State of California
California Natural Resources Agency
DEPARTMENT OF FISH AND WILDLIFE

FINAL LAND MANAGEMENT PLAN
for
BODEN CANYON ECOLOGICAL RESERVE

March 2021

BODEN CANYON ECOLOGICAL RESERVE
LAND MANAGEMENT PLAN

FINAL

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3/16/2021
Date

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This Land Management Plan reflects the cooperative efforts of the South Coast Region and the Wildlife and Biogeographic Data Branches. Personnel from these CDFW sections provided their time and energy (and patience) to effectively and efficiently produce a plan that not only documents the Reserve's natural resources but also sets a vision for the current and future management of the Reserve.

The time it has taken to accomplish the drafting of this LMP is indicative of the complexities of land management and the lack of adequate CDFW personnel, however the recent prioritization of staff and funding to complete it is a positive measure by CDFW managers and administrators.

Sincere thanks for allowing me the opportunity to serve as a liaison between the Region and Headquarters and to be integral in completing this LMP for a property that I have been involved with since prior to its acquisition by the state in 1998.

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APPENDICES

I. INTRODUCTION

The Boden Canyon Ecological Reserve (Reserve) consists of 1,221 acres of biologically important land under the ownership of the California Department of Fish and Wildlife (CDFW). This Land Management Plan (LMP) has been prepared as a guidance document for agency staff and the public. The document has six chapters. Chapter I provides background information on the various land purchases, the purposes for which the land was acquired and identifies the goals/purpose of the LMP. Chapter II provides a detailed description of the Reserve, including physical characteristics and cultural features. The Reserve is a relatively intact representation of the region's biological resources. A description of the habitats and species within the Reserve is provided in Chapter III. Chapter IV includes the goals identified for the long-term management of the biological resources, public use and facility maintenance, fire management, and biological monitoring. Tasks that should be conducted to allow the land managers to meet these goals are also listed and described. Chapter V is a summary of the staff, budget, and operations and maintenance tasks estimated to be needed to meet the management goals identified in Chapter IV. Chapter VI includes Climate Change Strategies for the Reserve in context of the State's larger climate change adaptation strategy. Chapters VII and VIII outline the process for future LMP revision and references cited in the LMP.

The 14 parcels that make up the Reserve are located within unincorporated lands of the County of San Diego (County). The Reserve is located north of Highway 78, northwest of Ramona, and east of the San Diego Zoo Safari Park (Figures 1 and 2).

A. Purpose of Acquisition

The Boden Canyon parcels were acquired by CDFW to further implement habitat protection efforts in this region under the State's Natural Community Conservation Planning efforts (NCCP, California NCCP Act, Fish and Game Code, Title 14, Section 2800-2835. 1991 and amended) (State of CA, WCB meeting minutes, Feb 24, 1998), to conserve, protect, and enhance core riparian, oak woodland, chaparral, and coastal sage scrub habitat areas, and to provide crucial wildlife linkages in San Diego County, as identified in the San Diego Sub-Regional Plan of the Multiple Species Conservation Program (MSCP) (Figure 3). For more on the MSCP see Chapter I. E. Planning Influences and Considerations, and Chapter IV. C. 1.b and 2.b for MSCP Goals, Tasks and Impact Guidelines.

The MSCP identifies Boden Canyon as a core resource area and an important biological linkage to habitats outside the MSCP. The site provides a connection between the San Dieguito River Valley, through Rancho Guejito, and to Pamo Valley, forming one of the longest natural wildlife movement corridors in San Diego County. It then extends further north into Riverside County. Boden Canyon is roughly 4 miles long and three quarters of a mile wide. It is located between the Cleveland National Forest to the east and the privately held Rancho Guejito to the west. While Boden Canyon is not an inherently unique feature in the landscape, most of the low-lying canyons within the region similar to Boden Canyon have been irreparably damaged by long histories of heavy agriculture and urban fringe development. Therefore, Boden Canyon is one of the few canyons that remain an intact representation of San Diego County's natural vegetative communities.

Figure 1. Regional Map

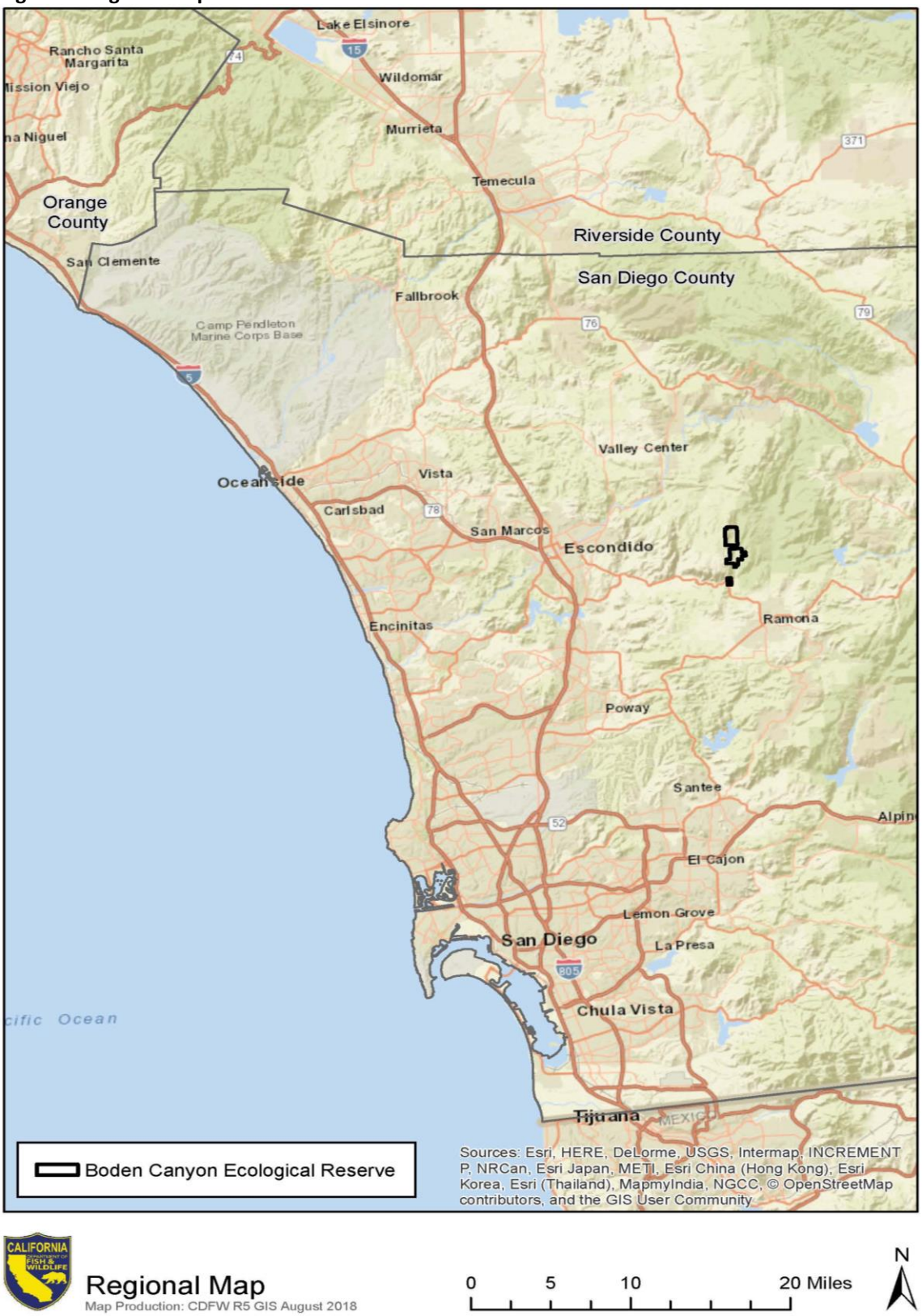


Figure 2. Vicinity Map

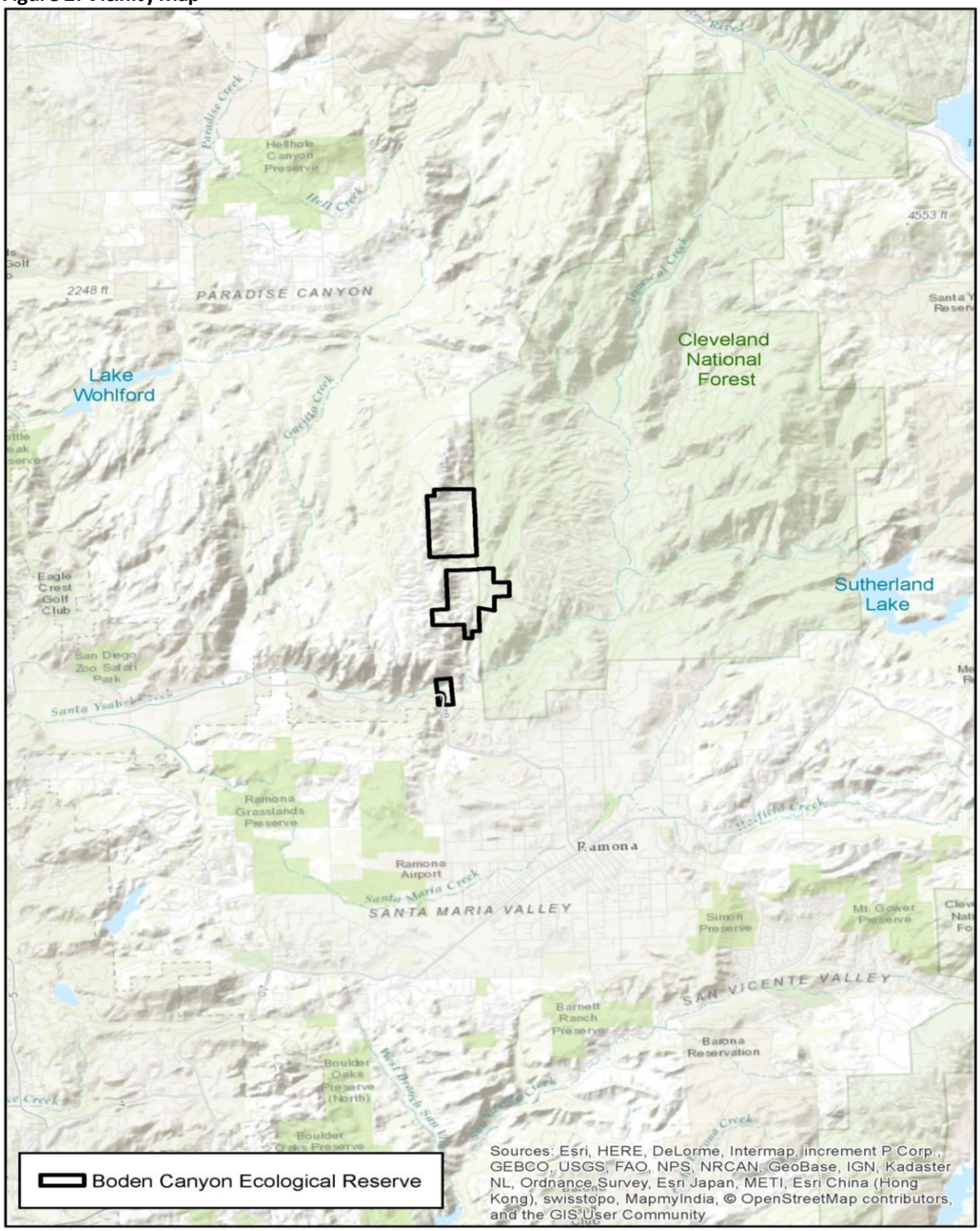
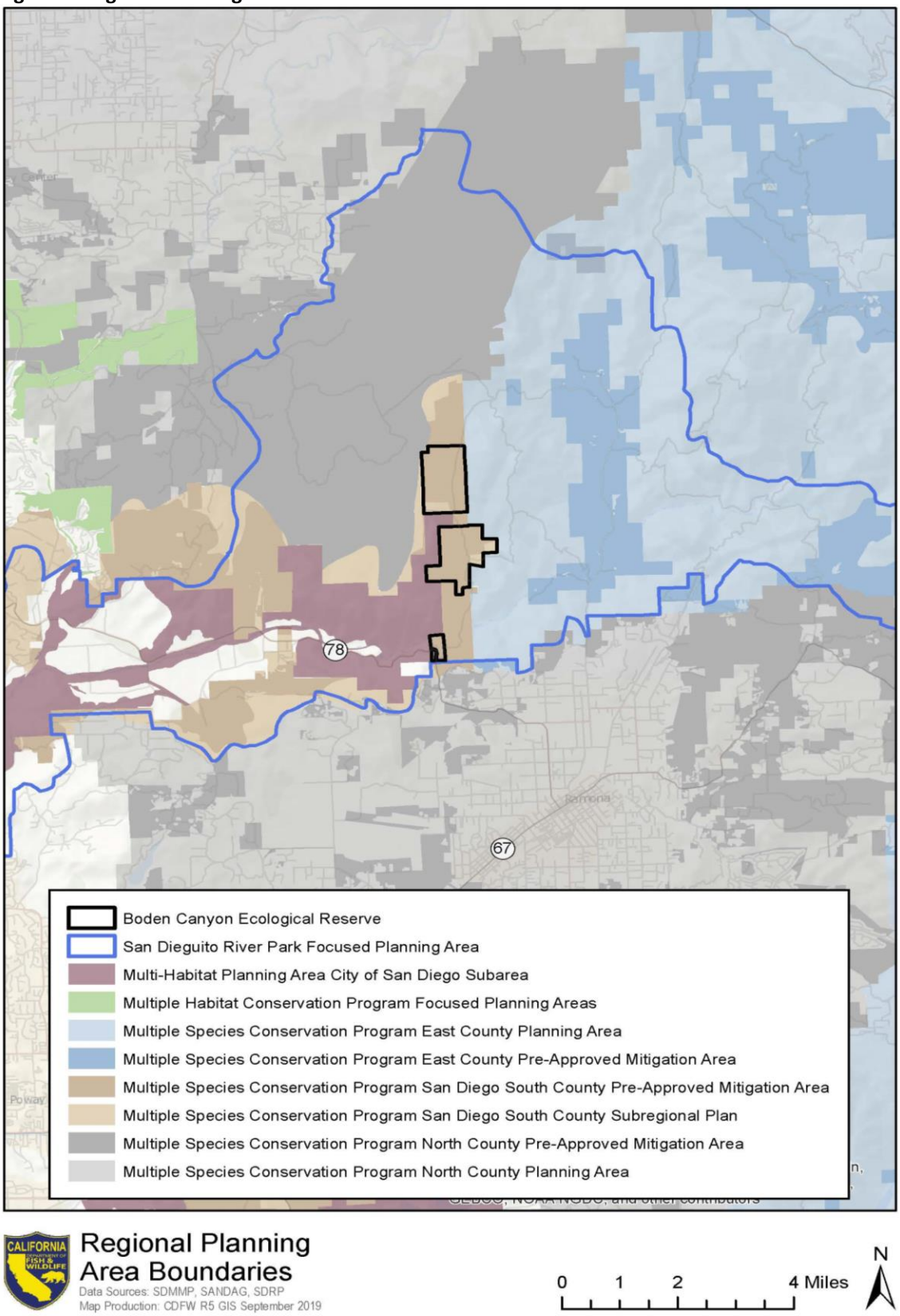


Figure 3. Regional Planning Area Boundaries



The Wildlife Conservation Board (WCB) acts as the real estate arm for CDFW. The minutes of the February 24, 1998 Board Meeting reflect the purpose of the acquisition and the intentions for management by CDFW. They state that CDFW's proposed management would be primarily for habitat protection and enhancement, but where compatible, could include hunting, hiking, nature observation and similar wildlife oriented public recreation (State of CA WCB minutes Feb. 24, 1998, page 47).

Three public agencies determined that Boden Canyon had resource and public trust values worth protecting and began acquiring the various privately held parcels in the late 1990's. These three agencies are CDFW, City of San Diego (City), and County of San Diego (County).

In addition to being the "Real Estate arm" for CDFW, WCB has a robust grant program. In 2019 WCB awarded a Grant to the San Diego Society for Natural History (2019, WCB Grant) for work on 5 CDFW properties over a five-year period. In 2020 they began implementing tasks within that grant. The purpose of the grant was to provide information for CDFW lands and land management planning efforts. CDFW acknowledged that some information was currently lacking that would strengthen Land Management Plans and the associated CEQA documents, as well as provide information necessary to better manage and monitor CDFW lands.

The grant prioritized tasks that CDFW in-house staff did not have expertise in (i.e., cultural resources, erosion, and hydrology) or included tasks where CDFW did not have sufficient staffing or funding to accomplish (small mammal trapping, diseased tree surveys). For this particular LMP for Boden Canyon Ecological Reserve, the grant tasks began in January 2020 and will be finalized around Spring of 2021. Study results were not available at the time of the Draft LMP's public review (September 2020), however they will be incorporated into this Final LMP. Additional information will be added into the LMP as tasks are completed.

B. Acquisition History

WCB, on behalf of CDFW, acquired 14 parcels, each identified by a letter designator, over a two-year period (Table 1 and Figure 4) that collectively form three discrete areas within Boden Canyon. The three areas of CDFW ownership are referenced in this LMP as the northern, central, and southern sections of the Reserve (Figure 5). The northern section consists of Parcels A, B, C, D and E. The central section consists of Parcels H, I, J, K, L and M. The southern section consists of Parcels R, S and T.

The properties were acquired primarily using Habitat Conservation Funds (Proposition 117, see Appendix D) designated for land purchases under the NCCP as well as from private grants, State Coastal Conservancy transaction funds and land value donations from various sellers. The total cost of the 14 parcels (1,221 acres) was $5,943,063. WCB approved the initial purchase of 561 acres at its February 24, 1998 meeting, and then acquisition of two additional land areas identified as Expansion #1 (590 acres) and Expansion #2 (70 acres), at a November 18, 1999 meeting. The Expansion #2 transaction includes 10 acres in the northwest corner that were retained by the landowner.

Of the total 2,050 acres in Boden Canyon acquired by the three agencies, CDFW owns and manages 1,221 acres (59.56%). The City owns 790 acres (38.53%) and the County owns 40 acres (1.95%) (Figure 5).

