill family. The ranch is bound by the existing communities of Rancho Santa Margarita, Mission Viejo, San Juan Capistrano and the undeveloped Cleveland National Forest and MCB Camp Pendleton. Various habitat types including but not limited to coastal sage scrub, chaparral, grassland, oak woodland and riparian are present on the ranch. Since 1882, the O'Neill family has been a responsible steward of the Ranch. We have, and continue to actively manage the Ranch to protect the resources on it. We intend to continue this tradition of stewardship into the future through implementation of the Southern Subregion Habitat Conservation Plan (SSHCP), approved by U.S. Fish and Wildlife Service on January 10, 2007.

RMV is the principal permittee under the SSHCP. In summary, the SSHCP Conservation Strategy provides a comprehensive, habitat-based approach to the protection of covered species and their habitats by focusing on the lands and aquatic resource areas essential for the long-term conservation of the covered species and by providing for appropriate management for those

28811 ORTEGA HIGHWAY • P.O. BOX 9 • SAN JUAN CAPISTRANO, CA 92693 • (949) 240-3363 • FAX (949) 248-1763

lands. The SSHCP Habitat Reserve ultimately will conserve approximately 32,818 acres in southern Orange County, comprised of historic Rancho Mission Viejo lands and three County of Orange wilderness parks.

We wish to inform the Commission of how the SSHCP Habitat Reserve, a product of existing regulatory mechanisms and management efforts, benefits the mountain lion, and in particular the Santa Ana Mountain (SAM) population. Establishment and management of the SSHCP Habitat Reserve address several of the management and recovery recommendations contained in the Petition, including: 1) Habitat Protection, 2) Crossing Infrastructure, 3) Rodenticides and Pesticides, and 4) Other Protective Measures and Management.

Habitat Protection

The Petition recommends full protection of mountain lion habitat, including resource-use patches and movement corridors, and a prohibition on large-scale development in primary travel corridors and habitat linkages, including between the SAM and Eastern Peninsula Range (EPR).

The mountain lion was addressed as a "planning species" in preparation of the SSHCP even though it was not a federally listed species or otherwise protected by federal regulations (Draft NCCP/HCP Planning Guidelines 2004, or "Planning Guidelines"). It is not a "Covered Species" in the SSHCP. Because the SSHCP was originally planned as a joint NCCP/HCP, the Planning Guidelines incorporated the "NCCP Tenets" outlined in the NCCP Conservation Guidelines and "Reserve Design Principles" based on the NCCP Tenets prepared by a panel of NCCP Science Advisors convened by The Nature Conservancy. The Planning Guidelines were

> *intended to provide an objective and common set of planning considerations and recommendations for use by resource and regulatory agencies and program participants in selecting and evaluating reserve program, restoration and management alternatives for the Southern Subregion NCCP/HCP.*
>
> (p. 1-1)

With respect to the mountain lion, and consistent with the information presented in the Petition, this species ranges throughout much of undeveloped portions of the SSHCP planning area. A radiotracking study found that virtually the entire planning area is habitat for the SAM population (Barrett and Beier 1993) (see attached Figure 169-M). Identified important use areas in this study include Arroyo Trabuco, Thomas Riley Wilderness Park, and the Richard & Donna O'Neill Conservancy. Surveys in the early 1990s for the proposed Foothill Transportation Corridor (SR-241), which was proposed to run north-south through the central portion of the planning area, recorded mountain lions at three camera stations, including within Cristianitos Canyon and Blind and Gabino canyons within the San Mateo Watershed and Sulphur Canyon

within the San Juan Creek Watershed. Other identified important "live-in"[1] and movement habitat in the planning area that connects to larger core habitat in the Cleveland National Forest includes La Paz and Blind canyons in the San Mateo Watershed and Verdugo Canyon in the San Juan Creek Watershed. The western portion of the planning area, including Arroyo Trabuco, Sulphur Canyon (associated with Chiquadora Ridge) and Chiquita Ridge in the San Juan Creek Watershed, was considered less suitable as live-in habitat for mountain lions when planning for the SSHCP was initiated in 1993 due to existing urbanization and agricultural land uses, resulting in smaller core habitat patches, but these areas still provide important movement habitat.

The Planning Guidelines included two main Planning Recommendations for mountain lion - Protection Recommendations and Management Recommendations:

1. Protection Recommendations

- *Protect "live-in" habitat within the portion of the San Mateo Watershed in the planning area and Verdugo Canyon in the San Juan Creek Watershed adequate to meet the life history requirements of the mountain lion, comprising a large, unfragmented block of chaparral and coastal sage scrub directly connected to more than 100,000 acres in Caspers Wilderness Park, the Cleveland National Forest, and Camp Pendleton. (Beier and Barrett [1993] describe the Santa Ana Mountain Range as encompassing 800 mi^2 [512,000 acres) of "contiguous wildlands used by cougars." This habitat includes the Santa Margarita Mountains, the Santa Rosa Plateau, the Chino Hills and the San Joaquin Hills.) "Live-in" habitat provides adequate prey (primarily mule deer) and vertical and horizontal cover suitable as resting and bedding sites (e.g., woodlands and riparian areas, rocky areas). The reader should note that the "live-in" habitat within in* [sic] *the San Mateo Watershed portion of the planning area and Verdugo Canyon would only provide about 25-30 percent of an average mountain lion home range in the Santa Ana Mountains (Padley 1989, 1996), and that the home range of any lions using the planning area likely will include Caspers Wilderness Park, Audubon Starr Ranch Sanctuary, Cleveland National Forest, and Camp Pendleton.*

