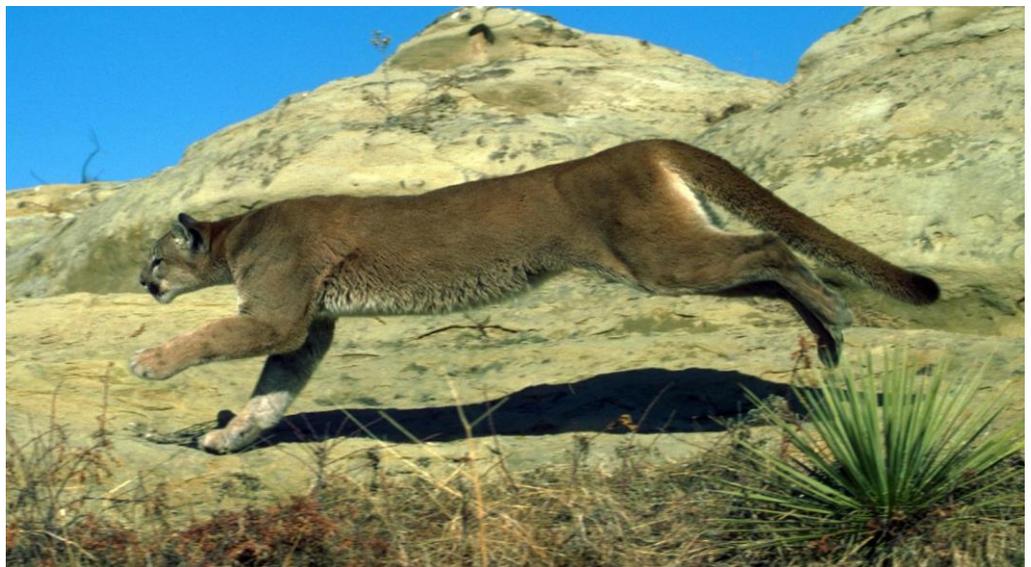


CALIFORNIA WILDLIFE BARRIERS 2020



March 2020

California Department of Fish and
Wildlife

2020 Priority Wildlife Movement Barrier Locations by Region.

California Wildlife Barriers 2020

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

INTRODUCTION

California is home to extraordinary biodiversity as well as 40 million people and a booming economy. Maintaining habitat connectivity across a matrix of developed areas is critical to conserving California's biodiversity and ecosystem resiliency now and into the future. Threats to habitat connectivity and wildlife movement across the landscape include habitat loss and fragmentation from development, as well as barriers created by linear infrastructure, such as roads, highways, dams, canals, and railroads. Not only do these impede wildlife movement, but they are often sources of mortality and affect population demographics, gene flow, resilience and ultimately persistence of California's wildlife.

Thousands of miles of linear infrastructure crisscross California's landscape that wildlife must navigate as they go about their daily and seasonal movements to secure the resources they need, such as food, mates, and shelter. The State Highway System alone consists of 16,662 miles of paved roads of varying widths. To date, identifying important wildlife movement locations has been piece-meal and based on local information and interest. This report is California Department of Fish and Wildlife's (CDFW) first attempt to collate an initial suite of priority wildlife movement barriers across the state. Currently, increasing attention is being directed toward wildlife habitat connectivity as a mechanism of maintaining biodiversity in the face of population growth and climate change. Listing priority wildlife barrier locations will help focus limited financial resources where the highest need has been identified to improve wildlife movement. This is complementary to CDFW's fish passage barrier priorities that have been identified for anadromous fish (most recently, [2018 Fish Passage Priorities List](#)). Like the fish passage priorities, the wildlife barriers list will be periodically updated to reflect new information and barrier removal successes.

METHODOLOGY

CDFW divides the state into six administrative Regions (Figure 1). CDFW staff in each Region identified linear segments of infrastructure that currently present barriers to wildlife populations in their jurisdiction. In doing so, the Regions used all available empirical information in their possession, including existing connectivity and road

crossing studies, collared-animal movement data, roadkill observations, and professional expertise.



Figure1. CDFW Region Boundaries

Each identified linear segment was then evaluated using 10 criteria and the degree to which the criteria applied to the segment under review. Finally, each Region identified their top ten priorities for remediation, and these were subsequently mapped.

The wildlife barrier criteria included:

1. Important landscape linkage identified in regional connectivity studies or habitat protection plans.
2. Known ungulate migration routes, including those identified in response to S.O. 3362.
3. Important movement corridors for sensitive species according to species-specific studies, genetic studies, or published recovery plans.
4. Known areas of high wildlife mortality due to infrastructure use (e.g., roadkill, drowning).
5. Areas where animals are known to cross more frequently than other nearby areas (e.g., riparian corridors, canyon bottoms, ridges, open space corridors).
6. Areas where animals approach and refuse to cross (e.g., collared animal behavior).
7. Areas where habitat of adjacent lands is currently in good condition.
8. Barriers where lands on both sides have conservation protections.