Table 1. Parcel Acquisition History

Acquisition Date	Parcels Acquired	Total Acreage
February 24, 1998	B, D, E, I, J, K, L, R, S, and T	561
November 18, 1999	C, H, and M	590
November 18, 1999	A	70

Figure 4. Parcel Ownership in Boden Canyon

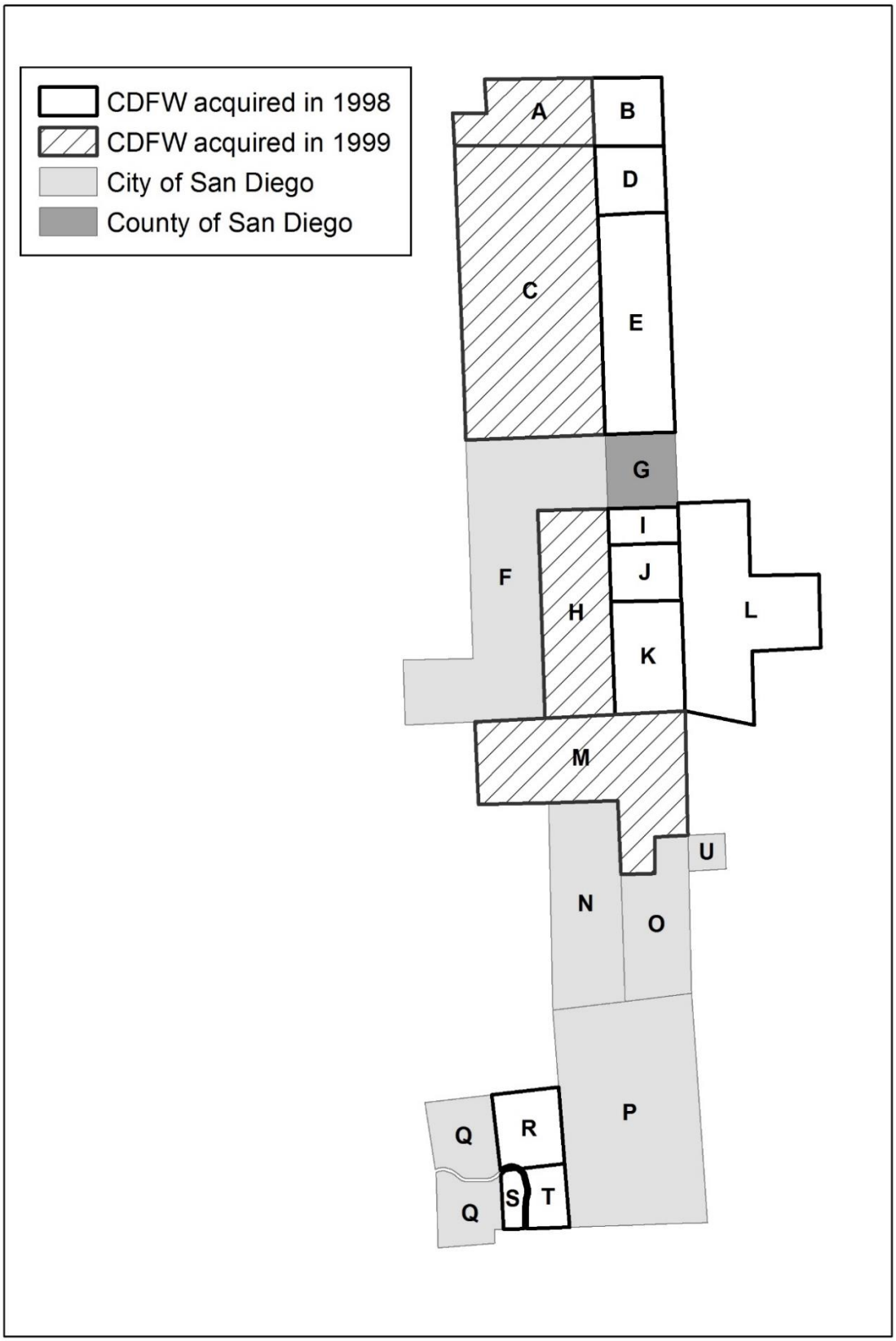
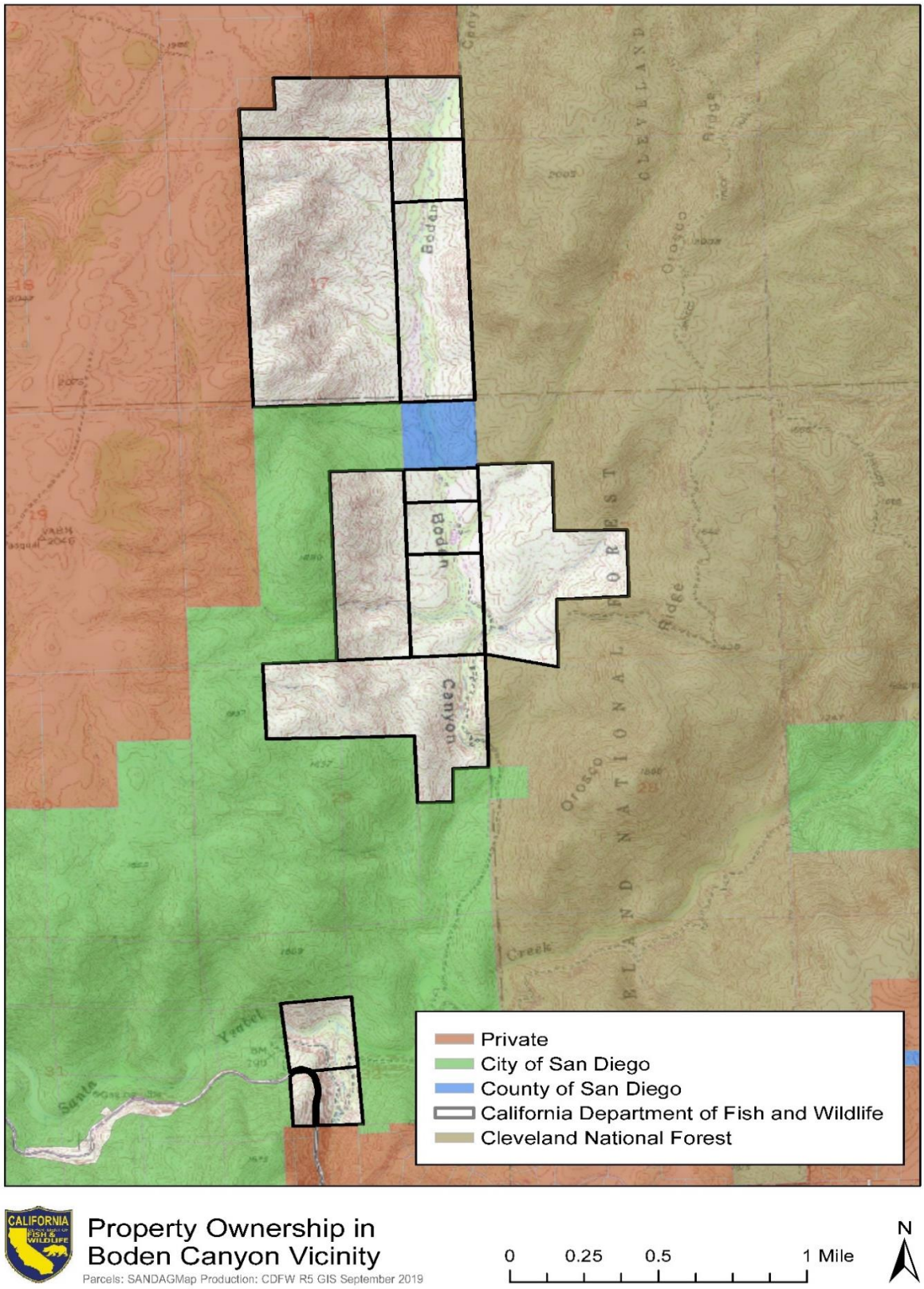


Figure 5. Property Ownership in Boden Canyon Vicinity



Despite two attempts to create one collective Land Management Plan (1999/2000 and 2005) that would have incorporated lands owned within Boden Canyon by CDFW, the City and the County, there were differences in both processes and priorities for each agency's respective parcels within the canyon. These differences proved difficult to encapsulate into one guidance document. Therefore, although CDFW is preparing its own LMP, the intent is to continue to work with the County and the City on management issues pertaining to all of Boden Canyon. Currently, each agency manages their property pursuant to their own mandates, budgets, and regulations. This LMP will pertain to the 1,221 acres owned and managed by CDFW and include the adjacent County and City properties within Boden Canyon as is relevant throughout the LMP.

C. Purpose of this Management Plan

An LMP is mandated by Fish and Game Code (FGC) Section 1019, for any property wholly under CDFW jurisdiction. The LMP, which becomes the primary management document for the property, contains management goals, tasks, and other necessary information for consistent and effective management of the property. The LMP does not provide specific designs or locations of proposed facilities but does provide a vision for the property and guidelines for use, management, and development. This LMP was developed with guidance from CDFW's *A Guide and Annotated Outline for Writing Land Management Plans, November 2014.*

This LMP has been prepared as a guidance document for agency staff and the public. It will provide focus and vision to conserve and manage declining sensitive biological resources within San Diego County in a manner that balances both the public interest needs and fiscal realities of CDFW. The overall purpose of this LMP is to develop a program that will protect Boden Canyon's ecological and cultural resources while providing compatible wildlife-dependent recreational opportunities for the San Diego region. The primary goal of this LMP is to provide measures to conserve the Reserve's natural biological resources while protecting watershed and wildlife corridor resources. The secondary goal is to provide measures for public use of and access into the Reserve that are compatible with the primary goal. These goals will be accomplished through the implementation of objectives addressed later in this document. As such:

- The LMP guides the adaptive management of habitats, species, and programs described herein to achieve CDFW's mission to protect and enhance wildlife values.
- The LMP serves as a guide for appropriate public uses of the property.
- The LMP serves as a descriptive inventory of fish, wildlife, and native plant habitats and the species they support, which occur in or use this property.
- The LMP provides an overview of the property's operation and maintenance, and personnel requirements to implement management goals. It serves as a budget planning aid for annual regional budget preparation.
- The LMP provides a description of potential and actual environmental impacts and subsequent mitigation that may occur during management and contains environmental documentation to comply with state and federal statutes and regulations.

A second but just as important purpose for this LMP is to ensure that management and monitoring of the Ecological Reserve occur as specified in the MSCP and through the Management Strategic Plan (MSP, San Diego Management and Monitoring Program, 2017). The MSP is a roadmap

document that unites the MSCP with other regional planning efforts and is further described below in Section E, and in Chapter IV in conjunction with the discussion on MSCP.

Boden Canyon is an integral part of the MSCP preserve system; as such, the CDFW has committed to complying with the intent and goals of the MSCP. The commitment is to maintain and improve habitats and species covered by the MSCP that occur within the Reserve. A list of MSCP-covered species that occur within the Reserve are noted in Chapter III, and the management and monitoring goals for these species and the habitats they depend upon are described in Chapter IV.

D. About the Department of Fish and Wildlife (CDFW)

> *The mission of the Department of Fish and Wildlife is to manage California's diverse fish, wildlife, and plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public.*

The five coastal southern California counties, which make up the South Coast Region (SCR), are home to nearly 50 percent of the State's population. For this reason, the SCR has a great need to identify priorities that will help CDFW meet its trustee role as stewards of California's wildlife. Furthermore, the Mission Statement of the SCR proposes to:

> *Conserve the South Coast Region's plants, fish, and wildlife and their habitats for current and future generations through management, protection, and education.*

CDFW accomplishes these Missions through the shared values of integrity, respect, leadership, credibility, perseverance, open-mindedness, transparency, effectiveness, and being solution oriented.

CDFW has two major land management designations: Wildlife Area and Ecological Reserve.

- Wildlife Areas exist to protect and enhance habitat for wildlife and to provide for public uses that are compatible with the long-term well-being of wildlife and habitat. The management of the wildlife areas results in a great variety of high-quality wildlife viewing, hunting, and fishing opportunities for the public.
- Ecological Reserves are established to provide protection for rare, threatened, or endangered native plants, wildlife, aquatic organisms, and specialized terrestrial or aquatic habitat types. Public entry and use of Reserves shall be compatible with the primary purposes of such a Reserve.

The Boden Canyon property was designated by the Fish and Game Commission as an Ecological Reserve in 2000 based upon the purposes for which it was acquired (see below).

FGC Sections 1580-1585 define an Ecological Reserve as:

Land or land and water area that are designated by the Commission pursuant to section 1580 and that are to be preserved in a natural condition, or which are to be provided some level of protection as determined by the Commission, for the benefit of the general public to observe native flora and fauna and for scientific study or research.

Notwithstanding section 1580, which sets forth the primary purposes of ecological reserves, the department may construct facilities and conduct programs in ecological reserves it selects to provide natural history education and recreation if those facilities and programs are compatible with the protection of the biological resources of Reserve. As provided in section 1764 and 1765, the Department may control access, use, and collect fees for selected ecological reserves.

The Fish and Game Commission, as part of the same process for designating the property as an Ecological Reserve, also approved certain public uses and prohibitions. Once approved by the Commission, the Office of Administrative Law reviewed and approved the specific regulations for inclusion into the California Code of Regulations (CCR), Title 14 Section 630 (and other applicable sections). For statewide consistency, regulations were taken from standard Ecological Reserve measures and then designated specifically (https://www.wildlife.ca.gov/Lands/Regulations) for Boden Canyon's unique features and needs. (See Chapter IV. D on the Public Use Element).

Monitoring and enforcement of these laws and regulations are performed by CDFW Law Enforcement Officers who frequently patrol the area and CDFW staff that manage the Reserve. Current allowed uses include hiking on the main trail and upland game hunting in designated areas pursuant to annually approved hunting regulations relative to season, limits, and methods of take. These allowed uses are described in further detail in Chapter IV. D.

E. Planning Influences and Considerations

The Reserve is located in San Diego County, which includes the second largest city in California, and the eighth largest city in the Nation. In addition, there are numerous smaller local jurisdictions within the County as well as acres of land that fall under County jurisdiction. Therefore, land use throughout the County is governed by a complex and interrelated network of existing policies, regulations, land ownership, and general plans. Although these are important planning documents relevant to land use regulations for properties adjacent to the Reserve, CDFW management of the Reserve is only to be dictated by this LMP.

California Environmental Quality Act (CEQA)

Established in 1970, CEQA is a statute that requires state and local agencies to identify the significant environmental impacts of their actions and to avoid, minimize, or mitigate those impacts, where feasible. It is the state counterpart to the National Environmental Policy Act (NEPA) and is the fundamental regulation influencing the environmental effects of development within California.

Natural Community Conservation Planning Act (NCCP Act)

According to FGC Section 2800, the purpose of the State's NCCP Act of 1991 was to sustain and restore species and their habitat impacted by human changes to the landscape. This voluntary program was based on broad partnerships among conservationists, local governments, landowners and regulatory agencies. The NCCP program created regional conservation and development plans that protect entire communities of native plants and animals while streamlining the process for compatible economic development in other areas.

State Wildlife Action Plan

California's distinctive topography and climate have given rise to a remarkable diversity of habitats that support a multitude of plant and animal species. In fact, California has more species than any other state, and it has the greatest number of species that occur nowhere else in the world. Many of the places where wildlife thrive are the same as those valued for recreation and other human activities. To ensure a sustainable future for wildlife – and the enjoyment of wildlife by generations to come – there is a need for a collaborative approach to conservation.

The State Wildlife Action Plan examines the health of wildlife and prescribes actions to conserve wildlife and vital habitat before they become rarer and more costly to protect. The plan also promotes wildlife conservation while furthering responsible development and addressing the needs of a growing human population.

SanDAG Regional Open Space Strategy

The San Diego Association of Governments' (SanDAG) Regional Open Space Strategy identifies the importance of open space. The goal is to ensure adequate quantities of diverse habitat types are conserved and maintained, and that the plants and animals found in these habitats are less likely to become endangered. Central to this is the creation and retention of open space corridors within and between communities.

Multiple Species Conservation Program (MSCP) Subregional Plan

The MSCP (Final MSCP Plan, August 1998), is a comprehensive NCCP that addresses multiple species habitat needs and the preservation of native vegetation communities within a 900-square mile area of southwestern San Diego County. The MSCP is implemented through local subarea plans, including the County of San Diego Subarea plan adopted in 1997. The MSCP was created to work across political boundaries in a regional conservation effort aimed at preserving San Diego's diversity of native plants and animals, as well as protecting habitats, watersheds, and water quality. In doing so, it helps to ensure compliance with the federal Endangered Species Act, as well as the state Endangered Species Act. The MSCP identifies a 172,000-acre preserve system and covers 85 plant and animal species. It also identifies Core Biological Resource Areas and Linkages where conservation planning is directed and where permanent conservation of habitat will be accomplished through individual subarea plans. The Reserve is located within the County subarea plan, more specifically the South County segment (see Figure 3).

Management and Monitoring Strategic Plan (MSP) Roadmap

The MSP Roadmap (San Diego Management and Monitoring Program and The Nature Conservancy. 2017). Management and Monitoring Strategic Plan for Conserved Lands in Western San Diego County: A Strategic Habitat Conservation Roadmap. 3 Volumes. Prepared for the San Diego Association of Governments. San Diego was prepared by SanDAG and the San Diego Management and Monitoring Program (SDMMP) to fulfill the need for a strategic approach to implement the management and monitoring objectives of the MSCP, the Multiple Habitat Management Plan (MHCP) and the proposed North County Plan (NCP). Its purpose was not to assign responsibilities for specific management and monitoring objectives but to identify what and where management is needed. The MSP Roadmap is intended to be used by NCCP/MSCP partners and stakeholders (including CDFW) to inform the development and implementation of resource management plans, annual work plans, and/or area-specific management directives. The MSP Roadmap builds upon the information collected and shared in other recently developed strategic plans including connectivity, invasive plant management, and management and monitoring of species and vegetation communities and threats/stressors to them.

CDFW has used the MSP Roadmap in the preparation of this LMP for regional information, as an additional source for determining significant occurrences of species, vegetation communities and/or Important Management Areas (IMAs) relative to the Reserve. In addition, habitat and species management and monitoring goals, objectives and tasks in this LMP are consistent with or compliment those discussed in the MSP Roadmap. The Reserve falls within Management Unit 5 of the MSP.

San Diego County General Plan

The Reserve is located in the General Plan area known as "North County Metro" and is in the far southeastern end of that unit. The unit lies just north of the Ramona Community Plan planning boundary and is just east of the San Dieguito planning area. Chapter 5 (Conservation and Open Space Element) of the County's 2011 General Plan incorporates the area around the Reserve. Addressing nine resource types including biological, water, cultural, and visual resources, the Element is intended to help guide development while conserving natural resources, protecting open space, and providing park and recreation resources. One Element goal is a regionally coordinated preserve system that will be monitored and managed to facilitate "the survival of native species and the preservation of healthy populations of rare, threatened, or endangered species."

San Diego County Master Trails Plan

CDFW properties are integral to a coordinated system of regional open space areas, biological linkages, and trail networks. CDFW reviews and, where/when appropriate, coordinates or consults with County staff on community needs regarding trails and trail systems relative to all CDFW properties, including the Reserve and this LMP.

On January 12, 2005, the San Diego County Board of Supervisors unanimously approved the adoption of the County Trails Program and the Community Trails Master Plan (CTMP). The County

Trails Program will be utilized by the County to develop a system of interconnected regional and community trails and pathways. These trails and pathways are intended to address an established public need for recreation and transportation but will also provide health and quality of life benefits associated with hiking, mountain biking, and horseback riding throughout the County's biologically diverse environments. The County Trails Program involves both trail development and management on public, semi-public, and private lands. The Community Trails Master Plan (2009) is the County's planning document for the trails program and contains proposed community trail alignment and pathway plans.