- *Maintain habitat connections throughout the planning area to provide movement opportunities for the mountain lion. As described above for individual sub-basins, as well as other areas in the planning area, important movement areas for mountain lion include Arroyo Trabuco, the Foothill-Trabuco Specific Plan Area, Chiquita Ridge, Sulphur Canyon, San Juan Creek, Trampas Canyon, Cristianitos Canyon, Verdugo Canyon, Gabino Canyon, La Paz Canyon and Talega Canyon.*

[1]Live-in habitat is includes large, unfragmented areas that provide for most if not all of the mountain lion's life history requirements including food, shelter, denning sites, and food sources (primarily mule deer).

2. Management Recommendations

In areas identified as "live-in" habitat or habitat connections, roads that are necessary to serve approved land and water uses located inside or outside the Habitat Reserve shall be designed and sited to accommodate mountain lion movement to the maximum extent feasible. Where roads are necessary, under the approved NCCP/HCP, they will be designed consistent with safety, roadway design criteria that are appropriate for the setting and desired roadway function. Roadway design shall include bridges and/or culverts large enough to accommodate mountain lion movement at key areas and, where appropriate and feasible, may include wildlife over crossings. As appropriate, fencing, grading and plant cover will be provided to serve wildlife crossings consistent with conservation principles and the adaptive management program. Where feasible and safe, lighting along roadways within the Habitat Reserve should be avoided. Where roadway lighting within the Habitat Reserve is necessary for public safety reasons, it should be low-sodium or similar low intensity lighting that is directed away or shielded from the Habitat Reserve.

These Protection and Management Recommendations for mountain lion were incorporated into the SSHCP in Appendix E.

Upon completed phased dedication of open space timed in relation to development, the SSHCP Habitat Reserve ultimately will conserve approximately 32,818 acres, representing about 72 percent of the vegetation communities and other landcovers in Subarea 1[2], as well as an additional 4,400 acres of Supplemental Open Space (SOS)[3], resulting in the protection of at least 81 percent of the vegetation communities/landcovers in Subarea 1. Approximately 16,536 acres of the planned Habitat Reserve are located on RMV-owned lands.[4] The SSHCP concluded that this level of protection would be adequate to support the wildlife planning species addressed in the Planning Guidelines, including mountain lion and its main prey mule deer (see SSHCP Chapter 13, pp. 199- 226-227). The Petition states that the SAM mountain lion population inhabits about 1,533 km^2 (~379,000 acres) of undeveloped areas, so the Habitat Reserve and SOS comprise just under 10% of the total inhabited area in the SAM range. As noted above, habitat within in the San Mateo Watershed portion of the planning area and Verdugo Canyon in the San Juan Creek Watershed would provide about 25-30 percent of an average mountain lion home range in the SAM range and that the home range of any lions using the Habitat Reserve likely

[2] The Southern Subregion NCCP/HCP planning area is divided into four Subareas. Subarea 1 includes the RMV General Plan Amendment/Zone Change ownership, previously set aside open space owned by RMV, the County-owned parklands and Prima Deshecha landfill, the National Audubon Society Starr Ranch and portions of the Santa Margarita Water District lands.

[3] Supplemental Open Space (SOS) refers to designated open space that although not a part of the managed Habitat Reserve, serves to contribute to the subregional Conservation Strategy by providing additional open space containing a combination of vegetation communities supporting Covered Species, wildlife connectivity and refugia areas within the study area which enhance the overall function and value of the Habitat Reserve.

[4] Changes to the Habitat Reserve boundaries that have occurred since approval of the HCP have increased the size of the Habitat Reserve to 33,306 acres.

will include Caspers Wilderness Park, Audubon Starr Ranch Sanctuary, Cleveland National Forest, and/or Camp Pendleton as these areas comprise a large, mostly unfragmented habitat area.

Further, 89 percent of the Habitat Reserve/SOS occurs in three large, contiguous and functionally connected Habitat Blocks analyzed in the context of the NCCP Conservation Guidelines Reserve Design Tenets and the Reserve Design Principals, based on the NCCP Tenets, prepared by the NCCP Science Advisors. These Tenets and Reserve Design Principals consider the conservation of planning species (including mountain lion); habitat block size; habitat contiguity (i.e., lack of fragmentation) and connectivity; and biological diversity and physiographic representativeness (e.g., spatial distribution and elevation).