9. Linkages that could facilitate range shifts due to climate change (e.g., connects lower to higher elevations or habitat towards the north).
10. Areas also identified as a fish passage barrier priority.

RESULTS

A total of 150 segments of linear infrastructure were initially identified as locations where animal movement is known or suspected of being negatively impacted. Each Region identified their top 10 priority locations. In a few instances, two adjacent Regions identified overlapping or adjacent segments, or a single location is represented by two segments. As a result, a total of 61 individual segments were identified as priorities statewide (Table 1). Most Regions indicated that additional priority segments would have been identified had we not focused on the top 10 locations. Some segments were noted as needing additional information and were therefore not included in the top 10 at this time; however, they might move up in priority in the future with additional information. Segment length varies from short segments (minimum 105 feet) representing a single known barrier feature to long stretches (maximum 62 miles) representing areas of concentrated wildlife impediment or mortality, and multiple solutions will likely be necessary for effective barrier remediation. These areas will require additional focused studies to determine the exact combination of type(s) and location(s) of remediation features necessary to effectively improve permeability to wildlife (e.g., fence, underpass, jump out, bridge).

Of the top priorities, 58 involve the State Highway System (e.g., interstate, highway, or state route). One road, one railway, and one canal location were also identified at this time. Collectively, they represent a total of 610 linear miles.

In February 2018, the U.S. Secretary of the Interior issued Secretarial Order No. 3362 (SO3362), directing BLM, USFWS, and NPS to work with western State wildlife agencies to improve the quality and condition of priority big-game winter and migration corridor habitat on and adjacent to federal lands. To achieve the objectives of SO3362, the Department of Interior asked states to identify 3-5 priority migration corridors or winter range habitats for big game species in their respective state. CDFW identified 3 priority focus areas for deer, and 2 for elk in response to SO3362. Eight of the identified priority wildlife barrier segments occur within these 5 focus areas. Outside these areas, CDFW identified an additional 40 barriers to large ungulates including deer, elk, pronghorn, and bighorn sheep. Some other species associated with barrier segments included mountain lion, black bear, mesocarnivores (e.g., bobcat, fox, kit fox, fisher, badger, ringtail), as well as smaller species such as California tiger salamander, western pond turtle, giant garter snake, California red-legged frog, arroyo toad, blunt-nosed leopard lizard, Tipton kangaroo rat, San Joaquin antelope ground squirrel and others, several of which are listed as threatened or endangered. Five barriers were associated with previously identified priority fish passage barriers (W034, W038, W039, W040, W053).

Table 1. CDFW list of priority wildlife barriers, 2020.

Barrier ID	CDFW Region	County	Barrier/Segment Name	Target Species	Segment Length (miles)
W001	1, 2	Lassen	Hwy 395 Janesville	mule deer, mountain lion	9.0
W002	1, 2	Lassen	Hwy 395 Doyle	mule deer, mountain lion	16.0
W003	1	Tehama	Hwy 36E Mill Creek to Chester	mule deer	21.2
W004	1	Modoc	Hwy 299/395 Cedarville Y	pronghorn	1.2
W005	1	Siskiyou	I-5 Yreka to Oregon Border	mule deer, mountain lion, gray wolf	23.3
W006	1	Shasta	Hwy 44 East: Redding East to Lake McCumber Rd.	mule deer	33.9
W007	1	Humboldt	Hwy 101 Red School House, Big Lagoon, Orick	elk, mule deer, mesocarnivores	12.8
W008	1	Siskiyou	Hwy 97 Grass Lake	elk, mule deer, mountain lion	16.7
W009	1	Modoc	Hwy 139 Perez to jump scales	mule deer, pronghorn	10.0
W010	1	Shasta, Siskiyou	I-5/299 intersection north to I-5/89 intersection	mule deer	61.7
W011	2	Nevada	I-80, Donner Summit, bisects Sierra Nevada	mule deer, black bear, mountain lion, gray wolf, elk	1.9
W012	2	Sierra, Nevada	I-80 Truckee River Canyon, bisects Sierra Nevada	mule deer, black bear, mountain lion, gray wolf, elk	11.4
W013	2	Colusa	Hwy 20 Salt Creek, west of Williams	tule elk	2.2
W014	2	Colusa	Hwy 20 junction with Hwy 16	tule elk	0.8
W015	2	Colusa	Hwy 16 Cache Creek to Hwy 20	tule elk	3.5
W016	2	Lake	Hwy 20 Cache Creek	tule elk	2.6
W017	2	Sierra	Hwy 395 Sierra County	mule deer, mountain lion	3.1