The Active Transportation Plan links the CTMP soft-surface trails with other on- and off-road active transportation facilities for a comprehensive network.

The County Department of Parks and Recreation has responsibility for trail maintenance and community-initiated trail development issues. Visit this page for current open and developed trail systems in communities and County parks.

Relevance to the Boden Canyon ER LMP:

The San Dieguito Community Plan found within the above first link lists the Coast to Crest Trail as a proposed trail. In the second link above, the County defers to the San Dieguito River Park Joint Powers Authority website for additional information on the Coast to Crest Regional Trail. The Coast to Crest Trail is proposed to be routed through the southern portion of the Reserve.

City of San Diego General Plan

While not located in the City of San Diego, the Reserve is immediately adjacent to City-owned lands, including 1) the San Pasqual Agricultural Preserve to the west, 2) lands acquired originally for a water resource development project "Boden Reservoir Basin" and 3) lands used for mitigation purposes. Existing trails are described in the City's General Plan, under Parks and Recreation, Open Space Lands, however specific trail information is deferred to the San Dieguito River Park website (sdrp.org).

Relevance to the Boden Canyon ER LMP:

Existing trails within the City of San Diego include the Clevenger Canyon North and South Trails. The trails are steep and rocky and are not permitted for multiple use (no bikes or horses) at this time. These are pedestrian use only. This use is consistent with CDFW regulations for pedestrian use only within the Reserve. Proposed trails important to the City include connections with the San Dieguito River Park and Cleveland National Forest.

Coordination with multiple City entities is important to the long-term management and continued conservation of the Reserve as well as to public recreation in the area.

San Dieguito River Park (SDRP) Focused Planning Area (FPA)

The San Dieguito River Park Joint Powers Authority has been the community lead on the Coast to Crest (CTC) Trail for over 30 years. The San Dieguito River Valley Regional Open Space Park identifies the Reserve in its CTC Trail FPA. Both CDFW and WCB recognized the importance of this proposed

trail at the time of acquisition and desire to provide compatible public access. It is understood that a multi-use "Coast to Crest Trail" is a likely cornerstone of the Regional Open Space Park. Approximately 48 miles of the CTC trail (out of 71 miles desired) has been completed.

Relevance to the Boden Canyon ER LMP:

Currently, a generalized trail corridor is proposed by the SDRP Joint Powers Authority (JPA) and supported by numerous organizations including the San Dieguito River Valley Conservancy to traverse east-west through the southern portion of Boden Canyon. This generalized corridor is called the Lower Santa Ysabel Trail in the JPA documents; however, the final alignment, uses, and protective measures are currently not available. In 2017, a concept was shared verbally with CDFW where a general alignment would follow the existing dirt road located through the Reserve, however this alignment is not substantiated in any current document. While the trail was envisioned and planned over 30 years ago, the segment that is proposed to cross the Reserve is still depicted as being in the bottom of the drainage in riparian habitat. Any trail proposed on the Reserve must obtain approval from CDFW as well as any other landowners (City of San Diego, County of San Diego and USFS, Cleveland National Forest). Such a trail would be included within the Reserve only if it is not in conflict with the primary goals of this LMP, the rules and regulations of the Reserve, and the underlying philosophy that the type and magnitude of allowed use must not result in substantive short- or long-term detriment to the natural environments. Subsequent CEQA analysis and review would need to be conducted by the SDRP or the applicable lead agency for any proposed project(s).

California Department of Fire Prevention and Response (CalFire)

CalFire and CDFW have several documents and policies that are applicable to management of the Reserve. Specifically, in 2012 the CDFW SCR and CalFire entered into a Cooperative Fire Protection Agreement and Operating Plan (Agreement) for multiple CDFW properties in San Diego County (Cooperative Fire Protection Agreement and Operating Plan, 2012), including the Reserve. This Agreement is the local manifestation of the statewide 1994 Policy that was jointly adopted by the Fish and Game Commission and the Board of Forestry (California BOF/FGC Joint Wildfire Policy, 1994) so that both CDFW and CalFire communicate, cooperate and strategically respond to wildfires using a "pre-, during, and post-fire strategy". Additionally, they state that CalFire will be involved in and/or review our LMPs relative to fire management, prevention and response. For more on these policies, strategies and their implementation on the Reserve, see Section IV. F, the Fire Management Element.

Cleveland National Forest (CNF), Forest Plan

The Forest Plan Supplemental Amendment was finalized in November 2013 (http://a123.g.akamai.net/7/123/11558/abc123/forestservic.download.akamai.com/11558/www/nepa/76364_FSPLT3_1462300.pdf).

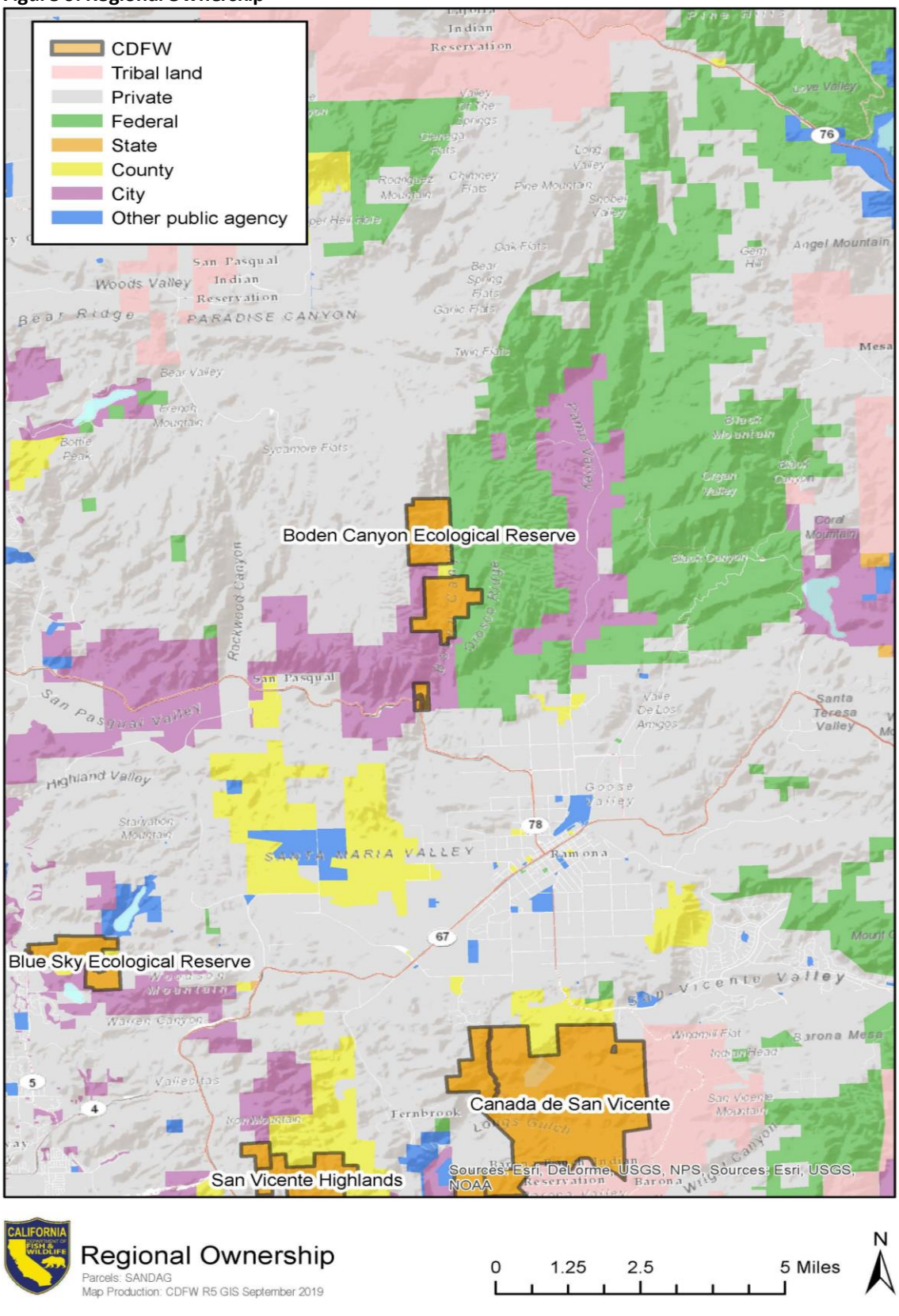
This document focused on changes to the 2006 Forest Plan relative to roadless areas and monitoring. No specific changes were amended from the 2006 Forest Plan relative to the CNF near Boden Canyon. In 2010, however, the Orosco Ridge Shooting Area east of the Reserve was temporarily or intermittently closed and remains closed today.

While the U.S. Forest Service owns and regulates its own properties, the Reserve is immediately adjacent to the CNF's western border (Figure 6). Several trails connect the Reserve to CNF including Santa Ysabel Truck Trail (Forest Service Road 12S04), Orosco Road (FS Road 12SO2) and Guejito Ranch Road (aka Truck Trail, FS Road 12S01). As of November 2017 Roads 12S03 and 12S04 are closed in the southern portion of Orosco Ridge, however they may be available as trails. (https://www.fs.usda.gov/recarea/cleveland/recarea/?recid=75030).

The primary public access to the Reserve is through CNF. From Pamo Valley, one would take Orosco Road and then traverse on foot through any of the three pedestrian gates into State property. The current CNF website best describes the area adjacent to Boden Canyon in its "Place-based Program Emphasis" section for the San Dieguito/Black Mountain Place. For details see:

https://www.fs.usda.gov/detail/cleveland/landmanagement/planning/?cid=fsbdev7_016605.

Figure 6. Regional Ownership



While this San Dieguito/Black Mountain Place is much larger than Boden Canyon, the CNF document states this nearly 26,000-acre "Place" is "highly diverse and supports a high number of sensitive species". It also recognizes California Fish and Game (CDFW) as an adjacent neighboring property owner, and the importance of multiple goals, including continuing to provide for public access, vegetation management for treating invasive species and for fuel reduction purposes, acquiring/consolidating core areas and enhancing wildlife corridors, participating in connecting trail systems and in conducting road maintenance. CDFW and CNF coordination is, as it is with the City and the County, key to successful management of biological, cultural and public use resources.

In April 2018, the Cleveland National Forest, Palomar District, initiated a National Environmental Policy Act (NEPA) Analysis for the Orosco Ridge Mountain Bike Trail System. This Trail System was identified as a partner project between the CNF and the San Diego Mountain Biking Association (SDMBA). It consisted of approximately 20 miles of trails within 1,800 acres on the ridge to the east of the Reserve. As of mid-2019 the CNF has eliminated the proposed project. For project details, the CNF website is: https://www.fs.usda.gov/project/?project=53904

II. PROPERTY DESCRIPTION

The Reserve is located in central San Diego County in the upper San Pasqual area, San Dieguito River watershed, approximately 9 miles east of Escondido and northwest of the community of Ramona. It is located predominantly to the north of Highway 78. The best way to access the Reserve is from Orosco Ridge located on USFS land adjacent to Pamo Valley. Visit the CDFW website for directions and other information pertinent to the Reserve:

https://www.wildlife.ca.gov/Lands/Places-to-Visit/Boden-Canyon-ER#992695-directions

A. Geographical Setting, Property Boundaries, and Adjacent Lands

The Reserve parcels occupy all or portions of Sections 8, 17, 20, 21, 29, and 32 of Township 12 South, Range 1 East of the San Bernardino Base and Meridian, USGS 7.5' San Pasqual and Rodriguez Mountain quadrangles. The Reserve is located within a sizeable swath of publicly owned lands that includes the City of San Diego to the south and west, a 40-acre parcel owned by the County of San Diego surrounded by CDFW parcels, and the CNF along the eastern boundary of the Reserve (Figure 6).

The major landform feature of Orosco Ridge creates a sharp break between Boden Canyon and the Pamo Valley watershed farther to the east. The CNF connects the Reserve to other public lands to Palomar Mountain and further north to Riverside County. Rancho Guejito, located along the northwestern boundary of the Reserve, is an approximate 22,000-acre, privately held, active cattle ranch supporting extensive grasslands, oak savannah, and chaparral-dominated terrain. Other private land holdings are located west of the Reserve; steep slopes at the south end of Boden Canyon rise up to the community of Ramona. Highway 78 traverses the extreme southern end of the Reserve. Only a small fragment of Parcel S is south of the highway (Figure 5). This corner of the Reserve is nonetheless contiguous with other, high-quality native habitat extending to the southwest.

B. Topography, Geology, Soils, Climate, Fire Cycles, and Hydrology

1. Topography and Geography

Boden Canyon is a large, north-south-trending canyon in the San Dieguito watershed. It is bounded by gentle hills that transition into steep ridges. Mature and dense oak woodlands occupy the valley floor, with only rare breaks in the canopy. There is an approximate 2.7-acre pond (with or without water dependent on rainfall), including a dam and spillway, located in the center of the Reserve. The slopes of Boden Canyon support mostly dense, and often impenetrable, chaparral, complemented by individuals or clusters of oaks in numerous side drainages. Recent wildfires (e.g., 1993, 2001, 2003, 2007 and 2013) have opened some of the chaparral canopy along the eastern flank and northern portion of the Reserve, at least temporarily affecting both plant and animal diversity in these areas. In several locations, larger side drainages also support dense and mature oak/riparian habitat. Steep slopes forming Orosco Ridge separate Boden Canyon from Pamo Valley, which lies 2 miles to the east, and similar slopes separate the Reserve from Rancho Guejito to the northwest. The south end of Boden Canyon empties into Santa Ysabel Creek, the primary drainage in this section of the San Dieguito Watershed. Santa Ysabel Creek connects downstream with the San Dieguito River, and upstream to Lake Sutherland. The southernmost drainage of a second major canyon, Clevenger Canyon, is also located at the south end of Boden Canyon. Clevenger Canyon continues off-site to the south/southeast, draining a portion of the Santa Maria Valley. The main Boden Canyon drainage, Santa Ysabel Creek and Clevenger Canyon convey seasonal flows; however downstream of the dam perennial water has been observed (2021, San Diego Natural History Museum). Mature oak woodland covers this canyon bottom also. Open land and rural estates with small agricultural areas lie to the south of the southern boundary of the Reserve. Elevations within the Reserve range from approximately 600 feet above mean sea level (AMSL) at the extreme downstream end of Santa Ysabel Creek in the southwest corner of the Reserve, to approximately 1,950 feet AMSL on a ridgeline along the eastern portion of the Reserve.

2. Geology and Soils

The underlying surficial geology within Boden Canyon is mapped as Mesozoic Plutonic rocks (Mesozoic granite, quartz monzonite, granodiorite, and quartz diorite) (Jennings, C.W., with modifications by Gutierrez, C., Bryant, W., Saucedo, G., and Wills, C., 2010, Geologic map of California: California Geological Survey, Geologic Data Map No. 2, map scale 1:750,000). Soils over the majority of the Reserve consist of sandy loams of the Fallbrook, Cieneba, or Visalia series; within drainages, Tujunga sand and riverwash predominate (Figure 7). Table 2 provides information on the soil types present within the Reserve and associated hydrological groups and erodibility potential (Bowman 1973). From the soil mapping data, it is clear that Boden Canyon is dominated by highly erosive soils. Erosive soils are more susceptible to indirect degradation following landform alterations such as removal of vegetation, creation of new roadways, compaction of soils, or diversion of drainage.

In 2020, under the WCB Grant to the SDNHM mentioned previously in this LMP, the CValdo Corporation conducted a hydrology and hydraulics study in Boden Canyon, in the central and northern units of the Reserve. As part of that study, they researched soils (also using the 1973

report) and provided information and insight to CDFW. The two predominant soils found in the watershed are classified as Fallbrook sandy loam, 15-30%, eroded and Cieneba-Fallbrook rocky sandy loams, 30-65% slopes, eroded. The Fallbrook sandy loam is described as having a medium to rapid runoff potential with an erosion hazard classified as moderate to high. The Cieneba-Fallbrook rocky sandy loam is described as having a rapid to very rapid runoff potential with an erosion hazard classified as high to very high (Boden Canyon Hydrology and Hydraulics Study, Jan 2021, CValdo Corporation.) This is important to note because CDFW will need to consistently and routinely monitor the erosion in the Reserve and take action to remedy erosion situations as they occur to the best of their ability. See Chapter IV Section E4 for tasks relating to erosion.

Frequent or severe wildfire can also cause an increase in a loss of vegetation and the subsequent soil degradation and erosion.