As shown in attached Figure 159-M, the Eastern Block is a large, contiguous habitat block containing approximately 23,210 acres. It includes the San Mateo Watershed within RMV lands south of Verdugo Canyon and the San Juan Creek Watershed north of Verdugo within Caspers Wilderness Park, Starr Ranch Sanctuary, and Cleveland National Forest. The Eastern Block provides core live-in habitat and several movement corridors for mountain lions, including along San Juan Creek, Bell Canon, Verdugo Canyon, Gabino Canyon, La Paz Canyon, Cristianitos Canyon, and Talega Canyon (see attached Figures 159-M and 169-M).

The Western Block is a smaller 7,300-acre block to the west, extending from the Upper Chiquita Canyon Conservation Area in the northern portion of Chiquita Canyon to San Juan Creek and connecting with adjacent portions of Chiquadora Ridge, the Riley Wilderness Park, Gobernadora Creek, and to Caspers Wilderness Park via an open space corridor (linkage I) at the northern edge of the PA 3 development area. This Western Block is less suitable as live-in habitat for mountain lion due to adjacent existing and planned/under construction development (PA 3) and agricultural land uses, resulting in smaller unfragmented habitat patches, but this block still provides movement habitat through the Habitat Reserve for the species.

The Arroyo Trabuco Block is a 1,900-acre block of habitat in Arroyo Trabuco that extends north-south from the Cleveland National Forest to San Juan Capistrano. Most of Arroyo Trabuco has been constrained by adjacent urban development for decades, but still provides movement habitat for mountain lions.

The three habitat blocks are all interconnected by habitat linkages that will be preserved and managed in the Habitat Reserve by RMV or the County of Orange, as shown in Figure 159-M. The Arroyo Trabuco and Western habitat blocks are connected by existing linkage B between the existing Ladera Ranch and Las Flores developments, which has a minimum width of about 1,500 feet. The Western and Eastern blocks are connected by linkages I and J. Linkage I is located between existing Coto de Caza and planned PA 3 and would have a minimum width of 2,000 feet. Linkage J is located along San Juan Creek and would have a minimum width of about 1,320

feet with planned setbacks from the 100-year floodplain. Basically all the labeled linkages except F, K, R and S, which are either constrained by size, or do not connect to suitable mountain lion habitat under the SSHCP, may be used by mountain lions for movement through the Habitat Reserve. However, since the SSHCP was approved in 2007, additional open space has been planned for linkage K related to development of PA 5. Under the SSHCP, linkage K would have had narrow dimensions (just a few hundred feet wide at some points) had PA 5 development occurred all the way to its southern boundary as proposed under the adopted B-12 Alternative (Figure 155-M). With the proposed additional open space, linkage K would be more than 1,200 feet wide at its narrowest point if one includes the natural open space along the northern border of the Talega development south of the RMV property boundary, thus expanding habitat for east-west habitat connectivity via linkage K that could be used by mountain lions.

Further, the SSHCP Habitat Reserve Management Program (HRMP) requires monitoring and management of certain vegetation communities in habitat linkages and wildlife corridors in the Habitat Reserve, including oak woodlands, riparian/wetland, coastal sage scrub and chaparral. Periodic 5-year Management Action Plans (MAPs) include goals and objectives for each community to ensure their functionality for wildlife use and movement, including mountain lions. For example, the most recent 2019-2024 MAP includes *Objective OW1.3. Maintain acreage of oak woodland communities in the identified habitat linkages and corridors in 2023 within 5% of 2008 baseline values.* Along with each explicit objective, the MAP spells out a Monitoring Approach (e.g., periodic mapping), a Management Action Threshold (e.g., a threshold percent change below baseline levels), and possible Management Actions (e.g., health assessments and remedial restorative actions).

Crossing Infrastructure

The Petition recommends designing and building wildlife crossings in strategic locations to improve wildlife connectivity, including overcrossings, underpasses, culverts, and exclusionary fencing to guide wildlife to safer crossings. Recommendations of mountain lion experts include crossings of Interstate 15 (I-15) approximately 20 miles east of the Habitat Reserve connecting the SAM to the EPR. The Petition also recommends that suitable habitat exists, through preservation or restoration/enhancement, on both sides of crossing structures, and that human activity be restricted and foot trails located away from the structures.

As described above, the three large habitat blocks - Arroyo Trabuco, Western, and Eastern - have high habitat contiguity and provide suitable habitat for mountain lion movement throughout the Habitat Reserve. As analyzed in the SSHCP, however, the construction of roads and other infrastructure within the Habitat Reserve, would contribute to some additional internal fragmentation in the future that could affect mountain lion movement. PAs 1 and 2 have been mostly fully developed, and construction in PA 3 began in January 2020.