Barrier ID	CDFW Region	County	Barrier/Segment Name	Target Species	Segment Length (miles)
W018	2	Alpine	Hwy 89 junction with Hwy 88	mule deer, mountain lion, black bear	0.5
W019	2	Alpine	Hwy 4 Alpine County	mule deer, mountain lion, black bear	17.6
W020	2	El Dorado	Hwy 50 Cameron Park to Shingle Springs, bisects Sierra Nevada	mule deer, mountain lion, black bear	3.7
W021	3	Santa Cruz	Hwy 1 SCLTS Rio Del Mar/Buena Vista	Santa Cruz long-toed salamander	5.2
W022	3	Santa Clara	Hwy 101 Metcalf/Burnett	mule deer, mountain lion, mesocarnivores	7.0
W023	3	Santa Cruz	Hwy 17 Los Gatos (Lexington Reservoir) to Scotts Valley (Carbonera Creek undercrossing)	mountain lion, bobcat, coyote, mule deer, small mammals	11.6
W024	3	Santa Clara	Hwy 101 Old Monterey/Hwy 129	mule deer, mountain lion, mesocarnivores	3.6
W025	3	Sonoma	Santa Rosa Plain -Todd Road	California tiger salamander (Sonoma dps)	1.5
W026	3	Sonoma	Hwy 12 near Glen Ellen	mule deer, mountain lion, mesocarnivores	12.4
W027	3	Alameda	Hwy 580 Castro Valley to Dublin	Alameda striped racer, Ca. Red-legged frog, native fish	3.6
W028	3	Alameda	Hwy 680 Sunol Ridge to Niles Canyon	Ca tiger salamander, Ca red-legged frog, Alameda striped racer, mountain lion	6.5

Barrier ID	CDFW Region	County	Barrier/Segment Name	Target Species	Segment Length (miles)
W029	3	Alameda	SR-84 and Calaveras Rd., Sunol Ridge to Niles Canyon	Ca tiger salamander, Ca red-legged frog, Alameda striped racer, mountain lion	11.7
W030	3	Santa Clara	Hwy 152 Pacheco Pass	Large carnivores, mesocarnivores; tule elk	11.7
W031	3	San Joaquin	Culvert on Hwy 12	giant garter snake, Pacific pond turtle, mink, river otter, beaver, all other reptiles and mammals in the area.	0.02
W032	4	Merced	Hwy 152 San Luis Reservoir	elk, mule deer, mountain lion, badger	22.6
W033	4	Kern	SR-58 Tehachapi Grade	mule deer, mountain lion	15.1
W034	4	San Luis Obispo	Hwy 101 - Cuesta Grade	mountain lion, mule deer, black bear	10.0
W035	4	Kern	High Speed Rail Alpaugh	kit fox, blunt-nosed leopard lizard, Tipton kangaroo rat, San Joaquin antelope squirrel	9.1
W036	4	Kern	I-5 Grapevine	mountain lion, mule deer, black bear, kit fox	19.6
W037	4	Kern	SR-178 Canebrake	mule deer, mountain lion, black bear	19.4
W038	4	Tuolumne	SR-108 Strawberry - Donnell Vista	mule deer, mountain lion, black bear, fisher	11.9