Figure 7. Soil Series

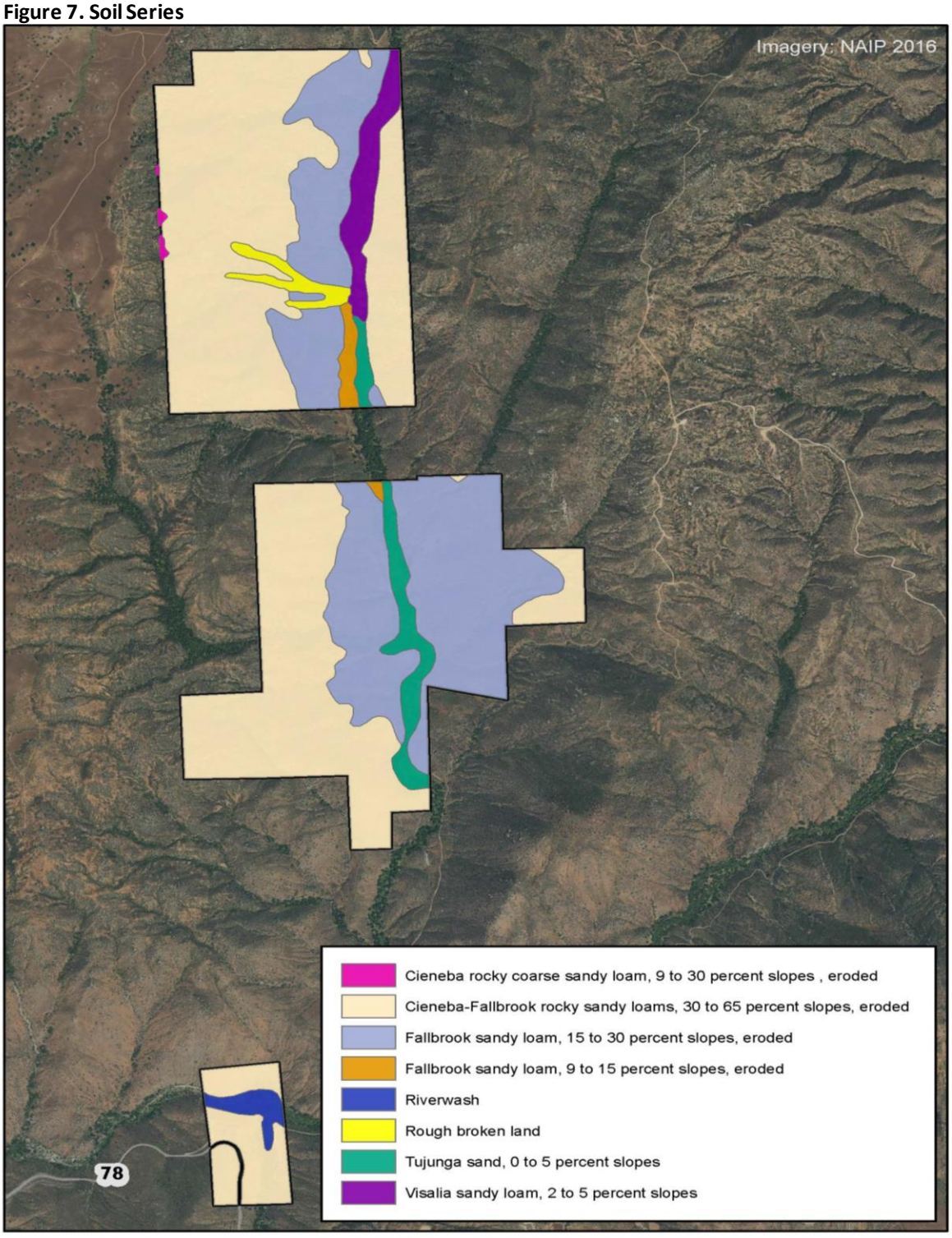


Table 2. Soil Series

Soil Name	Symbol	Drainage Class - Dominant Condition	Hydrologic Group	Potential Erosion Hazard
Cieneba rocky coarse sandy loam, 9 to 30 percent slopes , eroded	CmE2	Somewhat excessively drained	D	Severe
Cieneba-Fallbrook rocky sandy loams, 30 to 65 percent slopes, eroded	CnG2	Somewhat excessively drained	D	Severe
Fallbrook sandy loam, 15 to 30 percent slopes, eroded	FaE2	Well drained	C	Severe
Fallbrook sandy loam, 9 to 15 percent slopes, eroded	FaD2	Well drained	C	Severe
Riverwash	Rm	Excessively drained	D	Slight
Rough broken land	RuG		D	Not rated
Tujunga sand, 0 to 5 percent slopes	TuB	Somewhat excessively drained	A	Slight
Visalia sandy loam, 2 to 5 percent slopes	VaB	Well drained	A	Slight

Column Physical Name: drclassdcd Column Label: **Drainage Class** - Dominant Condition
The natural drainage condition of the soil refers to the frequency and duration of wet periods. This column displays the dominant drainage class for the map unit, based on composition percentage of each map unit component.

Column Physical Name: hydgrpdcd Column Label: **Hydrologic Group** - Dominant Conditions
Hydrologic Group is a grouping of soils that have similar runoff potential under similar storm and cover conditions. This column displays the dominant hydrologic group for the map unit, based on composition percentage of each map unit component.

The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Column Physical Name: forpehrtdcp Column Label: FOR - Potential Erosion Hazard (Road/Trail) - Dominant Component The relative potential erosion hazard for the map unit when used as a site for forest roads and trails, expressed as the rating class for the dominant component in the map unit, based on composition percentage of each map unit component.

3. Climate

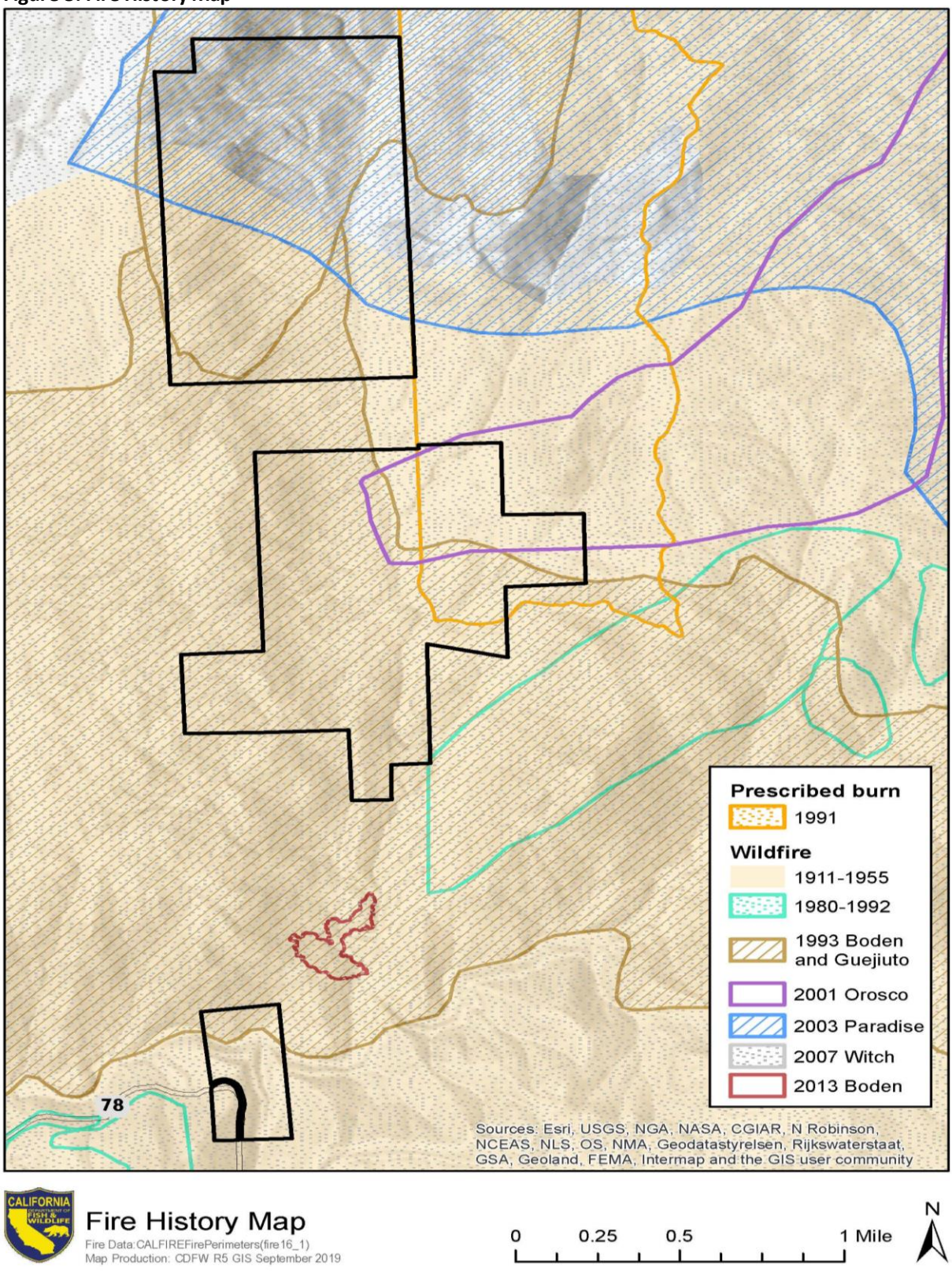
The climate of San Diego County is dominated by the semi-permanent Pacific high-pressure cell located over the Pacific Ocean. This high-pressure cell drives the dominant onshore circulation, maintaining clear skies for much of the year. Summers in the Boden Canyon area are typically warm and dry, while winters are mild with occasional rainy periods. The mean temperature is 61.8°F, and the mean maximum and mean minimum temperatures are 76°F and 47.4°F, respectively. Precipitation averages 16 inches annually and falls almost exclusively between November and April. A prolonged drought over the last decade may have altered the water table and likely had effects on the condition of habitats and species. In the winter of 2016-17 the amount of annual precipitation was well beyond what occurred the previous decade; approximately 22.15 inches of precipitation were logged for the weather station at CDFW's Cañada de San Vicente property, the closest rain gauge to Boden Canyon.

The predominant feature of the Boden Canyon wind climate is the sea-breeze/land-breeze cycle. During the daytime, particularly in the summer, onshore winds move inland with speeds of 7 to 10 miles per hour (mph). Easterly land breezes of 2 to 4 mph often occur at night. Surrounding rugged terrain, which induces turbulence into the airflow, modifies the influence of this cycle. In addition, this cycle is periodically affected by land airflow that dominates weather patterns. The most widely recognized of these are the Santa Ana conditions, during which strong, hot, dry easterly winds prevail for 2- or 3-day periods.

4. Fire Cycles

The Reserve is dominated by chaparral vegetation, with riparian communities along the unnamed tributary within Boden Canyon. Wildfires, both natural and man-made, have historically swept through this and surrounding areas. Fire history mapping for the Boden Canyon area is available from the California Department of Forestry and Fire Protection (CalFire) and is depicted in Figure 8 with recorded fires for the area dating back to 1911. Most of the area burned several times during the decade of 1910, and then not again until a very minor fire occurred in June of 1992 (Ysabel Fire burned less than an acre), then the following year the Boden Fire (May 1993) burned roughly 436 acres. The Guejito Fire in October of 1993 burned 540 acres. These were all prior to CDFW acquiring the property.

Figure 8. Fire History Map



After CDFW acquisition, about 5 percent (approximately 102 acres) of the Boden Canyon area was burned in the Orosco Fire of 2001 and another 371 acres (roughly 17 percent) within the Reserve burned in the Paradise Fire of 2003. In November 2007, the Witch [Creek] Fire burned approximately 1,244 acres in the Reserve and in 2013 an unnamed wildfire burned 20 acres on adjacent City of San Diego lands.

CDFW file photo – wildfire on CDFW property 2003

Below are descriptions of recent major fires within Boden Canyon:

- The Guejito Fire of 1993 opened up the chaparral and supported both a diverse mix of shrubs as well as lower-growing annual and perennial understory plants. This fire had only minimal impact on the primary riparian corridor that traverses the canyon.
- The Orosco Fire occurred in August 2001 with the origin presumed to be near the central pond in the Reserve. This fire spread east into chaparral slopes, with some limited damage to oaks within the canyon, and covered 102 acres in Boden Canyon. Water used to battle the wildfire came from the central pond, substantially reducing its volume that year. Burned areas resulting from the Orosco Fire were quickly recolonized by invertebrates, reptiles, and mammals, showing minimal impact on wildlife resources (CDFW Files).
- The first of two severe firestorms where multiple fires were burning throughout San Diego County broke out in October of 2003, and included the Paradise Fire, which burned from the north onto the Reserve, affecting approximately 371 acres within the

Reserve. Although the Paradise Fire severely burned some of the northern upland slopes, removing all or the majority of shrub cover, the fire burned only lightly within the riparian habitat in this area.

- Limited firebreaks, dozer lines and staging areas were created on the Boden Canyon lands during the Orosco and Paradise fires. The effects of the fire and firefighting activities damaged road surfaces, some culverts, and the creek crossing. Weed species such as mustard and Erodium were noted as abundant in disturbed areas after the fires (Bainbridge 2004).

- In the fall of 2007, a second severe firestorm burned throughout San Diego County. In the area of Boden Canyon, the Witch Fire burned the entire CDFW property holdings (1,221 acres). In its totality, the Witch Fire burned 141,019 acres. In 2007, the vegetation on the Reserve was still recovering from the 2003 Paradise Fire, and from several fires prior to that. The habitat types lost during the Witch Fire within the Reserve include various chaparral alliances, several scrub alliances, the riparian and oak alliances, and native/non-native grassland habitats. Recovery from these intense wildfires occurs naturally however, it does take time. (See Chapter IV for recent vegetation types and acreages).

In around 2013, a smaller wildfire of approximately 20 acres occurred on City of San Diego property (Parcel F) in Boden Canyon. Vegetation affected was mostly chaparral, a small portion of scrub and a small portion of riparian forest. This resulted in, again, the opening up of chaparral habitat on steep slopes. At this time, that area is recovering back to a coastal sage scrub/chaparral mix.

In addition to the fire suppression activities that occurred within the Reserve during the recent fires, a fuel break was established along the southernmost boundary of City of San Diego's Parcel P to help protect the community of Ramona. Both CalFire and USFS maintain access roads in the vicinity along ridgelines, boundaries and elsewhere to ensure adequate access for fire-fighting purposes.

Starting in 2007, and most recently in 2012, CDFW and CalFire entered into a Cooperative Fire Protection Agreement and Operating Plan (Agreement, see Appendix E) whereby the CDFW/State lands are defined as State Responsibility Areas (SRAs) for pre-fire planning, during-fire response, and post-fire remediation. The Reserve is one of 14 CDFW properties in San Diego County listed in the Agreement. The Agreement's purpose is to pro-actively and locally implement the 1994 Joint Policy between the State Board of Forestry and Fish and Game Commission (California BOF/FGC) (Appendix E). This statewide Policy lays out the importance of meeting annually to discuss pre-, during-, and post-wildfire concerns and issues so that both agencies can better protect the lives, property and resources of the state. It encourages staff from both agencies to meet to determine needs and mutual benefits that may be achieved with respect to minimizing habitat degradation while providing for public safety, property and habitat protection. It is acknowledged by both agencies in the Policy and in the Agreement that the most useful time to meet is during the "pre-fire" planning stage and that it is the most effective for discussing any fire ecology and fuel management considerations.

CalFire and its associated partner response teams have been involved in suppression activities in Boden Canyon at least since the 2001 Orosco Fire. CDFW has worked with the various Incident Commanders as Resource Specialists to provide information on property and access issues, resource (biological and cultural) information, and recommendations on suppression methods. Having this close communication during a wildfire incident is invaluable and is expected to continue.

In summary, most of the Reserve has burned at least 5 times in the past century. In general, native habitats return without any active restoration, however, there is concern that natural revegetation of chaparral and coastal sage scrub that has burned too frequently are often invaded by nonnative plants due to young native plants not having mature seed or well-developed root stocks to vigorously re-sprout after multiple fires.

While wildfire is a natural occurrence in southern California, and native plants are adapted to coexist with wildfire, large-scale type-conversion may reduce the ability of native species to thrive and the result becomes an altered post-fire successional regime. Non-native grasslands can become the dominant post-fire vegetation, which increases flashy fuels and a potential for increased frequency of wildfires. Non-native grasslands and habitat succession (or type-conversion) will need to be monitored over time. Actions may need to be taken to ensure natural habitats return (see Chapter IV. F, Fire Management Elements).

5. Hydrology

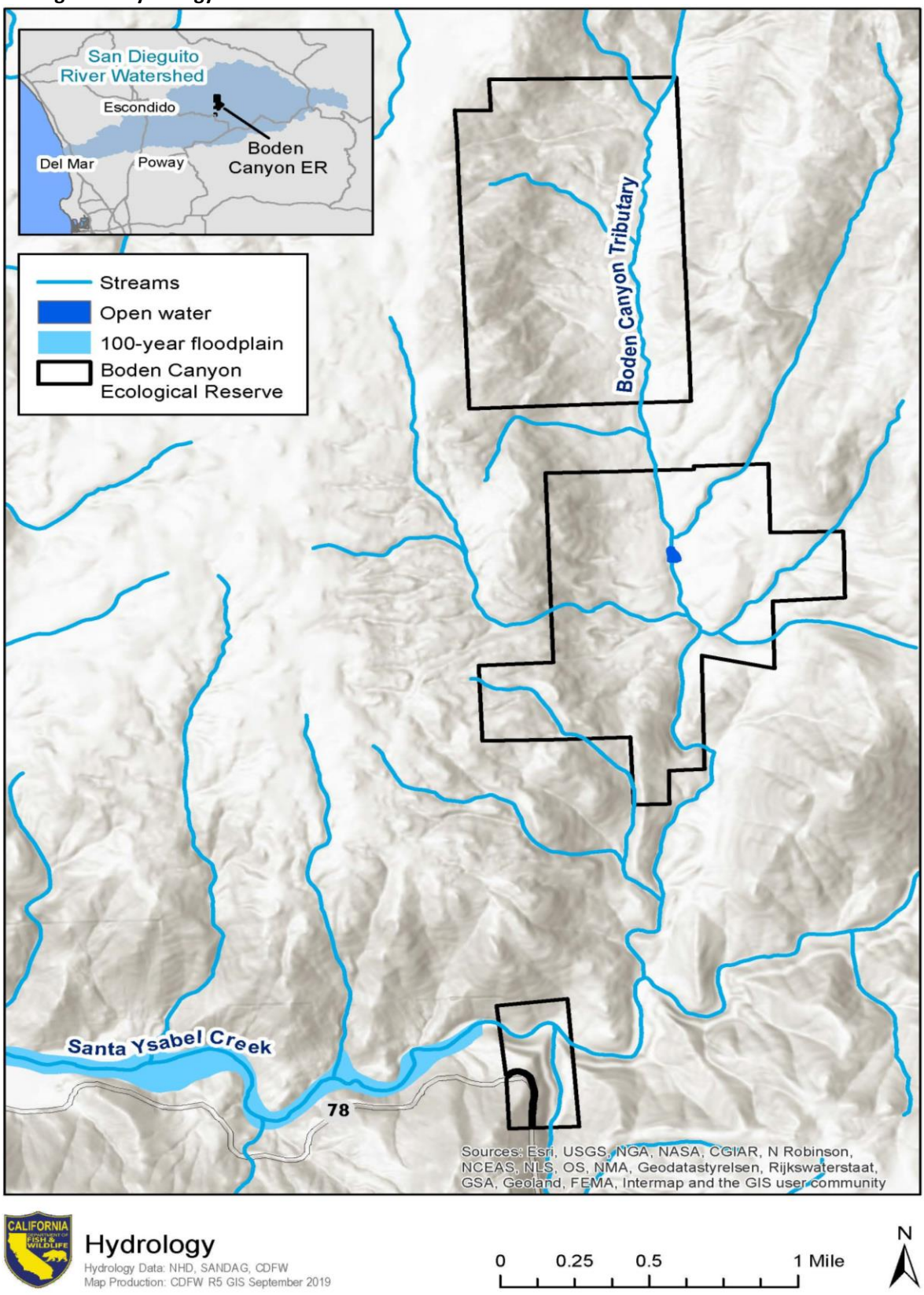
Santa Ysabel Creek, Photo Tim Hovey

The Reserve occurs within the larger San Dieguito River watershed and includes portions of two primary drainages (Figure 9). The first primary drainage, Santa Ysabel Creek, crosses the southern portion of the Reserve. The Santa Ysabel Creek drainage basin is partially controlled at Sutherland Reservoir. While the presence of Sutherland Reservoir prevents the creek from regularly carrying the magnitude of flood flows that were likely historic to this drainage, Santa Ysabel Creek carries substantial seasonal flows and can discharge large pulses of stormwater during heavy montane rain events. The second major drainage within the Reserve is the unnamed tributary within Boden Canyon (locally referred to as Boden Canyon Creek). This

hydrologic feature drains the watershed through a number of minor side drainages entering the valley from the surrounding steep topography. Since Boden Canyon drains areas of relatively steep topography across soils of high erosion potential, drainage patterns within the canyon are often well-defined as incised channels.