Attached Figure 155-M shows the proposed circulation system analyzed in the SSHCP. Cow Camp Road, running east-west between San Juan Creek and PA 2 and through PA 3, was proposed to cross Chiquita Creek (linkage C), Gobernadora Creek (linkage G) and San Juan Creek (linkage J) with bridges. Per the SSHCP, each of these crossings would be designed to maximize the likelihood of long-term connectivity and contiguity. For example, per the SSHCP, bridge heights would be a minimum of 20 feet high to minimize shading effects on riparian vegetation. To date, the Cow Camp Road bridge over Chiquita Creek has been constructed and the roadway was moved north to within the PA 2 development to minimize direct impacts to the Habitat Reserve. This bridge spans more than 1,400 feet across the confluence of Chiquita and San Juan creeks and is 50-60 feet high, well in excess of the minimum 20-foot requirement in SSHCP. The bridge crossings of Gobernadora and San Juan Creeks are associated with development of PA 3. The Cow Camp Bridge over Gobernadora Creek is under construction and will be complete later this year. This bridge spans 1,360 feet across Gobernadora Creek and is also 50-60 feet high, also well in excess of the minimum 20-foot requirement in the SSHCP. Grandeza Bridge over Gobernadora Creek from PA 2 to PA 3 will fully span Gobernadora Creek (and most of the canyon) at a height of approximately 130 feet, well in excess of the minimum 20-foot requirement in the SSHCP. Cow Camp Road Bridge over San Juan Creek will be designed to at least exceed the 20-foot requirement in the SSHCP.

Most significantly the northern portion of Los Patrones Parkway (referred to as "F Street" in the SSHCP) has been constructed south to PA 2 along the eastern side of Chiquita Canyon from its connection with SR-241 at Oso Parkway in the north. It generally follows the alignment previously proposed for SR-241, as shown in attached Figure 155-M. Attached Figure 159-M shows two conceptual east-west movement linkages across Chiquita Canyon north of PA 2. To facilitate wildlife crossings of Los Patrones Parkway, two large wildlife undercrossings were constructed to convey wildlife between Chiquita Canyon and Sulphur Canyon, which is a documented mountain lion movement corridor that links Chiquita Canyon in the west to Caspers Wilderness Park to the east via linkages H and I. In addition, all drainage culverts were upsized to 60 inches to accommodate mountain lion and other smaller predator movements. Camera studies have documented at least one mountain lion entering one of the undercrossings, as well as numerous mule deer. These studies are part of a Wildlife Corridor Monitoring Report required by CDFW for five years following the roadway opening. In addition, wildlife exclusion fencing was installed along portions of Las Patrones Parkway based on recommendations by mountain lion expert Dr. Winston Vickers, who conducted recent studies in the region.

Rodenticides and Pesticides

The Petition reviewed the available information on pesticide and herbicide effects on mountain lions (pp. 50-51). The Petition cites evidence from several studies for secondary poisoning of predators such as coyotes, bobcats, kit foxes, fishers, and raptors which could be extrapolated to

similar effects on mountain lions. Evidence of secondary poisoning of mountain lions is more limited, but researchers have found high rates of rodenticides in the systems of mountain lions and suspect that these rodenticides could be associated with direct deaths and with weakened immune systems that may make them more vulnerable to risk factors such as intraspecific conflicts. With respect to legal herbicides such as glyphosate, the Petition does not cite specific data for direct or secondary poisoning, but infers that mountain lions could be detrimentally exposed to herbicides through deer, which may browse on contaminated plants. This may be a particular problem in agricultural areas where crops browsed by deer may be subject to broad-scale herbicide treatment. As such, the Petition recommends prohibiting the use of second-generation anticoagulant rodenticides ("SGARs"), such as brodifacoum, bromadiolone, difenacoum, and difethialone in core habitat areas and linkages, and limiting the use of other pesticides and herbicides that may have negative effects.

Appendix J, Invasive Species Control Plan ("Control Plan"), to the SSHCP describes the control and eradication methods to be used in the Habitat Reserve to control invasive plants and introduced predators on sensitive species. Invasive species can have large-scale detrimental effects on natural vegetation communities and wildlife, and thus are an important focus of the HRMP. Control methods included mechanical (e.g., hand pulling, dragging, digging, etc.) and targeted use of chemical herbicides and pesticides. Acceptable uses of pesticides and herbicides are prescribed in the Control Plan, including a consideration of the potential adverse collateral effects on non-target species. The recommended methods for controlling particular plant species in the Control Plan were cross-referenced with the California Interagency Noxious Weed Coordinating Committee and Invasive Plants of California Wildlands' CalWeed Database. Overall, long-term control of invasive plants and introduced predators on RMV and throughout the Habitat Reserve will enhance habitat functions for native plant and animal species, which use and occupy the Habitat Reserve, and will substantially increase the likelihood that the Habitat Reserve will function successfully and provide for persistence and recovery of target species.

Rodenticides, which appear to have significant adverse effects on mountain lions, are not allowed in the Habitat Reserve. Chemical controls in the Habitat Reserve are currently restricted to targeted use of herbicides for pernicious invasive species such as giant reed (*Arundo donax*) which primarily occurs in creeks and artichoke thistle (*Cynara cardunculus*) which occurs in uplands, and chemical controls on the non-native invasive Argentine ant (*Linepithema humile*) and red imported fire ant (*Solenopsis invicta*). As other non-native plant species invasions of the Habitat Reserve occur, targeted herbicidal controls may be applied as needed and appropriate if mechanical removal is not effective, practical, or feasible. Per the SSHCP, use of pesticides in areas adjacent to the Habitat Reserve (e.g., golf courses) will be minimized to the extent feasible and will be used in accordance with an Integrated Pest Management Program designed to avoid and minimize effects on native species and habitats.