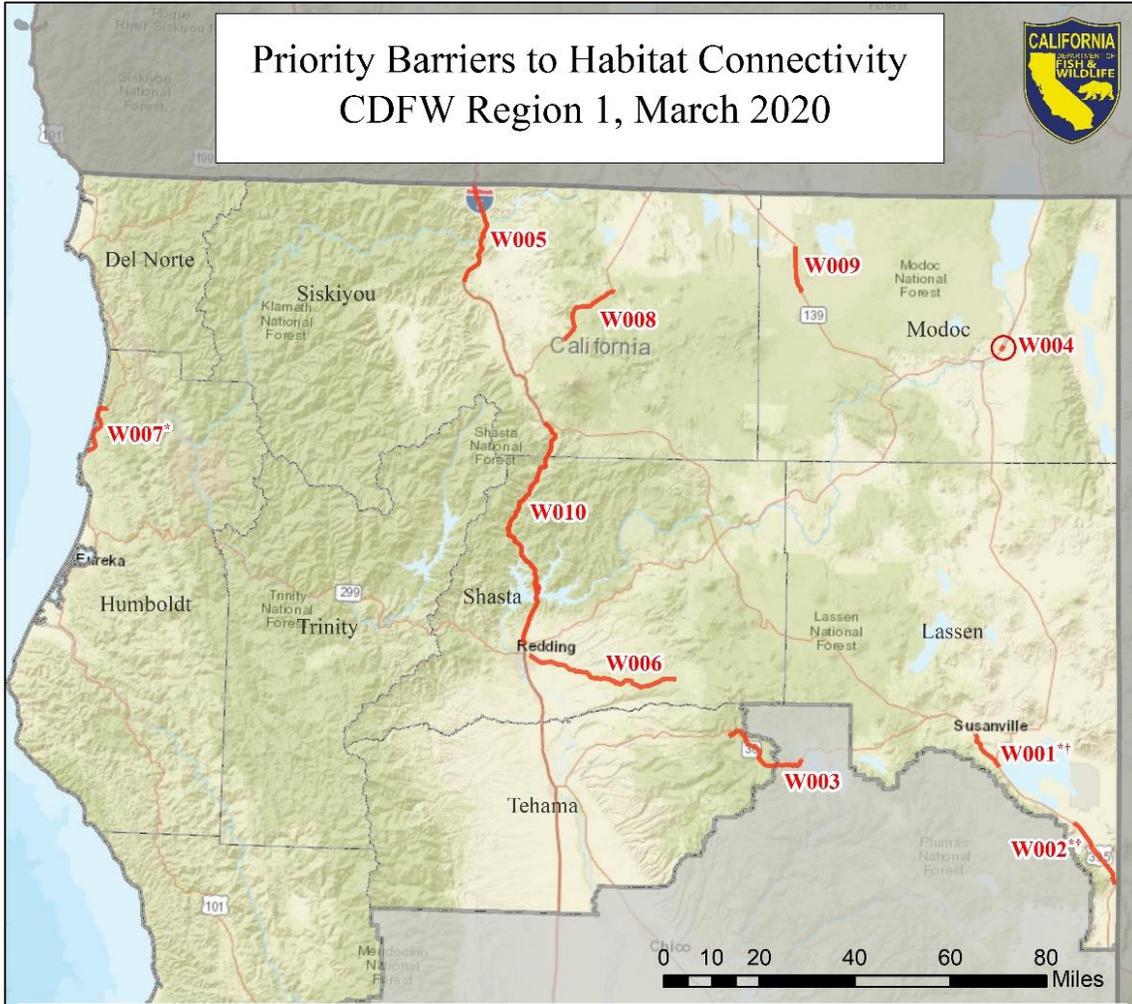
Barrier ID	CDFW Region	County	Barrier/Segment Name	Target Species	Segment Length (miles)
W039	4	Fresno	SR-180 Kings Canyon Foothills	mule deer, mountain lion, black bear, badger	13.8
W040	4	Merced	Concrete Canal - Los Banos	mule deer, elk, badger	12.5
W041	4	Monterey	Hwy 101 Prunedale	mule deer, mountain lion	10.9
W042	5	Los Angeles	Hwy 101 Liberty Canyon	mountain lion, mule deer, bobcat, mesocarnivores	0.9
W043	5	Los Angeles	SR-39 Cedar Creek to SR-2	bighorn sheep	5.9
W044	5	San Diego	SR-67 Mapleview St to Etcheverry Street	mule deer, bobcat, mountain lion, western toad, badger	16.5
W045	5	San Diego	MSCP wildlife infrastructure plan for SR-94	mountain lion, badger, mule deer, bobcat	14.7
W046	5,6	San Diego, Riverside	I-15 Temecula to E Mission Rd, mountain lion E-W movement barrier	mountain lion, mule deer, bobcat, mesocarnivores	6.7
W047	5	Los Angeles	I-5 North of Sylmar	mountain lion, mule deer	5.0
W048	5	Santa Barbara	Hwy 1 Vandenberg to Burton Mesa	mountain lion, mule deer, bobcat, mesocarnivores	3.7
W049	5	Santa Barbara	Hwy 1 Vandenberg Road	mountain lion, mule deer, bobcat, mesocarnivores	6.3
W050	5	Santa Barbara	SR-246 Purisima Hills to Santa Rosa Hills	mountain lion, mule deer, bobcat, mesocarnivores	6.0
W051	5	Ventura	SR-33 Red Mountain to Sulphur Mountain	mountain lion, mule deer, bobcat, mesocarnivores	2.6
W052	6	Orange, Riverside	SR-91, N-S Mountain lion movement barrier ("B Canyon")	mountain lion	3.3

Barrier ID	CDFW Region	County	Barrier/Segment Name	Target Species	Segment Length (miles)
W053	6	Riverside	Temecula Creek I-15 Undercrossing	western pond turtle, arroyo chub, arroyo toad, mountain lion, quino checkerspot butterfly	0.1
W054	6	Mono	Hwy 395 Mono Co. PM 16-27	mule deer, mountain lion, black bear	10.4
W055	6	Mono	Hwy 395 Mono Co. PM 80-87	mule deer, mountain lion, black bear	7.0
W056	6	Mono	Hwy 395 Mono Co. PM 90-97	mule deer, mountain lion, black bear	7.0
W057	6	Riverside	I-10, San Gorgonio River	mountain lion, black bear, bobcat	2.2
W058	6	Riverside	I-10 Banning Pass	mule deer, mountain lion, black bear, bighorn sheep	15.1
W059	6	Riverside, Orange	SR-74/Pines to Palms Hwy - through the Santa Rosa Mountains	bighorn sheep	8.3
W060	6	San Bernardino	I-15 Cajon Pass	mule deer, mountain lion, bear, bighorn sheep	2.7
W061	6	Imperial	I-8 Imperial Co.	bighorn sheep	13.1
<i>In SO3362 Priority Areas: W001, W002, W007, W012, W017, W030, W032, W054</i>					

MAPPED PRIORITIES

The following maps show priority barrier locations in each Region. These mapped priorities are also found in the [Habitat Connectivity Viewer](#) in CDFW's Biogeographic Information and Observation System ([BIOS](#)). This allows users to visualize the barriers relative to other data layers available in BIOS for use in conservation planning.