Under the WCB Grant mentioned previously, the CValdo Corporation's study (Boden Canyon Hydrology and Hydraulics Study, Jan 2021) looked at 100-year storm flows, current erosion problems and culvert issues, and evaluated the existing dam and spillway in the center of the Reserve. They looked at factors such as average precipitation, flow rates, soils, terrain, topography, watersheds, infrastructure and performed calculations that would help us determine what needed to be done to alleviate the erosion concerns at the Reserve. The report had conclusions and recommendations for CDFW to use in future year budgeting and deferred maintenance processes. See Chapter IV, Section E4 for more on this.

Figure 9. Hydrology



Santa Ysabel Creek is a perennial stream bisecting the Reserve, while the Boden Canyon drainage is an intermittent stream, flowing from brief periods to a few months, depending upon the annual rainfall and climatic conditions. In addition to surface water in Santa Ysabel Creek, one artificial pond, approximately 2.7 acres in area, occurs within the Reserve along the main valley floor within Parcel J. Based on a review of aerial photographs, the dam for this pond was constructed in 1979. In most good rain years, this pond provides a perennial source of water, although the water level is variable contingent on rainfall and sedimentation. Most recently, in June of 2020, the pond held approximately 9-acre feet of water (2020, CValdo Corp.). During the drought year of 1993, effectively all of the water within this pond dried. In 2001, and maybe even previously, water from the pond was used for fire suppression activities that further reduced the water level. From 2013 to the winter of 2016-17, the pond remained dry. Following the heavy winter rains of 2016-17 the water level in the pond rose significantly. The main Boden Canyon drainage upstream of the pond accrued sediment as had never been seen since CDFW acquired the property in 1998-99. In some places this sediment filled previously incised channels and exacerbated washed out culverts. These heavy sedimentation and culvert issues became more noticeable after the 2007 fires due to erosion from the burned area. Although the vegetation in the burned areas has recovered, large amounts of sediment are still moving through the stream system toward the pond with the added effects from blown culverts. The tasks of frequent monitoring, maintenance and/or repairs of the culverts are addressed in Chapter IV, Section E of this LMP. A second, approximately 0.7-acre pond was historically located at a higher elevation on a westerly side tributary to Boden Canyon in the lower portion of Parcel F on City of San Diego property. Based on a review of aerial photographs, the dam for this smaller pond was constructed prior to 1970. However, this dam was breached during the heavy rains in 1994-95 and the size of the pond was significantly reduced. In addition, sediment loading into this pond has further diminished its extent and this pond has not held water year-round in years. Between the breaching of the dam and the cumulative sediment loading, water is not expected to pool in this location in future years. Accordingly, this smaller, upper pond is not depicted in Figure 10 and is not considered significant for purposes of this LMP.

Santa Ysabel Creek and Boden Canyon are identified hydrologic subareas (HSAs) of the San Dieguito Creek Watershed Hydrologic Unit (Unit 5) within the Water Quality Control Plan for the San Diego Basin (Basin Plan) (California Regional Water Quality Control Board, San Diego Region 1994, as amended in 1997 and 2012), The Basin Plan designates a number of existing beneficial uses for the waters of Santa Ysabel Creek (HA 5.50) and Boden Canyon (HSA 5.51).

Beneficial uses designated by the Basin Plan include:

- Municipal and Domestic Supply
- Non-Contact Water Recreation
- Agricultural Supply
- Warm Freshwater Habitat
- Industrial Service Supply
- Cold Freshwater Habitat
- Industrial Process Supply
- Wildlife Habitat
- Contact Water Recreation
- Biological Resources

While not all of these beneficial uses are developed within the Reserve, suitable water quality necessary to maintain these potential uses should be sustained. Boden Canyon is mentioned in

the Basin Plan (2012, Chapter 1, page 1.9) as containing important biological resources and hence has been designated in the Biological Beneficial Use Category along with other conserved properties. The San Diego Regional Water Quality Control Board (SDRWQCB) draft Watershed Management Approach/Initiative (January 25, 2002) discussed the importance of maintaining both water quality and beneficial uses throughout each watershed. The Reserve could be affected by the actions of other landowners upstream, but CDFW is unlikely to affect any beneficial uses to downstream landowners by any actions taken or proposed to be taken by CDFW at the Reserve. The direct affects to water quality or beneficial uses at the Reserve primarily occur from natural occurrences based on weather patterns and climatic conditions and include change of water level in the pond and creeks, and the erosion caused by heavy precipitation or runoff. The effects of the 2007 wildfire and heavy rains during the winter of 2016-17 have caused increased sedimentation within the main Boden Canyon drainage and increased erosion of slopes from the existing adjacent Highway 78 and interior truck trails. In order to minimize these impacts, repairs to the Guejito and Santa Ysabel Truck Trails from culvert washouts and the erosion gullies will need to be considered (see Chapter IV, E. 3 and Chapter V). CDFW will work with the SDRWQCB and their staff to maximize beneficial uses and maintain water quality throughout the Reserve.

During 2006-07, CDFW coordinated with the SDRWQCB on a research study very pertinent to all of southern California. Boden Canyon's tributary (Boden Canyon Creek) within the Reserve became a natural stream sample site for the Southern California Coastal Water Research Project (SCCWRP) on fecal indicator bacteria (FIB). The goal of this study was to provide information on indicator bacteria contributions from natural streams in undeveloped catchments throughout southern California during dry weather, non-storm conditions. The final report by SCCWRP (Fecal Indicator Bacteria (FIB) Levels during Dry Weather from Southern California Reference Streams, Technical Report 542, January 2008) compared bacteria levels from 15 streams in five counties as far south as Boden and northward into northern Los Angeles County and San Bernardino Counties. Results were many, but a few include that southern California streams generally have FIB lower than the state's water quality standard during dry weather conditions; and FIB present in natural streams are most likely from non-human sources, meaning a combination of factors such as wildlife and erosion can cause bacteria levels.

The water quality, FIB, and general measurements taken as well as incidental or associated information collected at the Reserve can be utilized as baseline data and for future studies as desired or as needed. The full report is available to those who are interested, see above citation.

Riparian and/or Water Rights are assumed to have transferred with the land upon acquisition of the property. No indication to the contrary is reflected in the Title Deed for the parcels. According to the State Water Resources Control Board's electronic water rights data base: (http://www.waterboards.ca.gov/waterrights/water_issues/programs/ewrims/index.shtml) nothing is listed for the Boden Canyon property that would indicate any rights exist to outside parties.

C. Cultural Features

1. Archaeology

Prehistoric Period Resources

Native American Grinding Rock, CDFW File Photo by T. Stewart

The cultural story of this landscape starts long ago. The Kumeyaay believe that their ancestors were placed in this area by the creator and they have been here since time began. Scientific evidence, such as radiocarbon dating, indicates that people have been living in southern California for more than 9,000 years, with some evidence from the Channel Islands showing humans having been in this area for over 13,000 years. The general history of Native American Indians in the vicinity of what we know today as Rancho Guejito and Allesandro Ranch indicates that the land was occupied and managed by the San Pasqual Band of the Kumeyaay Tribe for an estimated 8,000 years (personal communication in CDFW files and property history, Stan Smith, 2000). The earliest, generally accepted occupation of the San Diego area is the San Dieguito Complex dating to approximately 10,000 years before present (Tuma, Phase 1 Cultural Resources Inventory of the Rockwood Villages and Hillebrecht Parcels, Rancho Guejito 2015, taken from Warren 1968). Cultural Resources studies were conducted in the vicinity in 2015 in conjunction with a proposed agricultural project on the nearby Rancho Guejito. Three sites were evaluated at that time including one just to the north west of Boden Canyon called the "Vineyard Areas" within the Rancho Guejito Property (Exhibit 1, BonTerra Psomas taken from above-mentioned Phase 1 Inventory). The report indicates that eight technical studies were conducted in the past (1979-2002) within a quarter mile of that proposed project site. While this

report does not include the Reserve, it was the closest and most recent data located during the preparation of this LMP.

It is generally thought and based on the absence of quality tool stone and water at nearby locations, that the area in the vicinity of the Reserve may have been used by Native Americans for hunting, gathering, and/or religious activities rather than as a settlement area. That same 2015 report mentions tribal communications regarding the potential for a burial ground in the vicinity of Rancho Guejito, however no artifacts, remains or prehistoric resources were identified during that evaluation. Consultants (Merkel & Associates, 2000) and CDFW staff have located a small number of cultural resources (bedrock milling features) on the Reserve. A previous landowner noted possible artifacts such as grinding stones and pottery. CDFW felt it was important to determine if additional cultural resources are present within the Reserve, and if so, how best to protect and manage them. In the draft LMP CDFW wrote "As funding becomes available, CDFW will prioritize a cultural and historic resources inventory". This came to fruition in late 2019, however results were not available at the time the Draft LMP was circulated. Results from that inventory have been incorporated into this Fnal LMP.

Implementation of the WCB Grant mentioned previously in this document (see Ch 1, Section A, p. 5) included a task to research and obtain cultural resources information that could be used by CDFW in the land management planning efforts at Boden Canyon Ecological Reserve. CDFW had no specific cultural information on the Reserve prior to this grant. The results of the cultural resources task were received in a preliminary report in 2020 and a final report in 2021.

Tasks from the WCB Grant included that a Records Search, a Sacred Lands File Search, Tribal Outreach, and field surveys over a portion of the Reserve be conducted. They also prepared a Cultural Resources Treatment and Protection Plan. (2021, PanGIS, Inc.)

Their records search identified one resource previously known from the Reserve, and their pedestrian surveys within the Reserve encountered seven previously unrecorded archaeological resources. Based on these field surveys, it is now believed that Boden Canyon was used as a prehistoric habitation site. Additionally, three previously known resources were identified in the search within a quarter mile of the Reserve.

In addition to the Tribal Outreach conducted by PanGIS through the WCB grant in May of 2020, CDFW conducted Tribal Outreach during the preparation of this LMP. Correspondence was sent to the California Native American Heritage Commission in June 2018. CDFW received a reply in July 2018 that included a contact list of the respective Tribes to communicate with directly. Letters were sent to the tribes on this contact list in August 2018 with a request to respond by October 2018 if they had any interest or information to share. Follow up with two tribes occurred in September 2018 and again in July 2019. In September of 2020, CDFW sent notices of aialability of the draft LMP to our Tribal list as well as to other members of the public. (See Appendix A Comments received and Response to Comments).

Historic Period Resources

Based on information in CDFW files, and from adjacent landowner Stan Smith to CDFW, Boden Canyon was named after one of the first families to settle the area, known at the time as

Vineyard, California, in the early 1890s. Mr. John (Johann) Boden was a German immigrant who married Miss Nellie Ranaud in 1893 in Escondido, California. Mr. Boden, his wife Nellie, and their nine children lived in the canyon for many years and grew produce that sold in Old Town (San Diego). A handful of other settlers also lived within Boden Canyon.

Historic structures discovered on-site include vestiges of two home sites located on the northern parcels. A box cistern was located in Boden Canyon off the Reserve and at one home site a spring was located. Remnants of two wells have been reported, however it is unknown how deep they are/were or what the rate of flow was when they were functioning.

Boden Homesite and Cabin, CDFW File Photo

More recent structural remnants occur throughout the canyon floor, such as old foundations and a tin shack. Other signs of early historic occupation include eucalyptus trees at homestead sites and an olive grove to the east of the large pond. Much of what were considered remnants of occupation, including the Eucalyptus and olive groves, has burned in the last twenty years.

Reports of other structures and artifacts within Boden Canyon, along with the limited surficial signs of historic and prehistoric occupation, suggest that the Reserve may have a much more substantial cultural history than currently known. This is further supported by Boden Canyon's juxtaposition within the landscape where the San Dieguito River Valley downstream, Pamo Valley upstream, and Rancho Guejito to the immediate north and west of the canyon are all known to support rich archaeological resources (San Diego County Water Authority 1995).

Findings from PanGIS, Inc in their January 2021 reports include three previously unrecorded prehistoric resource sites and four previously unrecorded historic sites. These resources will be conserved and protected according to CDFW policy and state and federal laws. The PanGIS Cultural Resources Treatment and Protection Plan is summarized below and is attached as Appendix F). Protocols developed for resources now known and any resources encountered in the future will be followed. CDFW will continue to manage the property conservatively,

understanding that a potential exists for cultural resources to be found while conducting surveys, posting the boundaries, or repairing fencing or maintaining roads. At the minimum, an archeological survey will be initiated where appropriate, prior to any management activity that may significantly disturb the surface. (See Chapter IV.G. and Chapter V for details.)

The Cultural Resources Treatment and Protection Plan (PanGIS, 2021) looked at the significance of the known and newly encountered resources at the Reserve and provided a system for CDFW staff to not only protect, but to maintain these resources in a way that ensures their conservation in the years to come. See their summary and Table 14 in Chapter IV of this document.

2. Historic Land Use

As indicated previously, Boden Canyon has been used for homesteading and associated activities such as limited farming and livestock grazing. Through much of the twentieth century, Boden Canyon was grazed as pasture lands, although grazing was apparently minor considering the intact nature of much of the vegetation within the Reserve and a lack of substantial livestock-associated erosion that can frequently be observed in areas of overgrazing. Findings from the 2020 PanGIS surveys estimate ranching activities occurred at least from the 1930's through the 1950's. A homestead-associated olive grove was estimated as having remains of 100-year-old trees. The trees were burned in past wildfires however there are 30-50-year-old trees growing up around them. This would date historic usage of Boden Canyon to about the 1920's.

In the years prior to CDFW acquisition, Boden Canyon had been contemplated for, or proposed for, a variety of uses. These include such uses as a water storage reservoir, a regional landfill site, and a recreational vehicle camping park. Boden Canyon was also marketed as a mitigation land bank for many years prior to its acquisition. The County of San Diego purchased their 40-acre parcel (Parcel G, see Figure 4) in the center of Boden Canyon as mitigation for County Public Works projects (San Diego County Recorder's Office, 1995).

D. Existing Structures, Easements, and Land Use

1. Existing Structures

There are no substantial structures remaining within the Reserve. Non-building structures occurring within the Reserve include an earthen dam with a concrete spillway that supports a seasonal pond located in Parcel J. Based on historic aerials, the dam and spillway were constructed in 1979. Another small dam was built in the southwest portion of the City-owned Parcel F; however, due to sedimentation and recent breaching of the small dam this former pond no longer holds water.

Limited drainage improvements, most likely unauthorized, were previously installed along the main canyon road (historically called "Orasco-Guejito Truck Trail") to provide for vehicular

access throughout the canyon. It is unknown when these were developed. A concrete "Arizona-crossing" on the main access road at Santa Ysabel Creek (on City Parcel P) was substantially damaged in the winter rains of 2004-05 and is at present nonfunctional. As a result, vehicular access into the majority of the Reserve is severely constrained. One authorized improvement done in 2001 by CDFW along the main access road at Clevenger Canyon was the replacement of an existing 72-inch by 70-inch corrugated steel pipe culvert with a new 72-inch by 80-inch corrugated steel pipe at the same location (Streambed Alteration Agreement R5-2001-0158).

Three gates are located within the Reserve; the main access gate from Highway 78 and a backup gate located just beyond it, and the third at the far north end on Parcel B. Two other gates just outside the Reserve include one at the USFS Cleveland National Forest (CNF) boundary with City's Parcel P, on the now abandoned Lower Santa Ysabel Road and another just east of Parcel L on USFS property that connects to the Orosco Truck Trail. These gates plus others on adjacent USFS land are intended to limit vehicular access into the Reserve and into CNF, however trespass from motorcycles and bicycles does occur.

A dilapidated shack of corrugated metal and wood exists within the Reserve along the main access road near the northern boundary. A smaller combination maintenance shack and outhouse near the large pond was burned to the ground during the Orosco Fire of 2001. Various sites of decomposing lumber, building foundations and aged tin also exist around the canyon suggesting that other structures may have previously existed in these locations. The recent wildfires have consumed most, if not all, of the materials at these dilapidated sites.

Two Rainmaker full-ramp wildlife guzzlers (developed water sources) occur within the Reserve. Guzzlers are man-made structures that, when installed, collect and store rainwater for use by wildlife. Free-standing water has been considered to be a resource that limits distribution and abundance of many species of wildlife in arid regions of the United States, and water developments have been used since the 1940s to improve habitat. Wildlife is then able to access this water when and where it may not be available naturally. Guzzlers have been used by wildlife agencies since the 1940's throughout the western United States and are frequently constructed where rainfall is low and/or seasonal. The presence of water is often a limiting factor for the success of wildlife, especially for reproduction, and in order to increase the carrying capacity of numerous species increasing the limiting factors (i.e. availability of water) is needed (Rosenstock, Journal of Range Management, 1999 and Simpson, California Fish and Game Journal, 2011). Guzzlers at Boden Canyon are expected to be beneficial for birds, mammals, reptiles, and amphibians.

Slope failure at the entrance to the Reserve off Highway 78.
Photo taken spring 2017, T. Stewart

State Route 78 (Highway 78) also known as San Pasqual Road, is immediately south of Boden Canyon and was one of the original state highways designated in 1934, although portions of the route existed as early as 1900 (Wikipedia). Initially it was a dirt road, was later paved, and has been utilized ever since as a major transportation corridor in the county. It connects travelers from Interstate 5 at the coast to the mountain communities of Julian and beyond to the Anza Borrego Desert.

Caltrans, more recently, has performed improvements to Highway 78, to the south of the Reserve, and created a temporary staging area for that construction work just off of Highway 78, a few hundred yards to the east of the gated road used for management of the Reserve. It is CDFW's understanding that because this fill area was intended to be a temporary staging area, it was not engineered to remain intact or to be used after the construction work was completed. However, this large un-engineered fill is still present, and may be a contributing factor to the increased erosion and rockslides on the slopes in this area of the Reserve.

In 2008, CDFW issued a Letter of Permission to Caltrans to conduct remediation associated with erosion caused by this fill, however, to date, it has not been done and the problems have been exacerbated by the heavy precipitation during the winter of 2016-17 and again in the winter of 2018-19. In 2008, Caltrans stated the completion of the remediation project was dependent upon available funds for Highway 78 improvements. CDFW is continuing to work with Caltrans to rectify the problems associated with this fill.

2. Existing Easements

Easements and rights-of-way are legally recorded documents that run with the deed of the land and are transferred with the land from owner to owner. Easements typically preserve the rights of an entity other than the landowner. The Reserve has a small number of primarily inactive easements.

Existing easements are listed in each of the Title Documents associated with the three acquisitions. Some date back to 1913 and 1932 for road Right of Ways (ROWs) in favor of the "County of San Diego Highway Commission, and for County of San Diego public road purposes for San Pasqual Road, Orasco-Guejito Truck Trail" and in 1952 an easement in favor of the "U.S.A. for ditches or canals" with no location listed. Then finally, in 1975 two easements were recorded in favor of two named private parties for ingress-egress and incidental purposes ("which cannot be plotted") along the "existing road" in various parcels. These were from long ago adjacent landowners no longer pertinent to the Reserve. In each of the three Title Documents, it states that there is "no apparent record access to a county-maintained road or public highway". While these written easements are difficult to interpret and often more difficult to map, they are present in the land transaction history.