An example is San Juan Creek (linkage J) where large-scale giant reed removal has occurred over the past several years and was completed 2018. It is expected that the giant reed control program will be in a maintenance phase in the future where smaller, localized infestations are detected through regular monitoring and treated as-needed. As part of its cattle ranching operations, RMV has consistently performed eradication of artichoke thistle across most of the RMV property since the 1970s and efforts continue as-needed. Artichoke thistle still occurs in certain areas of the Habitat Reserve, but in much smaller populations compared to other un-managed coastal uplands due to the consistent ongoing control efforts.

According to the Invasive Species Control Plan, chemical controls of Argentine ants and fire ants are planned to occur on an as-needed, targeted basis when major outbreaks occur. Emerging methods that avoid and minimize potential impacts to non-target species will be employed to the extent feasible, such as bait traps designed to preclude access by non-target species. Controls on Argentine ant will be conducted as part of the Habitat Reserve management program, primarily along the urban-Habitat Reserve interface where mountain lion activity is less likely. Controls of fire ants is conducted by Orange County Vector Control on an as-needed basis, primarily along Chiquita Creek to date, which is not considered live-in habitat for mountain lions, but which may support movement.

As noted above, rodenticides are not used in the Habitat Reserve as a management tool and thus management actions are not expected to contribute to such impacts in the SAM population. Adverse effects of herbicides, mediated through deer could possibly occur, but are expected to occur at low levels, if at all. Herbivory of artichoke thistle by deer is unlikely because of the plant's spines (https://www.cal-ipc.org/resources/library/publications/ipcw/report38/), so the limited and targeted use of herbicides on thistle is unlikely to be passed onto mountain lions. Likewise, giant reed is considered to be highly "deer resistant" (https://njaes.rutgers.edu/deer-resistant-plants/), so the limited and targeted use of herbicides on giant reed in the future also is unlikely to be passed onto mountain lions.

Other Protective Measures and Management

In addition to habitat conservation measures and the Invasive Species Control Plan that address the management and recovery recommendations in the Petition, the SSHCP provides for several other protective measures and management actions that will ensure the availability of the suitable live-in and movement habitat in the Habitat Reserve for mountain lions.

- An overall Habitat Reserve Management Program, which includes adaptive management of suitable habitat for the mountain lion, such as oak woodlands, riparian communities, chaparral and coastal sage scrub, as well as wildlife linkages and corridors.

- Public and HOA education programs regarding living with native wildlife including mountain lions, Habitat Reserve access restrictions, public education signage regarding Habitat Reserve access restrictions (i.e., no unauthorized access) and prohibitions on dogs in the Habitat Reserve.

- A Habitat Restoration Plan (Appendix H to thc SSHCP).

- A Wildland Fire Management Plan (Appendix N to the SSHCP).

- County Ongoing Management Plans for Caspers Wilderness Park and Thomas Riley Wilderness Park (Appendix F to the SSHCP).

- Construction avoidance and minimization measures implemented through Biological Resources Construction Plans that include specific measures to avoid and minimize impacts to sensitive species and resources, such as any active mountain lion denning sites within or near planned construction sites (Appendix U to the SSHCP).

Future Management Measures by Others

RMV has identified several future management measures by other entities, that RMV would support, that could build on the SSHCP Conservation Strategy and directly benefit the SAM population. These measures include:

1. Installation of wildlife exclusion fencing along State Route 74 (SR-74/Ortega Hwy).

SR-74 is a two lane rural highway operated by Caltrans that provides access between Riverside and Orange counties. Average daily trips on this road are 22,000 vehicles. Studies cited in the Petition have identified that vehicle strikes account for a high proportion of deaths in mountain lions in the SAM, increasing the risk of extinction. Vickers (2015, cited in the Petition) has documented vehicle strikes on SR-74. On the portion of SR-74 within RMV lands there are two large culvert crossings that provide opportunities for mountain lions to cross under the highway; however, there is no fcncing in place that would push lions to using these culverts. The lack of exclusionary fencing results in lions opportunistically crossing the highway at grade. A management measure to address this issue would be the installation of wildlife exclusion fencing along appropriate sections of SR-74 by Caltrans.

2. Support and provide funding for population estimate studies of mountain lions in the SAM.

RMV has previously provided a letter of support for the NCCP Local Assistance Grant Program application submitted by Dr. Winston Vickers of UC Davis for the study titled: *Estimation of the population of mountain lions in the Santa Ana Mountains and comparison of techniques for population estimation and DNA collection, wildlife photo technology development, and development of a long-term monitoring plan and collaborations for mountain lion populations in regional NCCP's.* Studies such as this should be funded.

3. Support the provision of a functional wildlife crossing of I-15 to connect the SAM and EPR mountain lion populations.

The Petition identifies I-15 as significant barrier to mountain lion movement between the SAM and EPR, thus contributing to the SAM mountain lion population risk of extirpation. According to the Petition, this risk is primarily due to its small inherent population size and the lack of interchange between the SAM and EPR populations needed to prevent inbreeding, in combination with human-caused mortality due to vehicle strikes, depredation kills, and other factors within the SAM range. Vickers et al. (2015, cited in the Petition) documented only one radio-collared mountain lion crossing between EPR and SAM in the last 13 years, and this individual was killed 25 days later for depredating sheep. Gustafson et al. (2017, as cited in the Petition) documented three males moving from the EPR to the SAM over 15 years, but only one successfully bred. According to the Petition, with inbreeding depression, it is projected that the SAM population will likely be extirpated within 50 years. A viable wildlife crossing of I-15 would therefore seem essential to the viability of the SAM population.