Priority Barriers to Habitat Connectivity CDFW Region 1, March 2020



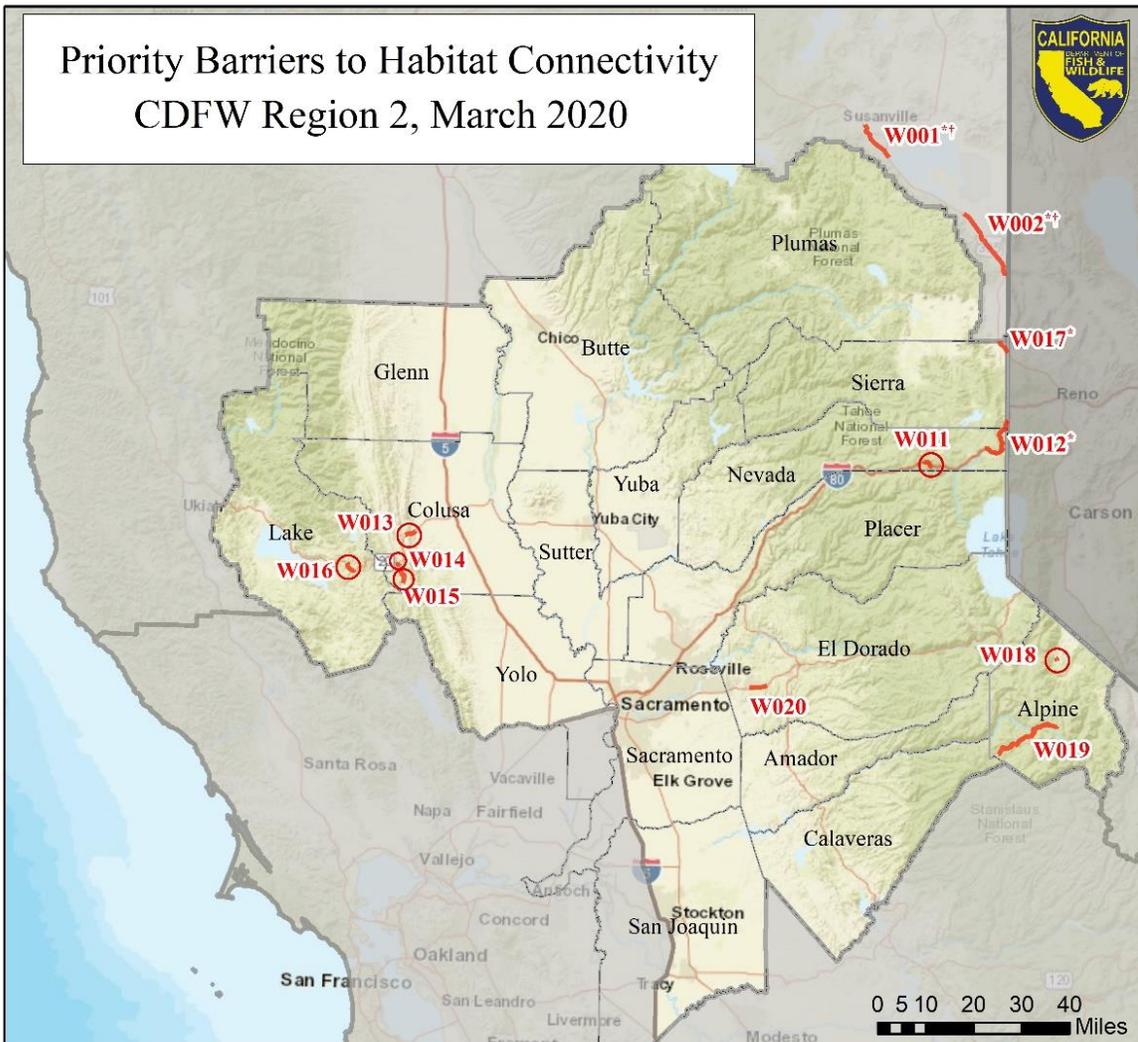
Barrier ID	County	Infrastructure Type	Route	Barrier/Segment Name
W001 ^{**}	Lassen	Highway	395	Hwy 395 Janesville
W002 ^{**}	Lassen	Highway	395	Hwy 395 Doyle
W003	Tehama	Highway	36	Hwy 36E Mill Creek to Chester
W004	Modoc	Highway	299/395	Hwy 299/395 Cedarville Y
W005	Siskiyou	Highway	5	I-5 Yreka to Oregon Border
W006	Shasta	Highway	44	Hwy 44 East: Redding East to Lake McCumber Rd.
W007 [*]	Humboldt	Highway	101	Hwy 101 Red School House, Big Lagoon, Orick
W008	Siskiyou	Highway	97	Hwy 97 Grass Lake
W009	Modoc	Highway	139	Hwy 139 Perez to jump scales
W010	Shasta/Siskiyou	Highway	5	I-5/299 intersection north to I-5/89 intersection