Other than the ingress-egress transaction(s) for Parcel G carried out by the previous landowner in 1995, there have been no easements recorded over the parcels now owned by CDFW since 1975. The 1995 land transactions (with the County) by the previous landowner provided a reciprocal easement for ingress and egress across the County's Parcel G to the then private landholder's adjacent property, as well as easements for utilities and road purposes. These carried over to the Successor owner, the State, when the State purchased the property in 1998 from that same landowner. The ingress-egress easement states it is for the benefit of the County for the inspection and property maintenance purposes only and runs with the land (Grant Deed for Mountain Meadow Road Mitigation, Aug 17, 1995). The easement also reserves in favor of the grantor (now the State) an easement for ingress and egress, underground utilities and road purposes across the County parcel.

There is a Conservation Easement recorded over the City's Parcel F due to its mitigation status, however, there are no other easements or exceptions listed on the City Parcel F. There are no documents associated with City Parcels N, O, U, P or Q that could be located by the County Recorder's Office that indicate easements in favor of the State or for the benefit of the City by the State.

3. Existing Land Use

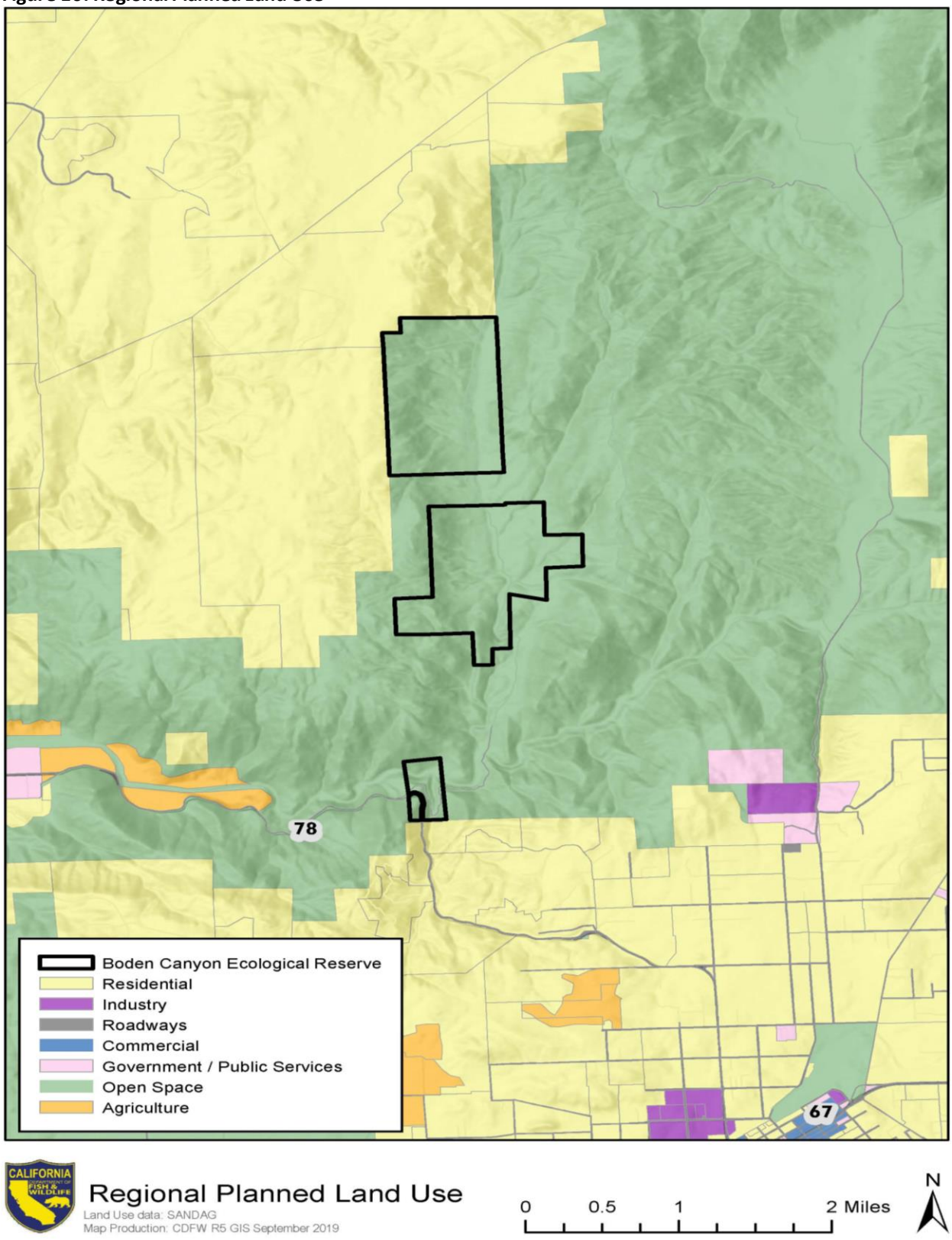
The Reserve is located in the County's 2011 General Plan area known as "North County Metro" and is in the far southeastern end of that unit (County of San Diego, 2011). The unit lies just north of the Ramona Community Plan planning boundary and is just east of the San Dieguito planning area. Chapter 5, the Conservation and Open Space Element, of this 2011 General Plan discusses the area around the Reserve. Figure 10 below, Regional Planned Land Use, depicts the current *planned* land use in the vicinity of the Reserve.

The existing land use of the Reserve is open space, designated as a State Ecological Reserve (refer to Chapter I, Section D of this LMP) and as well is designated as open space or "conserved lands" in local SanDAG, MSCP and other planning documents. The CDFW's adopted public uses are low to moderate, including upland game hunting and pedestrian use, with more active uses occurring for land management purposes (maintenance of existing roads, signage, gates, etc). There are no developed facilities within the Reserve that if present, may bring in a high number

of users and no commercial endeavors are permitted; thus the level of usage is low to moderate. Authorized vehicles are permitted on the main road for management, enforcement, and biological monitoring. Emergency vehicles are allowed as needed. However, all vehicular access is currently limited due to washouts and erosion as discussed above. Existing public uses approved by the Fish and Game Commission and under law (CCR, Title 14, Sections 550 and 630) include public pedestrian access for the purposes of hiking, nature study, and upland game hunting. Dogs are allowed within the Reserve for use while hunting and while under full voice command.

At the present, Boden Canyon experiences low to moderate levels of human use; human activity varies depending on the day of the week and the current hunting season. Based on CDFW patrol information and remote camera footage throughout the canyon, there are approximately 40 hikers/month, 5 motorcycles/month and roughly 22 mountain bikers/month. While the pedestrians are there legally and appropriately, both the mountain bikers and motorcyclists are there illegally. While CDFW understands the users and the impacts from mountain bikes and motorcycles are different, the Ecological Reserve regulations do not permit either motorcycles or mountain bikes. Damage occurs from both bikes and motorcycles and includes, but is not limited to, increased erosion of trails and to the watershed, excessive high decibel noise from motorcycles that may affect endangered species (least Bell's vireo), potential trampling of endangered species (arroyo toad), and potential for unsafe encounters with authorized users (hikers, hunters). As stated previously in this document, the dominant soils found at the Reserve are naturally highly erodible (CValdo Corp, 2021). CDFW will attempt to maximize erosion prevention and minimize or avoid activities that may exacerbate erosion. CDFW desires to provide a quality experience to its public for wildlife-dependent uses and as such does not allow motorcycle or bicycle use. (For more on Public Uses, see Chapter IV. D)

Figure 10. Regional Planned Land Use



III. HABITAT AND SPECIES DESCRIPTION

This Chapter will provide a description and discussion of the vegetation communities and habitats at the Reserve (Section A), the botanical resources (Section B), the sensitive botanical resources (Section C), the wildlife resources (Section D), and the sensitive wildlife resources in the following guilds - invertebrates, birds, mammals, and reptiles and amphibians (Section E). Descriptions of existing biological conditions within the Reserve are based on the results of multiple field surveys, including but not limited to the following:

- Biological resources inventory conducted for the San Pasqual/New Vista properties (Lettieri-McIntyre and Associates (LMA), Inc. 1994) prior to acquisition by the state.
- Baseline biological resources inventory for Boden Canyon (Merkel & Associates, Inc. 2000) including vegetative mapping, bird point counts, mammal tracking, and herpetological surveys.
- Site visits occurred from 1994-2000 by Clark Mahrdt and Dick Barber, and other members of the Palomar Audubon Society, to document bird species using the site throughout the year, including Christmas Bird Counts.
- Zimmitti and Mahrdt conducted nocturnal surveys in 1999 to document the presence of the arroyo toad in Boden Canyon (Zimmitti et al 1999).
- Rapid Vegetation Survey by CDFG team and The Nature Conservancy (now a CDFW program known as VegCAMP) in November 2001.
- Focused botanical surveys conducted by Andy Sanders (UCR) and CDFW biologists were initiated in 2001 and completed in 2006.
- General wildlife surveys conducted by the South Coast Region of CDFW during 2001-2002 soon after acquisition of the Reserve.
- Post-fire herpetofauna monitoring surveys conducted during 2001-2002 by CDFW.
- General site surveys were conducted by EDAW biologists during 2003-2005.
- Bat detection (acoustic) surveys conducted by CDFW biologists in 2016 (CDFW, Dillingham, et al 2016).
- Focused surveys for the Harbison's dun skipper were conducted in 2016 (Marschalek, et al, 2016).
- Focused arroyo toad surveys conducted by CDFW biologists in partnership with others in 2002, 2003, 2004, 2005, 2008, 2009, 2012, 2014, 2016 and 2017 (CDFW Hovey, et al).
- Focused Least Bell's vireo surveys conducted by CDFW biologists in 2002 and 2017.
- Vegetation surveys by CDFW "Veg-Camp" biologists in 2001 (listed above) and again from 2009-12.
- Vegetation mapping and aerial imagery by AECOM in 2012 (not specific to the Reserve).
- Invasive plant species inventories and treatments were initiated in 2002 and are ongoing throughout the Reserve.
- Aquatic invasive species inventory and removal began in 2001 and continues periodically, primarily at the central pond area.
- Small Mammal Trapping Surveys conducted in 2020 by the San Diego Natural History through a Grant from WCB to the San Diego Society of Natural History.

- A Wildlife Corridor Remote Camera Study conducted in 2020-2021 by the San Diego Natural History through a Grant from WCB to the San Diego Society of Natural History.
- A Diseased Tree Study conducted in 2020-2021 by the San Diego Natural History through a Grant from WCB to the San Diego Society of Natural History.
- A Hydrology and Hydraulics Study conducted by CValdo Corporation in 2020 as part of the WCB Grant to the San Diego Society of Natural History.
- A Cultural Resources Study with a Treatment and Protection Plan conducted by PanGIS, Inc. in 2020 as part of the WCB Grant to the San Diego Society of Natural History.

The following surveys were conducted in association with regional efforts (NCCP, MSCP) and included Boden Canyon as a sample site:

- Arroyo Toad and Western Pond Turtle in the San Diego MSCP, 2002 (USGS, Interim Report 2003).
- Bat Inventory of the San Diego MSCP Area (USGS, Interim Report Contract P0150005, 2003).
- NCCP Raptor Monitoring Jan 1-Dec 31, 2002 (Wildlife Research Institute, March 2004).

Nomenclature for taxonomic and common species names follows that of Hickman (1993), Sibley (2003), Stebbins (1985), Page and Burr (1991), and Whitaker (1998).

CDFW monitoring team, CDFW file photo

A. Vegetation Communities and Habitats

In 2001, 2009, 2011, and 2012 the CDFW conducted vegetation surveys (rapid assessments, field reconnaissance, and verification surveys) and analysis to document the vegetation types found within the Boden Canyon Ecological Reserve. The resulting classification followed the hierarchical National Vegetation Classification System (Jennings et al. 2009) and A Manual of California Vegetation (Sawyer et al. 2009). This system classifies vegetation at the alliance and association levels. Within the boundaries of the Reserve, 28 rapid assessment surveys were conducted during this effort.

Additionally, in 2012, AECOM conducted a broad scale habitat-mapping project (AECOM 2014) as part of a regional effort in conjunction with SanDAG that included mapping approximately 661,850 acres within the full Management and Monitoring Strategic Plan (MSP) Area (MSPA). The MSPA includes the plan area boundaries for three plans, the MSCP, the MHCP and the proposed NCP. Areas that were not covered in 2012 were mapped in 2015 using CalVeg vegetation information updated at that time. AECOM used fourteen general categories of vegetation communities and that data maps to the detailed Alliance level. A slightly more detailed classification from the 2012 AECOM surveys of vegetation communities was used for this LMP, however they are consistent and fully compatible.

According to the Vegetation Classification Manual (VCM) for Western San Diego County, the Reserve contains thirteen vegetation alliances and fourteen general vegetation groups based on AECOM work. These can be found in the Vegetation map (Figure 11) and below in Table 3, Vegetation Alliances found in the Reserve.

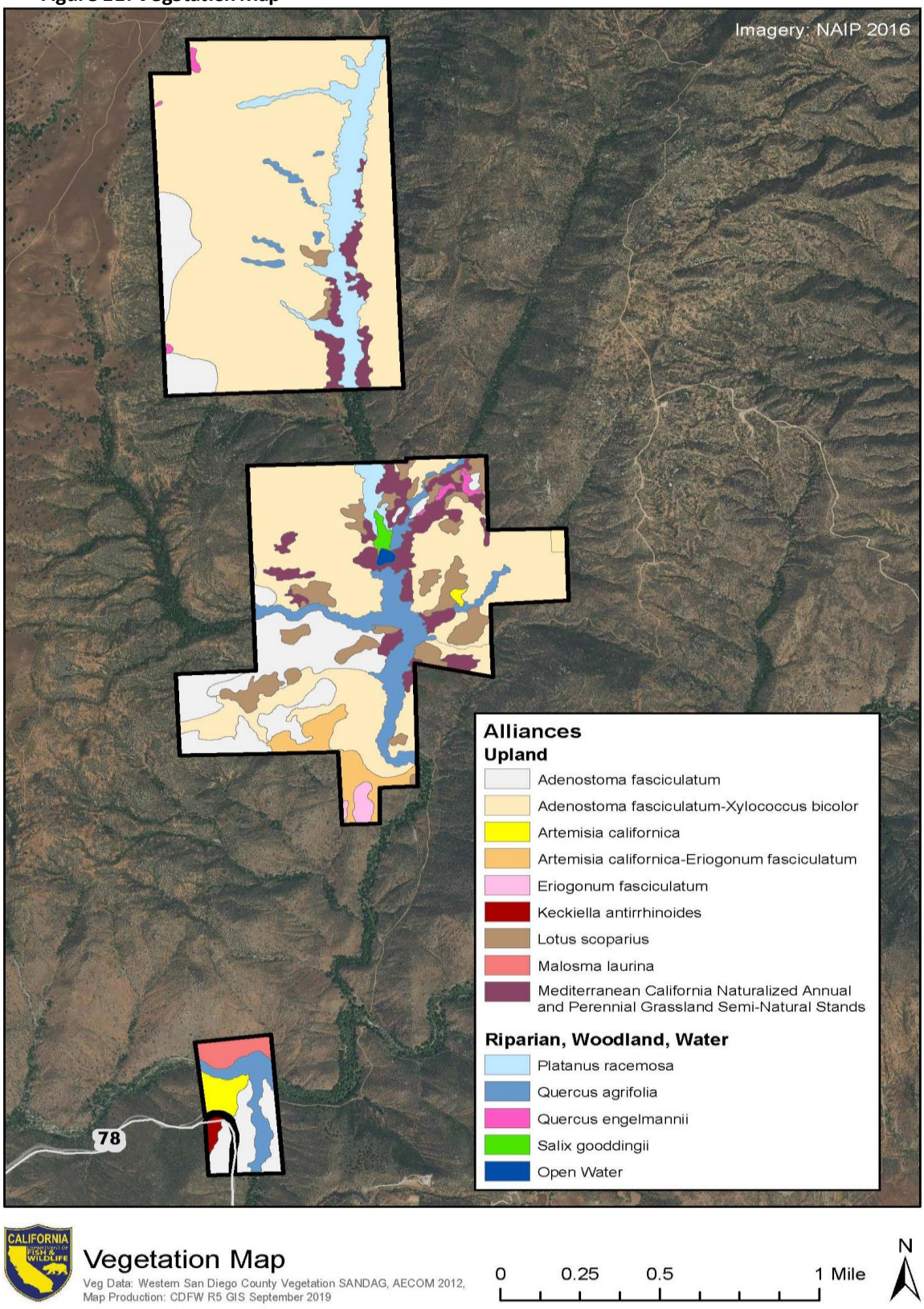
Table 3. Vegetation Alliances within Boden Canyon Ecological Reserve

Vegetation Alliance Names	**Common Names for Vegetation Type**	**Acres**
Adenostoma fasciculatum Alliance	Chamise Chaparral	150.6
Adenostoma fasciculatum-Xylococcus bicolor Alliance	Chamise-Mission Manzanita Chaparral	712.9
Artemisia californica Alliance	California Sagebrush -Coastal Sage Scrub	11.7
Artemisia californica-Eriogonum fasciculatum Alliance	California Sagebrush-California Buckwheat Scrub	17.9
Eriogonum fasciculatum Alliance	California Buckwheat Scrub	3.1
Keckiella antirrhinoides Alliance	Diegan Sage Scrub	3.3
Lotus scoparius Alliance	Deerweed Scrub	62.8
Malosma laurina Alliance	Laurel Sumac Scrub	12.1
Mediterranean California Naturalized Annual and Perennial Grassland Semi-Natural Stands	Grassland	70.1
Open Water	Open Water (pond)	1.8
Platanus racemosa Alliance	California Sycamore Woodlands	75.0
Quercus agrifolia Alliance	Coast Live Oak Woodland	77.6

Vegetation Alliance Names	Common Names for Vegetation Type	Acres
Quercus engelmannii Alliance	Engelmann Oak Woodland	5.2
Salix gooddingii Alliance	Southern Riparian Woodland	3.2
Grand Total		**1207.3**

*Acres are approximate and based on the 2012 AECOM data and imagery in cooperation with the Vegetation Classification Manual for Western San Diego County (Sproul, et al 2011)

Figure 11. Vegetation Map



The following vegetation alliance descriptions are summaries of combined detailed accounts presented in the Classification of the Vegetation Alliances and Associations of Western San Diego County (Sproul et. al. 2011), from 2012 AECOM and from CDFW/VegCamp data. Not all plant species included in these summaries are found within the Reserve but rather, are general descriptions.