Summary and Conclusion

RMV understands the current and future risk to the SAM mountain lion population, primarily due to the inherent small population size and adverse effects of inbreeding and human-caused mortality. For this reason RMV has made a substantial effort toward conserving mountain lion habitat in the SSHCP Habitat Reserve. During the SSHCP planning process, and associated CEQA and NEPA reviews, RMV thoroughly considered the available information regarding mountain lion habitat use and movement in the SSHCP planning area, which is a relatively small subset of the SAM range used by mountain lions. As discussed in detail above, the SSHCP provides for comprehensive conservation and management of the species within the Habitat Reserve, including providing for and maintaining mountain lion movement via natural habitat linkages and corridors, and large bridge and culvert crossing structures. In addition, RMV has coordinated with, and supported, Dr. Vickers more recent work on mountain lions in the region, and supports future work by Dr Vickers.

As described above, live-in habitat within the SSHCP in the San Mateo Watershed portion of the planning area and Verdugo Canyon in the San Juan Creek Watershed provides about 25-30 percent of an average mountain lion home range in the SAM, and thus has a limited, albeit important, contribution to the overall viability of the SAM population, estimated in the Petition to be approximately 29 individuals (Benson et al. 2019, as cited in the Petition). As the sole owner and manager of more than 16,500 acres of the 32,800-acre Habitat Reserve, RMV is able to effectively protect and manage important habitat for the mountain lion in the SAM range through open space dedication and implementation of the HRMP. Therefore, RMV believes that the SSHCP adequately addresses the needs of the mountain lion within its portion of the SAM population. If the mountain lion is listed under CESA, the SSHCP should be recognized as contributing to the protection and management of the SAM population.

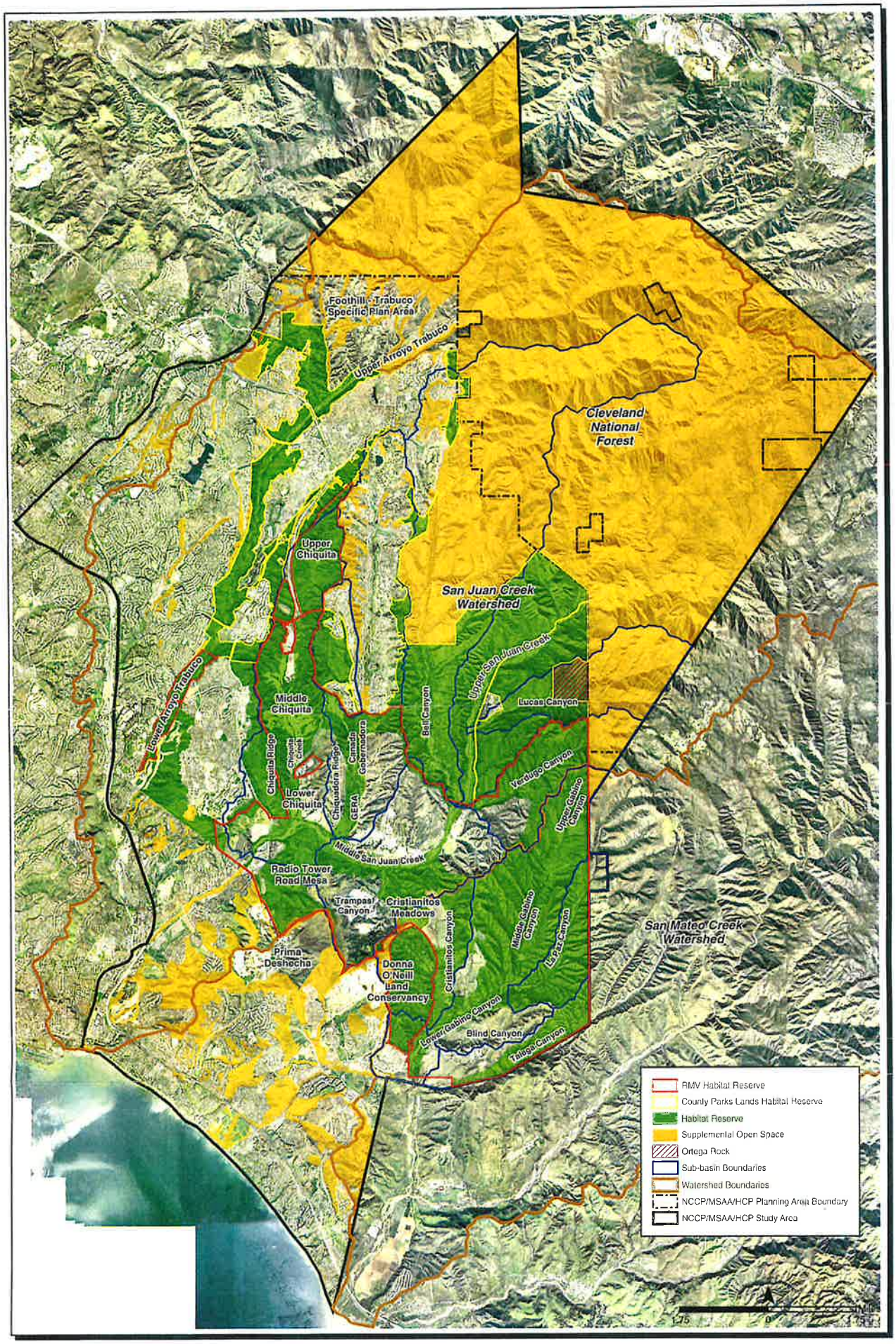
RMV appreciates the opportunity to provide these comments. Should you have any questions regarding our comments, please feel free to contact me at (949) 240-3363 Ext. 297 or via email at lcoleyeisenberg@ranchomv.com.