^{*} within SO3362 priority area, ^{**} identified as a top priority by more than one region

Note: Barriers are not numbered in order of priority.

Priority Barriers to Habitat Connectivity

CDFW Region 2, March 2020

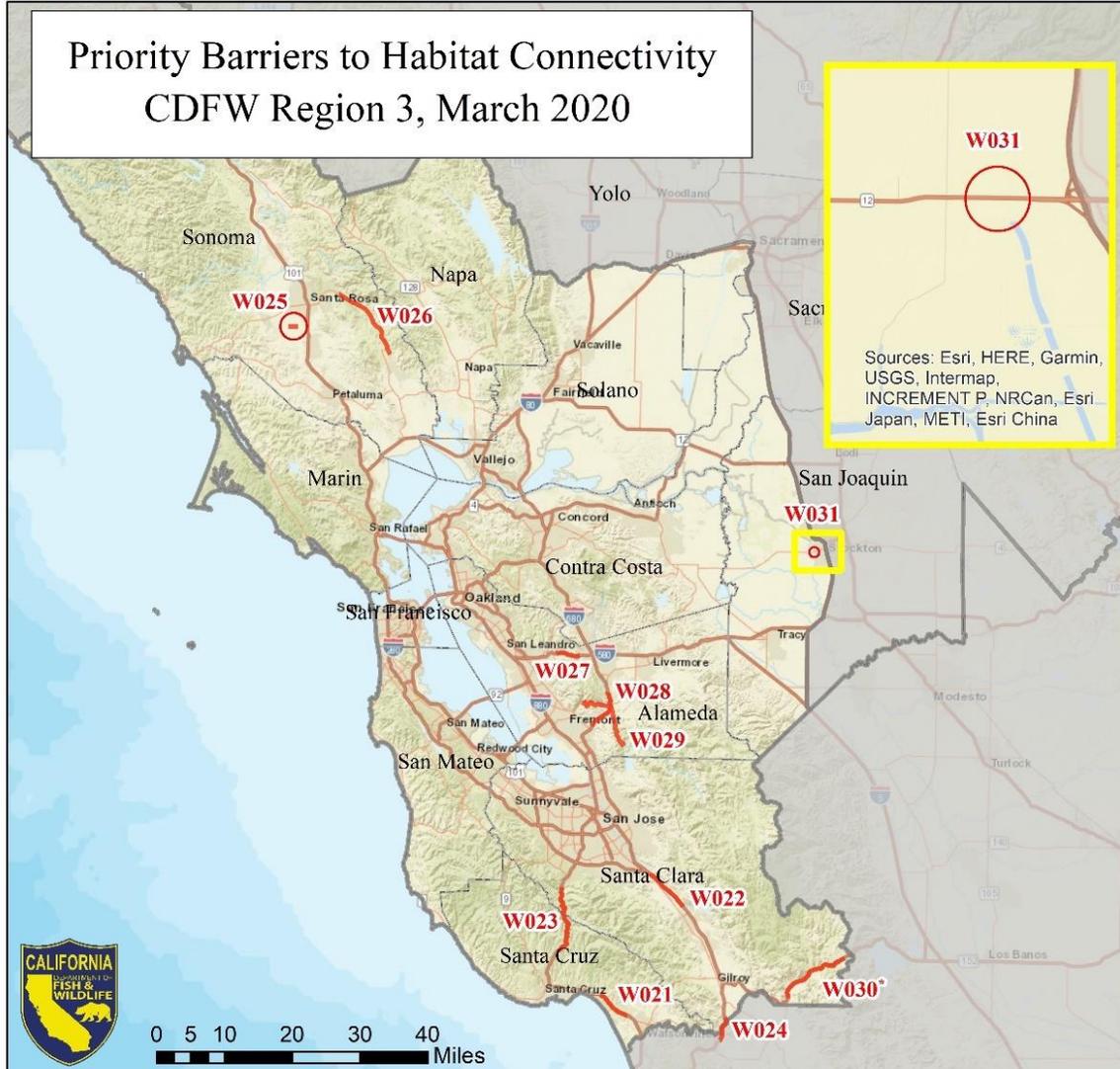


Barrier ID	County	Infrastructure Type	Route	Barrier/Segment Name
W011	Nevada	Highway	80	I-80, Donner Summit, bisects Sierra Nevada
W012 [*]	Sierra/Nevada	Highway	80	I-80 Truckee River Canyon, bisects Sierra Nevada
W013	Colusa	Highway	20	Hwy 20 Salt Creek, west of Williams
W014	Colusa	Highway	20	IIwy 20 junction with IIwy 16
W015	Colusa	Highway	16	Hwy 16 Cache Creek to Hwy 20
W016	Lake	Highway	20	Hwy 20 Cache Creek
W017 [*]	Sierra	Highway	395	Hwy 395 Sierra County
W018	Alpine	Highway	89	Hwy 89 junction with Hwy 88
W019	Alpine	Highway	4	IIwy 4 Alpine County
W020	El Dorado	Highway	50	Hwy 50 Cameron Park to Shingle Springs, bisects Sierra Nevada
W001 ^{**}	Lassen	Highway	395	Hwy 395 Janesville
W002 ^{**}	Lassen	Highway	395	Hwy 395 Doyle

^{*} within SO3362 priority area, ^{**} identified as a top priority by more than one region

Note: Barriers are not numbered in order of priority.

Priority Barriers to Habitat Connectivity CDFW Region 3, March 2020



W031

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China

Barrier ID	County	Infrastructure Type	Route	Barrier/Segment Name
W021	Santa Cruz	Highway	1	Hwy 1 SCLTS Rio Del Mar/Buena Vista