***Adenostoma fasciculatum* Alliance**
(Chamise Chaparral)
150.6 acres

Throughout its range, chamise (*Adenostoma fasciculatum*) is dominant in the shrub canopy and depending upon the location, may include ribbonwood (*A. sparsifolium*), eastwood manzanita (*Arctostaphylos glandulosa*), common manzanita (*A. manzanita*), whiteleaf manzanita (*A. viscida*), *Ceanothus spp*., sticky monkeyflower (*Diplacus aurantiacus*), California yerba santa (*Eriodictyon californicum*), California buckwheat (*Eriogonum fasciculatum*), chaparral yucca (*Hesperoyucca whipplei*), toyon (*Heteromeles arbutifolia*), California scrub oak (*Quercus berberidifolia*), scrub live oak (*Q. wislizeni*), white sage (*Salvia apiana*), purple sage (*S. leucophylla*), black sage (*S. mellifera*), and poison oak (*Toxicodendron diversilobum*). Emergent trees may be present at low cover. Shrubs are typically less than 13 feet tall; the canopy is intermittent to continuous, and the herbaceous layer is sparse to intermittent.

As a result of extensive high-frequency and high-intensity fires in Western San Diego County over the past few decades, this alliance is now poorly represented as mature stands. There is evidence of type conversion to post-fire alliance stands of laurel sumac (*Malosma laurina*) and deerweed (*Acmispon glaber* previously *Lotus scoparius*), in addition to largely annual non-native grasslands.

At the Reserve, chamise chaparral constitutes roughly 13% of the vegetation and is the second highest in acreage (chamise-manzanita chaparral is the highest) and is found primarily on the steep slopes to the west of the main Boden Canyon drainage.

***Adenostoma fasciculatum-Xylococcus bicolor* Alliance**
(Chamise-Mission Manzanita Chaparral)
712.9acres

In this alliance, chamise and mission manzanita (*Xylococcus bicolor*) are co-dominants in the shrub canopy and may co-occur with hoaryleaf ceanothus (*C. crassifolius*), Ramona lilac (*C. tomentosus*), wart-stem ceanothus (*C. verrucosus*), bush-rue (*Cneoridium dumosum*), chaparral yucca, toyon, laurel sumac, California scrub oak, holly-leaf redberry (*Rhamnus ilicifolia*), sugar bush (*Rhus ovata*), white sage, and black sage. Shrubs are usually less than 10 feet tall; and the canopy is intermittent to continuous. The herbaceous layer is sparse to intermittent.

This chaparral, characterized by the mixture of chamise and mission manzanita, is endemic to the south coast of California and adjacent northern Baja California. Like chamise, manzanita is a resprouter following fires, but is typically representative of more mesic settings than where chamise is the sole dominant.

This is the predominant habitat type at Boden Canyon, comprising roughly 62% of the Reserve. It includes components of both southern mixed chaparral and southern maritime chaparral. Southern mixed chaparral is more widespread in the central and northern portions of Reserve. Dominant species can change depending on post fire succession and intervals between fires.

***Artemesia californica-Eriogonum fasciculatum* Alliance**
(California Sagebrush-California Buckwheat Scrub)
17.9 acres

This alliance occurs from Northern Baja California to the Mount Diablo Range of central California. It is made up of two associations locally. One, the California sage (*Artemisia californica*) - California buckwheat - laurel sumac is typical of drier coastal sage scrub slopes at lower and mid-elevations, usually away from the immediate coast. A second, the California sage - California buckwheat - coast prickly pear (*Opuntia littoralis*)/ladyfingers (*Dudleya edulis*) association has been recently defined from coastal San Diego County using data from this study and the Cabrillo National Monument project (Sproul, et. al. 2011).

This alliance is often found in drier and more exposed settings either adjacent to California sage alliance stands or farther inland away from direct maritime fog influence.

The alliance is characterized by California sage and California buckwheat as co-dominants in the shrub canopy and may include lower cover of chamise, sticky monkeyflower, California joint fir (*Ephedra californica*), interior goldenbush (*Ericameria linearifolia*), chaparral yucca, deerweed, laurel sumac, lemonade berry (*Rhus integrifolia*), sugar bush, and/or white sage. Most shrubs are less than 7 feet in height. Some emergent large shrubs are up to 16 feet tall. The canopy can be one or two tiered, and ranges from intermittent to continuous cover. An herbaceous layer is present and dominated by spring annuals but may have some perennial grasses and geophytes.

***Artemesia californica* Alliance**
(California Sagebrush-Coastal Sage Scrub)
11.7 acres

This quintessential alliance of the California coastal sage scrub macrogroup is widespread from the San Francisco Bay Area south to northwestern Baja California. Throughout the range of this alliance, *Artemisia californica* is dominant or codominant in the shrub canopy. The shrub canopy is intermittent to continuous. Subdominant shrubs, depending on location, may include *Adenostoma fasciculatum, Baccharis pilularis, Mimulus aurantiacus, Encelia californica, E. farinosa, Eriogonum fasciculatum, Hesperoyucca whipplei, Isocoma menziesii, Keckiella cordifolia, Lotus scoparius, Opuntia littoralis, Salvia apiana, S. leucophylla, S. mellifera,* and *Toxicodendron diversilobum*. The main shrub layer is usually < 5 m tall, and includes plants such as *Malosma laurina, Rhus integrifolia*, or *Sambucus nigra*. The herbaceous layer is variable both seasonally and annually. There are two associations of this alliance defined for the project area. Both are widespread and extend well north of the study area. The *A. californica* Association has high cover and strong dominance of the

nominate species, while the *A. californica-Mimulus aurantiacus* Association may have *M. aurantiacus* as a codominant.

California sagebrush at Boden Canyon is considered to fit within the coastal form of Diegan sage scrub habitat and can be found primarily on the south-facing slopes above the canyon bottoms and is generally found in the southern portion of Boden Canyon.

***Keckiella antirrhinoides* Alliance**
(Diegan Sage Scrub)
3.3 acres

Keckiella antirrhinoides is a medium to large shrub that is intermediate in growth form between typical drought-deciduous coastal scrub shrubs and evergreen sclerophyllous chaparral shrubs. Consequently, it occupies intermediate positions on somewhat mesic slopes associated with elements of both macrogroups. In general, the definition for the alliance is as follows: *K. antirrhinoides* is dominant or codominant in the shrub canopy with *Adenostoma fasciculatum, Artemisia californica, Cneoridium dumosum, Eriodictyon crassifolium, Eriogonum fasciculatum, Hesperoyucca whipplei, Malosma laurina, Quercus berberidifolia, Rhus ovata, Salvia apiana, S. mellifera, Tetradymia comosa,* and *Xylococcus bicolor.* Emergent *Q. engelmannii* trees may be present at trace cover. Shrubs are generally < 2 m and the canopy is open to continuous and may be two-tiered. The herbaceous layer can range from open to intermittent. The *K. antirrhinoides* Alliance is limited to south coastal California and adjacent Baja California. Sampling in western Riverside and San Diego counties has defined the alliance. Stands most commonly associate with *A. californica* and all stands sampled in this study have been identified as members of the *K. antirrhinoides-A. californica* Association.

At the Reserve, this Diegan sage scrub habitat dominated by Keckiella (also called yellow bush snapdragon or penstemmon) is found in uplands predominantly adjacent to coast live oak riparian forest on south-facing slopes, and generally in the southern part of Boden Canyon.

***Acmispon glaber (Lotus scoparius)* Alliance**
(Deerweed Scrub)
62.8 acres

Deerweed is a short-lived perennial shrub, which typically colonizes slopes after fires in chaparral and coastal sage scrub throughout much of California. The alliance is an indicator of post-fire (or occasionally, other disturbance) conditions. Stands tend to persist for only a few years before other longer-lived woody species germinate or resprout, forming enough cover to convert to longer persisting vegetation types.

In general, the characteristics of this alliance include: deerweed as the dominant or codominant in the shrub canopy with chamise, California sage, coyote bush, California joint fir, interior goldenbush, California yerba santa, California Buckwheat, sawtooth goldenbush (*Hazardia squarrosa*), sand aster, chaparral bushmallow, desert apricot (*Prunus fremontii*), sugar bush, oak "golden" gooseberry

(*Ribes quercetorum*), and white sage. Shrubs are usually less than 7 feet tall and the canopy is open to intermittent and often two tiered. The herbaceous layer may be sparse to intermittent. At the Reserve, the post-fire transitional deerweed scrub is found within the more general vegetation type of coastal scrub, and may eventually co-occur with the laurel sumac stands depending on the timing of the post-fire succession and climatic conditions that may hasten the growth of more typical coastal scrub species.

***Malosma laurina* Alliance**
(Laurel Sumac Scrub)
12.1 acres

Laurel sumac is a large evergreen, sclerophyllous shrub that occurs along the coast from Santa Barbara County south into northwestern Baja California. It is frost sensitive and its presence generally signifies the warm coastal regions of southern California. The shrub is a consummate resprouter and can regularly resprout from its deep root crown multiple times in short succession following fires.

In general, the characteristics of the alliance as sampled so far include: laurel sumac dominant or co-dominant in the shrub canopy with California sage, big-pod ceanothus, sticky monkeyflower, bush sunflower, Coastal buckwheat (*E. cinereum*), California buckwheat, toyon, chaparral yucca, yellow bush-penstemon, holly-leaf redberry, lemonade berry, sugar bush, purple sage, black sage, Parry's tetracoccus (*Tetracoccus dioicus*), and/or poison oak. Emergent trees such as coastal live oak, or California sycamore may be present. Shrubs are usually less than 16 feet in height and the canopy is open to continuous. The herbaceous layer ranges from sparse to grassy. As a result of high frequency fires in the past few decades, this alliance has become more common in many areas of western San Diego County.

At the Reserve, laurel sumac scrub occurs within the coastal scrub areas that transition from the drainage bottoms up into the more mesic upland areas. It is found in the southern area (Parcel R) to the north of Santa Ysabel Creek and throughout the central parcels.

Mediterranean California Naturalized Annual and Perennial
Grassland Group
70.1 acres

The description is based on the group level (i.e., hierarchical level above the alliance) since classification to an alliance is not possible. Nonnative grasses and forbs are dominant over the native species, but none of the following nonnative species are clearly dominant or codominant: *Avena* spp., *Bromus* [ripgut, soft chess, red foxtail (*rubens*)], false brome, rye (*Lolium*) [now *Festuca perennis*], [rye grass (*perenne*), (*multiflorum*), (*temulentum*)], fountain grass (*Pennisetum* spp.), black mustard (*Brassica nigra*), poison hemlock (*Conium maculatum*), and/or crown daisy (*Glebionis coronaria*).

Grasslands at Boden Canyon ER, CDFW file photo by T. Stewart

These species, though, may be present without dominance in a mixed assemblage that could include other naturalized, ruderal species, such as *Agrostis*, Pacific bentgrass (*avenacea*, *desertorum*, creeping bentgrass (*stolonifera*), bentgrass (*viridis*), tall fescue (*Festuca arundinacea*), crab grass (*Digitaria spp*.), Russian thistle "tumbleweed" (*Salsola spp*.), filaree (*Erodium spp*.), Johnson grass (*Sorghum spp*.), thistle species (*Centaurea spp*.), Bermuda grass species (*Cynodon spp*.), Mediterranean grass (*Schismus spp.*), and milk thistle (*Silybum marianum*). This vegetation type is widespread and highly variable, and representative of general situations where ruderal plants have replaced natives through repeated soil disturbance and introduction of nonnative plants.

At the Reserve, the grassland group occurs within and on the edges of the coast live oak and sycamore woodlands, and up into the uplands as well. This vegetation type occurs to the west at Rancho Guejito and also to the east within Pamo Valley. These offsite areas may pose concerns as nonnative weed source populations that could continuously reinvade Boden Canyon.

***Platanus racemosa* Alliance**
(California Sycamore Woodlands Alliance)
75.0 acres

Sycamore stands are common along many of the streams. They may have mixtures of coast live oak and other trees, but are characterized by the presence of sycamores regularly spaced throughout the stands. In general, the alliance is characterized by: California sycamore dominant or co-dominant in the tree canopy with white alder (*Alnus rhombifolia*), California black walnut (*Juglans californica*), western cottonwood, coast live oak, valley oak (*Q. lobata*), sandbar willow, black willow (*S. gooddingii*), red willow (*S. laevigata*), arroyo willow (*S. lasiolepis*), yellow willow (*S. lutea*),

Peruvian pepper tree (*Schinus molle*), and pepperwood. Trees are the dominant layer and are generally less than 115 feet in height. The canopy is open to intermittent and the shrub layer is open to intermittent with the herbaceous layer ranging from sparse to grassy.

In the Reserve, this sycamore alliance, also known as southern riparian forest, is found generally upstream of the pond in the main drainage of Boden Canyon.

***Quercus agrifolia* Alliance**
(Coast Live Oak Woodland)
77.6 acres

Quercus agrifolia is the primary tree alliance in western San Diego County. *Quercus agrifolia* is diagnostic of California broad-leaved woodlands in the warm-temperate portions of the state. Stands may either be found in mesic uplands or riparian or semi-riparian settings where fluvial processes affect regeneration. Fire is the main natural process affecting upland stands. Both processes may be actively present in the riparian stands. Regeneration from seed is episodic, but trees live for >200–300 years. Stands can be eliminated by repeated fires at short intervals.

Coast Live Oak CDFW File Photo by T. Stewart

Statewide, general alliance characteristics include *Quercus agrifolia* as the dominant or codominant species in the tree canopy. Associated tree species may include *Acer macrophyllum, A. negundo, Arbutus menziesii, Juglans californica, Platanus racemosa, Populus fremontii, Quercus douglasii, Q. lobata, Q. engelmannii, Q. kelloggii, Salix lasiolepis*, and/or *Umbellularia californica.* Trees are generally < 30 m tall and the canopy is open to continuous. The shrub and herbaceous canopies are variable.

In general, characteristics of the alliance on a state-wide basis include: coast live oak dominant or co-dominant in the tree canopy with big-leaf maple (*Acer macrophyllum*), California boxelder (*A. negundo*), Pacific madrone (*Arbutus menziesii*), California black walnut, California sycamore, western cottonwood, blue oak (*Q. douglasii*), valley oak, Engelmann oak (*Q. engelmannii*), black oak, arroyo willow, and/ or pepperwood. Trees are generally less than 98 feet tall and the canopy is open to continuous. The shrub layer is sparse to intermittent, and the herbaceous layer is sparse to grassy.

At the Reserve, the coast live oak woodland is intermixed with southern coast live oak riparian forest. True stands of the coast live oak alliance are found in the eastern part (parcels K, L and M) while the coast live oak riparian forest dominates the main canyon drainage below the pond and occurs along the edges of Santa Ysabel Creek. Dense stands of poison oak, wild grape, and San Diego sedge are typical understory species. Drier, less shaded areas on terraces within the oak canopy support numerous grasses such as beardless wild ryegrass, wild oat and various bromes. Most of the coast live oak habitats support some riparian elements.

***Quercus engelmannii* Alliance**
(Engelmann Oak Woodland)
5.2 acres

Quercus engelmannii is endemic to south coastal California and adjacent Baja California Norte, Mexico. It is a subtropical oak that is partially drought deciduous. It occupies interior portions of San Diego County and only a few individuals and no stands are known within 5 miles of the coast, with an exception being Marine Corps Base Camp Pendleton. Recent fires in San Diego County have had varied effects on *Q. engelmannii*, including mortality of some mature trees. Stands with grassy understories tend to suffer minimal damage, while trees in stands with shrubby understories are top-killed but may survive by resprouting.

In general, *Q. engelmannii* is dominant or co-dominant in the tree canopy with *Juglans californica, Q. agrifolia*, and *Q. kelloggii* sometimes present as associates. Trees are usually < 18 m tall, and the canopy may be open to closed. The shrub layer is sparse to open and the herbaceous layer is sparse and often dominated by grass species. This alliance is uncommon in western San Diego County. In general, stands diagnostic of the alliance have Engelmann oak dominant or co-dominant in the tree canopy with coast live oak and black oak sometimes present. Trees are usually less than 59 feet tall and the canopy may be open to closed. The shrub layer is sparse to intermittent and the herbaceous layer is sparse or grassy. Engelmann oak occupies interior portions of the Reserve (Parcel L).

***Salix gooddingii* Alliance**
(Southern Riparian Woodland)
3.2 acres

Salix gooddingii is a common riparian tree in the West and this alliance occurs throughout the southwestern United States and northern Mexico. Mixed and pure stands of *S. gooddingii* occur regularly in the Central Valley and Southern California. In Southern California, this alliance has been identified along riparian corridors at low elevations in western Riverside County (Klein and Evens

2006), along the San Dieguito River and eastward into San Felipe Wash (Evens and San 2005), and in Anza-Borrego Desert State Park (Keeler-Wolf et al. 1998). In this treatment, mixed stands with *Populus fremontii* are included in the *Populus fremontii* Alliance.

In California, this alliance is generally defined by *Salix gooddingii* as dominant or co-dominant in the tree canopy with *Alnus rhombifolia, Populus fremontii, Salix laevigata, S. lasiolepis, S. lucida ssp. lasiandra, Sambucus nigra*, and/or *Washingtonia filifera*. Shrubs may include *Baccharis pilularis, B. salicifolia*, and *Cornus sericea*. Trees are generally < 30 m and the canopy may be open to continuous. The shrub layer is open to continuous and the herbaceous layer is open to continuous.

At the Reserve, this broad, multi-layered tree canopy includes tall western sycamore, western cottonwood, Goodding's black willow, and white alder, as well as black cottonwood, arroyo willow, lance-leaf willow and narrow-leaved willow. Shrubby species below or adjacent to the tree canopy includes mule fat and western false indigo. It includes an abundance of western poison oak, wild grape and California blackberry. Slightly drier areas support California rose, dense stands of bracken fern or basket rush. Other typical herbaceous species in the understory include wild celery, spike sedge, common monkeyflower, scarlet monkeyflower, stinging nettle and hedge nettle (Merkel & Associates, Inc. 2000).
This vegetation classification can be found along Santa Ysabel Creek (Parcel R) and in Boden Canyon above the pond (Parcel J).

Open *Water*

1.8 acres (variable)

In general, the classification of Open Water is not a vegetation type, rather an indication of standing water at a particular location within the mapped area. Oftentimes, the shoreline or margin areas surrounding the open water can be classified as "bare" if not currently under water but devoid of vegetation.

Pond at Boden Canyon, Spring 2017, CDFW File Photo by T. Stewart

At the Reserve, a 1.8 – 2.7-acre pond lies behind an earthen dam with a concrete spillway in the central parcels (Parcels J and K). Based on aerial imagery, the dam was built in or around 1979 (Merkel & Associates, 2000). The water in the pond in the central parcel is dependent upon climatic conditions and how much precipitation is received in any given year. How long the water stays ponded is dependent upon evaporation or soil saturation. The acreage listed here and depicted on Figure 11 (1.8 acres) is what was determined at the time the imagery was taken, however, it can fluctuate seasonally and annually. CDFW records show the pond was about 2.7 acres in the early 2000's, but due to drought and climatic conditions, the size of the pond has become reduced over the years. See more about this pond in Chapter IV, Section E 3.