Sincerely,

Laura Coley Eisenberg
Senior Vice President, Open Space & Resource Management

Attachments

SSHCP Figures 169-M, 155-M & 159-M



NCCP/MSAA/HCP

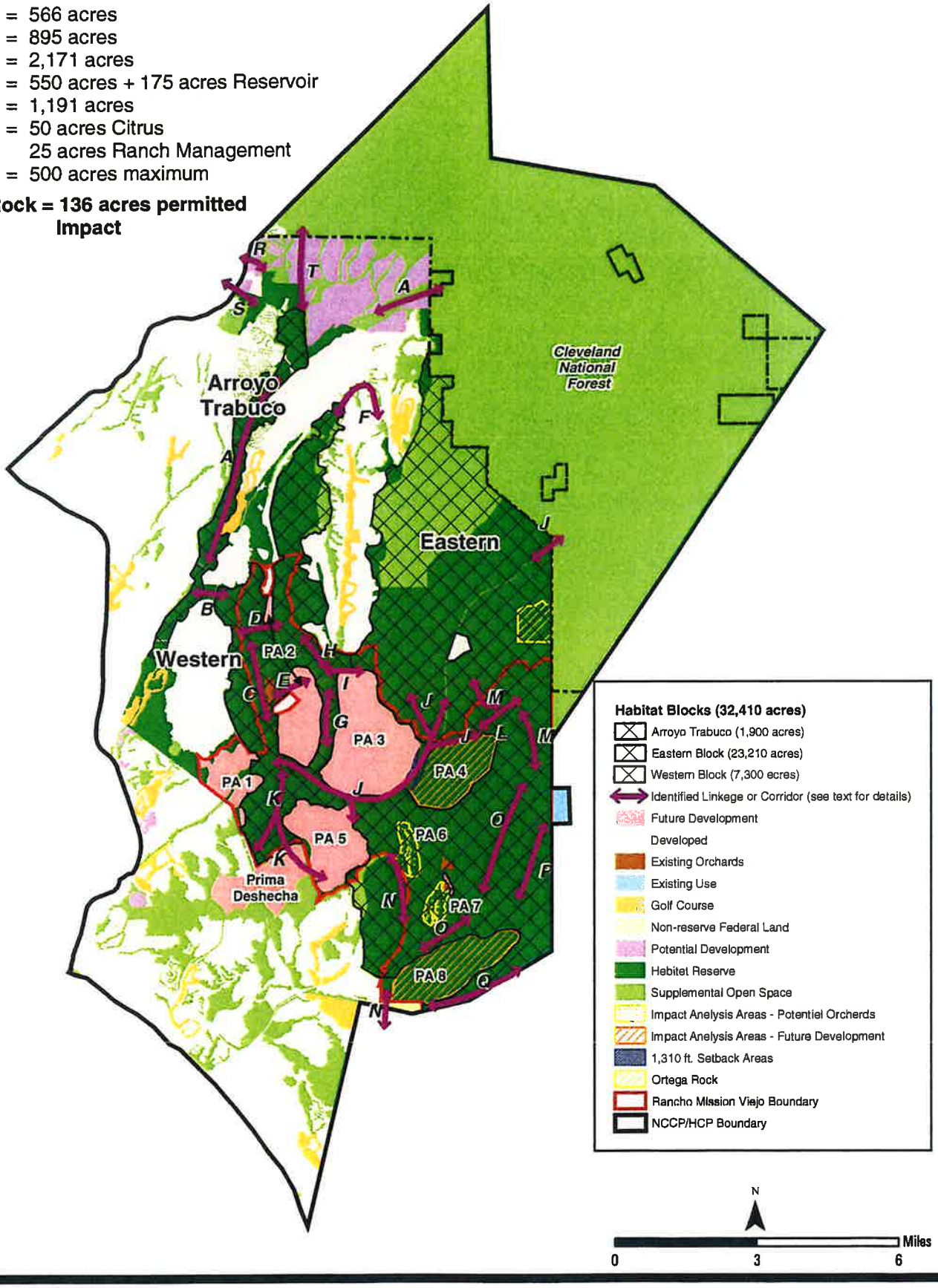
Habitat Reserve with Major Landscape Features