W022	Santa Clara	Highway	101	Hwy 101 Metcalf/Burnett
W023	Santa Cruz	Highway	17	Los Gatos (Lexington Reservoir) to Scotts Valley (Carbonera Creek undercrossing)
W024	Santa Clara	Highway	101	Hwy 101 Old Monterey/Hwy 129
W025	Sonoma	Road	Todd Road	Santa Rosa Plain - Todd Road
W026	Sonoma	Highway	12	Hwy 12 near Glen Ellen
W027	Alameda	Highway	580	Hwy 580 Castro Valley to Dublin
W028	Alameda	Highway	680	Hwy 680 Sunol Ridge to Niles Canyon
W029	Alameda	Highway	84	Hwy 84 and Calaveras Rd., Sunol Ridge to Niles Canyon
W030*	Santa Clara	Highway	152	Hwy 152 Pacheco Pass
W031	San Joaquin	Highway	12	Culvert on Highway 12

* within SO3362 priority area
 Note: Barriers are not numbered in order of priority.

**Priority Barriers
to Habitat Connectivity
CDFW Region 4
March 2020**



Barrier ID	County	Infrastructure Type	Route	Barrier/Segment Name
W032*	Merced	Highway	152	Hwy 152 San Luis Reservoir
W033	Kern	Highway	58	SR-58 Tehachapi Grade
W034	San Luis Obispo	Highway	101	Hwy 101 - Cuesta Grade
W035	Kern	Railway		High Speed Rail Alpaugh
W036	Kern	Highway	5	Hwy 5 Grapevine
W037	Kern	Highway	178	SR-178 Canebrake
W038	Tuolumne	Highway	108	SR-108 Strawberry - Donnell Vista
W039	Fresno	Highway	180	SR-180 Kings Canyon Foothills
W040	Merced	Canal		Concrete Canal - Los Banos
W041	Monterey	Highway	101	Hwy 101 Prunedale

* within SO3362 priority area
 Note: Barriers are not numbered in order of priority.

Priority Barriers to Habitat Connectivity CDFW Region 5, March 2020

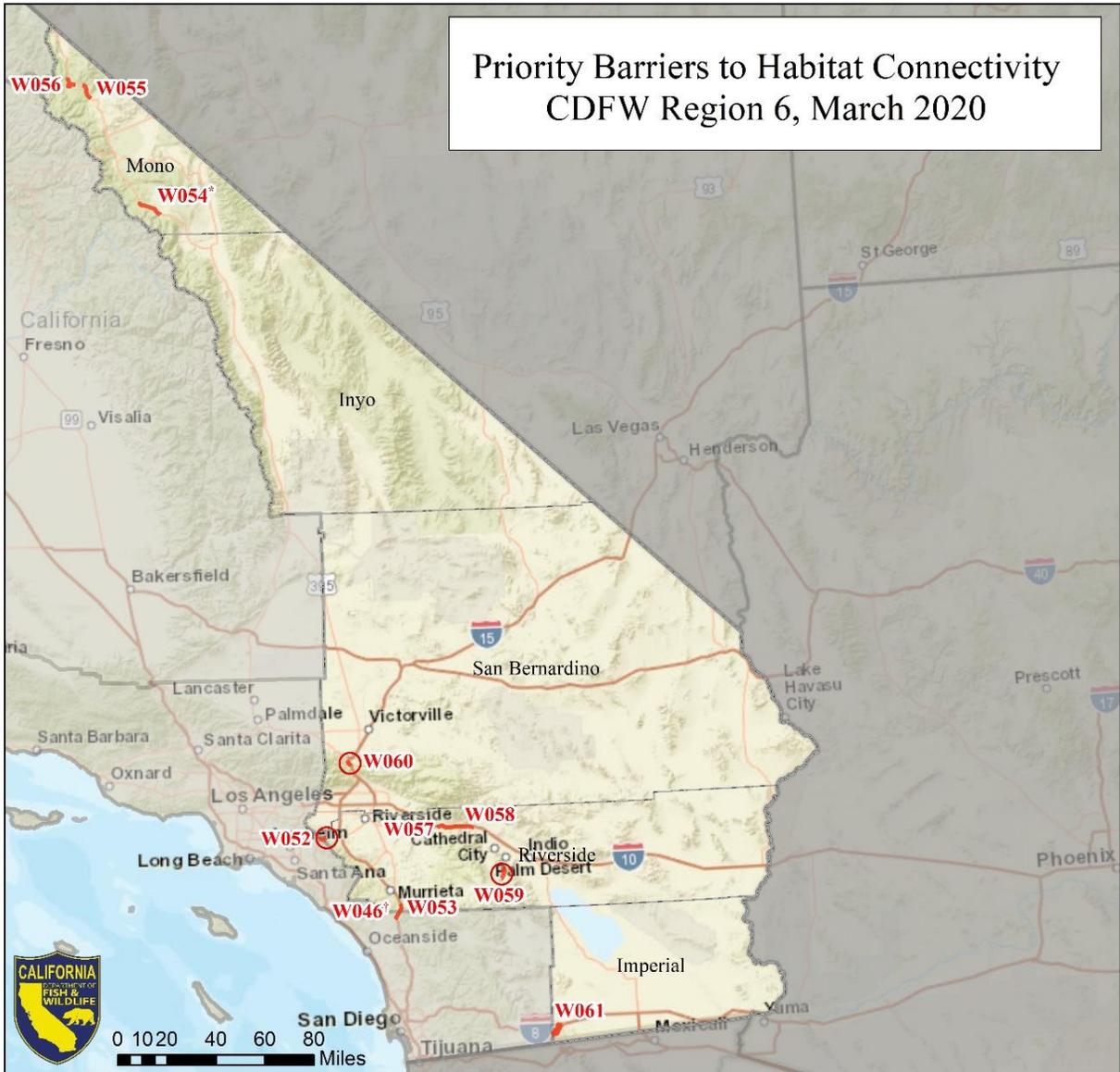


Barrier ID	County	Infrastructure Type	Route	Barrier/Segment Name
W042	Los Angeles	Highway	101	Hwy 101 Liberty Canyon
W043	Los Angeles	Highway	39	SR-39 Cedar Creek to SR-2
W044	San Diego	Highway	67	SR-67 Mapleview St to Etcheverry Street
W045	San Diego	Highway	94	MSCP wildlife infrastructure plan for SR-94
W046 [†]	San Diego, Riverside	Highway	15	I-15 Temecula to E. Mission Rd, mountain lion E-W movement barrier
W047	Los Angeles	Highway	5	I-5 North of Sylmar
W048	Santa Barbara	Highway	1	Hwy 1 Vandenberg to Burton Mesa
W049	Santa Barbara	Highway	1	Hwy 1 Vandenberg Road
W050	Santa Barbara	Highway	246	SR-246 Purisima Hills to Santa Rosa Hills
W051	Ventura	Highway	33	SR-33 Red Mountain to Sulphur Mountain

[†]identified as a top priority by more than one region

Note: Barriers are not numbered in order of priority.

Priority Barriers to Habitat Connectivity CDFW Region 6, March 2020



Barrier ID	County	Infrastructure Type	Route	Barrier/Segment Name
W046 [†]	San Diego, Riverside	Highway	15	I-15 Temecula to E Mission Rd, mountain lion E-W movement barrier
W052	Orange, Riverside	Highway	91	SR-91, N-S Mountain lion movement barrier ("B Canyon")
W053	Riverside	Highway	15	Temecula Creek I-15 Undercrossing
W054 [*]	Mono	Highway	395	Hwy 395 Mono Co. PM 16-27
W055	Mono	Highway	395	Hwy 395 Mono Co. PM 80-87
W056	Mono	Highway	395	Hwy 395 Mono Co. PM 90-97
W057	Riverside	Highway	10	I-10, San Geronio River
W058	Riverside	Highway	10	I-10 Banning Pass
W059	Riverside/Orange	Highway	74	SR-74/Pines to Palms Hwy - through the Santa Rosa Mountains
W060	San Bernardino	Highway	15	I-15 Cajon Pass
W061	Imperial	Highway	8	I-8 Imperial Co.

^{*} within SO3362 priority area, [†] identified as a top priority by more than one region
 Note: Barriers are not numbered in order of priority.