FIGURE 169-M

Planning Area Development

PA 1 = 566 acres
PA 2 = 895 acres
PA 3 = 2,171 acres
PA 4 = 550 acres + 175 acres Reservoir
PA 5 = 1,191 acres
PA 6,7 = 50 acres Citrus
25 acres Ranch Management
PA 8 = 500 acres maximum

Ortega Rock = 136 acres permitted Impact



NCCP/MSAA/HCP

Alternative B-12 Habitat Blocks with Habitat Linkages & Wildlife Corridors

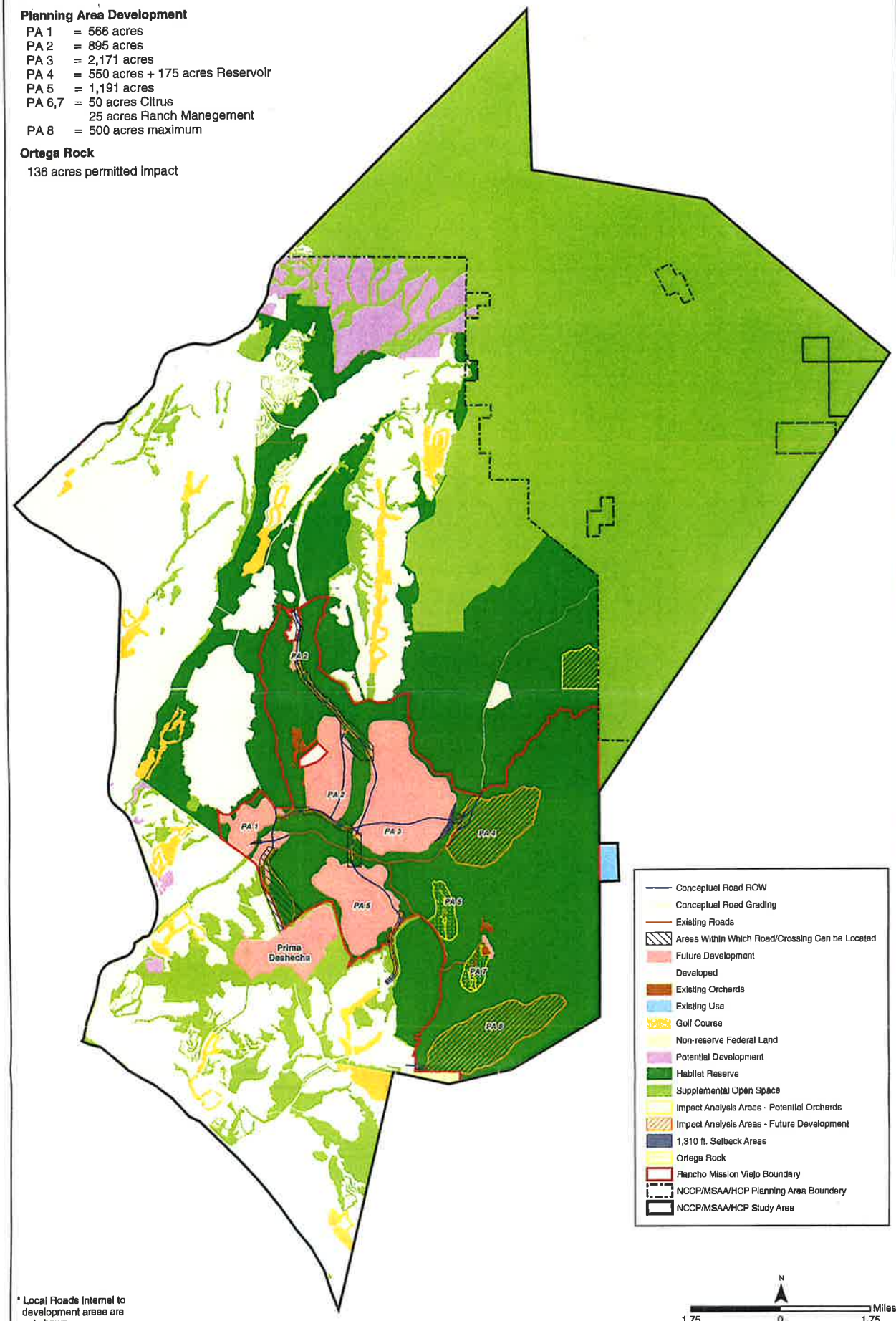
FIGURE 159-M

Planning Area Development

PA 1 = 566 acres
PA 2 = 895 acres
PA 3 = 2,171 acres
PA 4 = 550 acres + 175 acres Reservoir
PA 5 = 1,191 acres
PA 6,7 = 50 acres Citrus
25 acres Ranch Manegement
PA 8 = 500 acres maximum

Ortega Rock

136 acres permitted impact



* Local Roads Internal to development areas are not shown.

NCCP/MSAA/HCP

Alternative B-12 with Proposed Circulation System

FIGURE 155-M