During years of normal rainfall, a dense growth of leafy pondweed (*Potamogeton foliosus var. foliosus*) can develop around the edges and the upper end of the pond by late summer. The pond is also characterized by a broad alluvial fan with high groundwater at the upstream end of the pond. These conditions enhance the suitability of the drainage upstream of the pond to support the coast live oak riparian forest described above. Increasing sedimentation above the pond causes the vegetation type to be variable and somewhat dynamic.

B. Botanical Resources

General plant inventories were conducted in the Boden Canyon area by Lettieri-McIntyre in 1994, by Merkel and Associates in 2000, and then UC Riverside (Andy Sanders) under contract to CDFW conducted full floristic surveys in 2001 and in 2005. From 2009-2012 the CDFW VegCamp Team conducted Vegetation Rapid Assessments which documented botanical resources, including vegetation communities, within the Reserve (Sproul et al, 2011). Under the WCB Grant mentioned previously, SDNHM provided incidental floristic information they collected while doing other field

surveys. All information was incorporated throughout this Final LMP. See the introductory paragraphs in Section III above for details on what surveys have been conducted on the Reserve.

From all vegetation and floristic surveys (1994-2012) a total of 445 plant species were recorded within the Reserve (Appendix B); of these species, 117 (26.5 percent) are nonnative, underscoring the relatively low level of disturbance to much of the Reserve. An estimated 10 percent of the vascular flora within the Reserve may as yet be undetected, consisting of species in very dense chaparral or remote areas, or spring annuals with a limited window for identification (Merkel & Associates 2000). In general, the flora is representative of the on-site vegetation series and the Peninsular Range foothills of San Diego County (Merkel & Associates, Inc. 2000).

Nonnative Weedy Species

The removal of non-native, weedy species has been a focal point of management since the mid 1990's. Prior to its acquisition, the previous landowner had conducted treatment of non-natives and since its acquisition, on-going eradication efforts and on-going maintenance has occurred by CDFW. Through a State voter-approved bond act in 2000, Proposition 12 (the Safe Neighborhood Parks, Clean Water, Clean Air, and Coastal Protection Bond Act of 2000 -see Appendix D), CDFW was able to hire one full-time biologist, temporary help and contractor help to remove non-native plant species. The Bond Act specifically called for the targeted removal of certain invasive, exotic species, including *Arundo donax,* Thistles,[*Carduus pycnocephelus, Centaurea benedicta, C. maculosa, C. melitensis, C. solstitialis, Cirsium vulgare, Cynara cardunculus, Silybum marianum, Salsola sp.*], *Cortaderia spp., Myoporum leatum, Nicotiana glauca, Ricinus communis, Tamarix spp., Xanthium sp.*, cocklebur. CDFW attempts to remove these and other non-native, invasive species on all its lands in its annual vegetation maintenance program.

Nonnative plant species that have the ability to outcompete native plants, and ultimately change the character of a native habitat, are of great concern to CDFW. Within the Reserve, the two perennial species of greatest concern are European tamarisk (*Tamarix parviflora*) and giant reed (*Arundo donax*). Both of these species are typically found within drainages, particularly where disturbance has exposed new surfaces to colonization, and/or where an irregular hydrologic regime causes the dieback or scour of native riparian species (Merkel & Associates, Inc. 2000).

Tamarisk. CDFW File Photo

Tamarisk is primarily found in the downstream areas of Santa Ysabel Creek. It is only rarely observed from 200 yards upstream of the road crossing to a point just prior to the confluence of Santa Ysabel Creek and Clevenger Canyon. At the confluence, tamarisk becomes much more evident and remains a locally common species downstream (Merkel & Associates, Inc. 2000). Several young tamarisk plants were also noted in the sandy stream delta upstream of the large pond in the central portion of the Reserve. Other tamarisk plants occur north of the Reserve on private lands at the top of the Boden Canyon Creek watershed. Extensive tamarisk eradication at the northern end of the pond was conducted prior to CDFW's acquisition of the land. Ongoing eradication efforts, which have since occurred at the base of Clevenger Canyon, the Santa Ysabel Creek crossing, and at the pond in 2002 and 2003, have eradicated all known individuals except for any seedlings that may have developed in 2004 from off-site, upstream populations. Current searches (since June 2005) that are being conducted by CDFW staff for new plants have resulted in the removal of 800 individuals, approximately 90 percent of which were seedlings (J. Ekhoff, pers. comm. 2005). In 2013 several tall tamarisk were discovered growing within the willow trees on the north end of the pond. In 2014, with help from the City of San Diego, CDFW cut down, chipped, and herbicide-stump-treated the approximately 70+ tamarisk. In 2016, in the same area north of the pond, CDFW cut down, stacked and stump-treated approximately 225 additional tamarisk. Follow up herbicide treatments have occurred as needed to a few re-sprouting and seed sprouted tamarisk.

A tall dense patch of giant reed occurs along the downstream portion of Santa Ysabel Creek on the City of San Diego's parcel (UCR 2005). This species has the ability to spread rapidly, is difficult to eradicate, and represents a threat to riparian habitat values. CDFW is monitoring giant reed on the Reserve and will continue to treat as necessary.

Extensive areas of tree tobacco previously dominated much of the mesa immediately east (north of Highway 78) within the Reserve, and the access road between the Highway 78 and Santa Ysabel Creek crossing. This species was also present adjacent to Santa Ysabel Creek and in Boden Canyon. However, extensive eradication efforts conducted by CDFW on the mesa, as well as Kelly & Associates (CDFW file notes, Kelly and Associates 2002-2003) within the creek and canyon areas, have effectively removed the majority of this species within the Reserve. Compared to tamarisk and giant reed, this species is not considered a major threat to existing habitats. Mature individuals are

rare as they have been one of the major target species of the ongoing CDFW eradication program. Most of the remaining individuals are scattered seedlings (J. Ekhoff, pers. comm.).

Three specimens of pampas grass (*Cortaderia sp*.) had been previously documented along the main access road within the Reserve, but these three individuals have been treated with herbicide, though not removed (J. Ekhoff, pers. comm. 2005). Olive trees (*Olea seuropea*) are found in a grove to the east of the large pond. These occurrences indicate that the trees were likely introduced with the historic occupation of the canyon, similar to the eucalyptus trees in the area. There are currently seven olive trees, no new ones observed and no signs of grove expansion. Eucalyptus trees that have died (likely due to the fires) and are safety hazards are removed as needed and as staffing is available.

CDFW staff attempts vigorous removal of highly invasive, non-native plant species at all its properties. Specific issues of concern to the Reserve include:

- Exotic annual grasses (Non Native Grasses, NNG) every year are out competing annual forbs (wildflowers) for water and sunlight. The native annual plant seed bank diminishes over time reducing not only their total number but genetic diversity that can lead to extirpation.
- NNG also occur along roadsides and therefore spread by these corridors as do other weeds.
- NNG are the most ignitable vegetation when dry and spread fire fast and hot into native shrubs. They are also the most common oak understory plant.
- NNG in conjunction with Tocalote, small pod mustard and a suite of other similar physiognomic weeds will continue to reduce the Reserve's native wildflower species in number and diversity and that in turn will reduce faunal diversity.
- The above weed problems may eventually lead to a vegetational community type conversion especially in ecologically important natural disturbance regimes.

Invasive thistle at Boden Canyon ER, Spring 2017, CDFW. Photo by T. Stewart

For a complete list of the nonnative, invasive weedy species at the Reserve, see Appendix B.

C. Sensitive Botanical Resources

Special status plant species are species that are either legally protected under the federal and state Endangered Species Acts (ESAs) or other regulations, or species considered by the scientific community to be sufficiently rare to qualify for such listing. Special status species include species listed or proposed for listing as endangered or threatened under the federal ESA (USFWS Federal Register 50 CFR, Sec 17-.11), the California ESA (California Fish and Game Code Div 3, Ch. 1-5, Sec 2050), or the California Native Plant Protection Act (California Fish and Game Code, Ch 10, Sections 1900-1913). Also included in this section on sensitive botanical resources are species that are of special concern to CDFW (California Department of Fish and Wildlife, California Natural Diversity Database (CNDDB), Special Animals List, October 2017), are listed as "covered species" within the MSCP and/or are species included in the MSP Roadmap for management or monitoring. (For more information on MSP categorization and risk level definitions, see Section IV.C.1.b.) Furthermore, it is mandatory that California Native Plant Society (CNPS) lists 1A, 1B, and 2 species be fully considered within this LMP as they meet the definitions of Section 1901, Chapter 10 (Native Plant Protection Act) or Sections 2062 and 2067 (California ESA) during the preparation of environmental documents relating to CEQA (CNPS 2014). All species identified through California Natural Diversity Database (CNDDB) searches known to occur or to have occurred within the project vicinity are considered below.

Threatened and Endangered Plant Species

Out of the total of 445 plant species documented on the Reserve, none are listed or are candidates for listing under the state or federal endangered species acts, and none are currently expected within the vicinity of the project area. See Table 4 for all Sensitive Species found on the Reserve and see Appendix B for a list of all wildlife (plant, reptile, amphibian, bird and mammal) species known to occur on the Reserve.

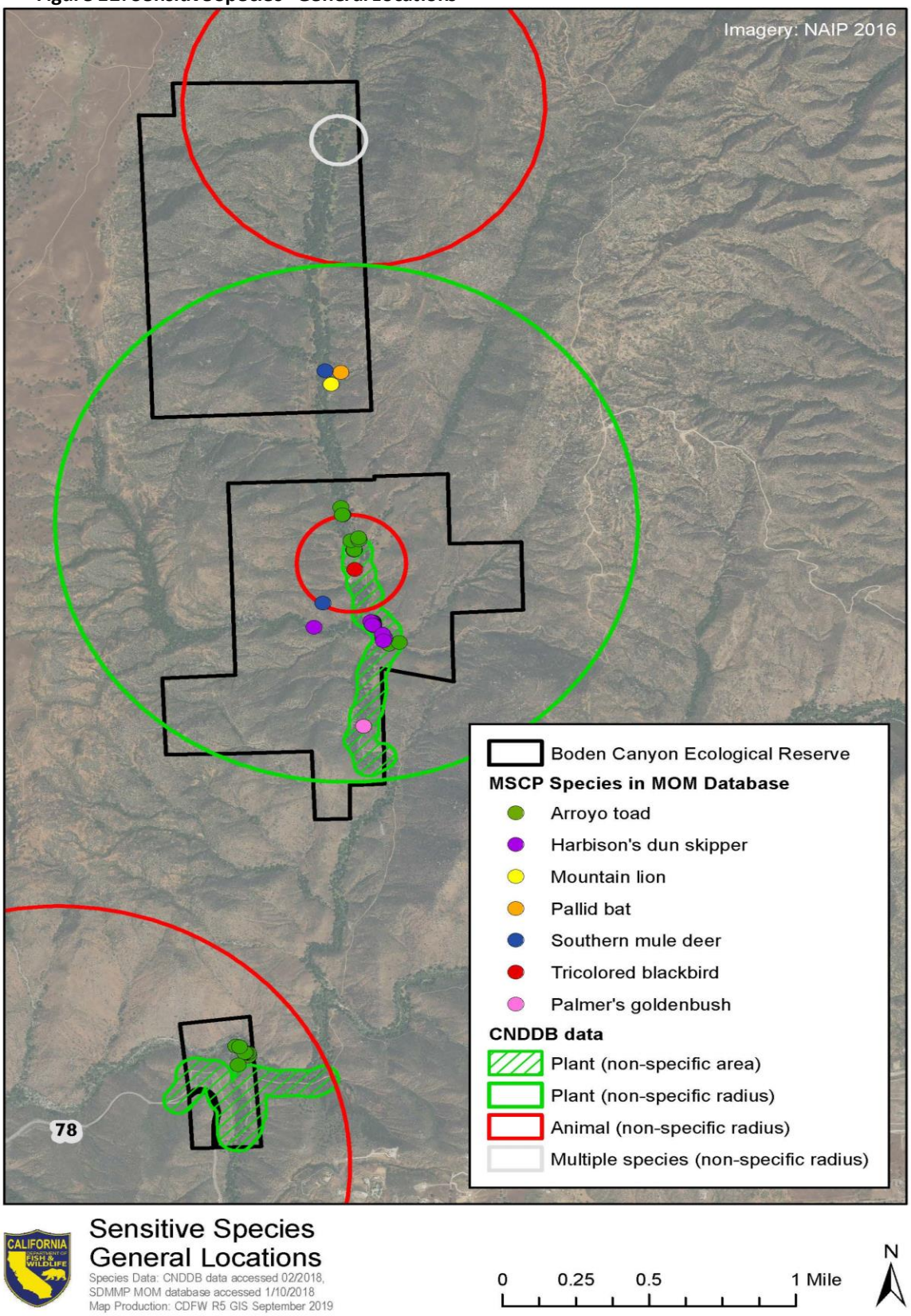
MSCP Plant Species

Sensitive floral species known to occur within the Reserve are listed in Table 4. Locations of sensitive species are visually represented in Figure 12. Descriptions of sensitive plant species identified within the Reserve during biological surveys conducted from 1994 through 2017 are provided below.

One MSCP-covered plant species is reported in the CNDDB and in the San Diego Management and Monitoring Program (SDMMP) Master Occurrence Matrix (MOM) database as inside the Reserve, *Ericameria palmeri*, Palmer's Goldenbush. It is also included as an MSP species and is under the Management Focus Group VF. One other plant, the Engelmann Oak (*Quercus engelmannii*) although not an MSCP-covered species, is included as an MSP species because of its coverage in MHCP and is also in the VF category. The species *Caulanthus heterophyllus*, slender pod jewelflower, was

included in MSCP as *C. stenocarpus*. However, since the conception of MSCP when it was initially evaluated and included as an MSCP species, this taxon has been combined with the more common and widespread *C. heterophyllus.* Until additional taxonomic work is conducted, this species is no longer addressed for management or monitoring needs or included within the MSP Roadmap document. No other non-listed sensitive plant species are currently expected within the vicinity of the Reserve.

Figure 12. Sensitive Species - General Locations



CNDDB version 02/2018. Please Note: The occurrences shown on this map represent the known locations of the species listed here as of the date of this version. There may be additional occurrences or additional species within this area which have not yet been surveyed and/or mapped. Lack of information in the CNDDB about a species or an area can never be used as proof that no special status species occur in an area.

Non-listed, Sensitive Plant Species Detected On-site

Based on biological surveys conducted in Boden Canyon between 1994-2012, or included in CNDDB or in SDMMP's MOM database, four sensitive plant species were documented as occurring within the Reserve:

- *Clarkia delicata, Delicate Clarkia (CNPS List1B.2)*
- *Ericameria palmeri var. palmeri, Palmer's Goldenbush (CNPS List 1.B.1 and MSCP/MSP VF)*
- *Lepidium virginicum*, Robinson's Peppergrass (CNPS List 1B)
- *Quercus engelmannii*, Engelmann Oak (MSP VF and CNPS List 4)

See Table 4 below for all sensitive plants and animal species documented on the Reserve.

Delicate clarkia, File photo

Delicate clarkia (*Clarkia delicata*) is an annual herb occurring in cismontane woodland, and valley and foothill grassland habitats. It is found at elevations between 771 feet to 3,281 feet and flowers from April to June. Delicate clarkia, a CNPS List 1B species, was found to be fairly common in the Reserve in spring of 2005 (Sanders, UCR 2006), however, it was not observed in 1994 or 2001. A "Clarkia sp." was noted in 1994 (LMA 1994).

Palmer's Goldenbush (*Ericameria palmeri*) is a perennial evergreen shrub occurring in chaparral and coastal sage scrub habitats. The species is found at elevations between 98 feet to 1,968 feet, with flowers blooming from July to November. Palmer's goldenbush is a CNPS list 1.B.1 species, an MSCP covered species and an MSP VF species. A single location of this plant was found by UCR on non-CDFW property but in Boden Canyon. Sanders also noted that it was scarce (Sanders, UCR 2006). Palmer's goldenbush was not reported as observed in either 1994 or in 2001, however, is reported

in CNDDB and is in the SDMMP MOM database as being in the Reserve so it has been included in Table 4 as present in the Reserve.

Robinson's peppergrass (*Lepidium virginicum var. robinsonii*) is a CNPS List 1B species and was detected by Sanders within the Reserve. Sanders also reports that this species is scarce and recommended spring surveys in the Reserve, however, he noted that this taxon is turning out to be far more common and widespread in lowland southern California than was previously realized (Sanders, UCR 2006).

Engelmann oak (*Quercus engelmannii*) is addressed in the MSP Roadmap (covered in the MHCP) as a species included in the Vegetation Focus Management Group "VF" for oak woodlands. It is also a CNPS List 4 species that was reported in 1994 by LMA, in 2001 by M&A, and again in 2005 by UCR. Engelmann oaks occur throughout the Reserve; however, they are listed as uncommon by both M&A and UCR (LMA 1994, M&A 2001, Sanders, UCR 2006).

Five additional plant species found, or potentially present (listed on one or more survey record), on the Reserve are CNPS List 4 species and are listed below because they are of local interest, however they do not meet the threshold for significance for this LMP:

- *Chorizanthe leptotheca*, Ramona Spineflower (CNPS List 4)
- *Machaeranthera juncea*, Rush Bristleweed (CNPS List 4)
- *Polygala cornuta* var. *fishiae*, Fish's Milkwort (CNPS List 4)
- *Scirpus acutus*, (previously *Juncus acutus*) Southwestern spiny rush (CNPS List 4)
- *Viguiera laciniata*, San Diego County Sunflower (CNPS List 4)

Ramona spineflower (*Chorizanthe leptotheca*), a CNPS List 4 species, is known from the Reserve (Sanders, UCR 2006). It was not observed in 2001, and a "*Chorizanthe sp*." was reported in 1994.

Rush bristleweed (*Machaeranthera juncea*), a CNPS List 4 species, is reported as scarce and scattered within the Reserve (Sanders, UCR 2006). It was not reported as observed in 1994 or 2001.

Fish's Milkwort (*Polygala cornuta* var. *fishiae*) is an inconspicuous shrub that was reported in the Reserve as scattered and scarce (Sanders UCR 2006). This species was not reported in 1994 or 2001, however M&A noted suitable habitat existed in Boden Canyon for this plant (M&A 2001).

Southwestern spiny rush (*Scirpus acutus*, formerly *Juncus acutus*) is a CNPS List 4 species that occurs along streams generally in more coastal localities than the Reserve. This species was reported in 1994 only (LMA 1994) and not relocated or confirmed in later surveys by others, however it remains on the plant list for the Reserve.

San Diego County sunflower (*Viguiera laciniata*), a CNPS List 4 species, is reported from the Reserve, however Sanders noted that this locality may have been planted (Sanders, UCR 2006). It was not reported as observed in 1994 or in 2001.

See Table 5 below for sensitive species (plants and animals) that were previously reported but are unconfirmed within the Reserve or have potential to occur within the Reserve.

Sensitive Plant Species with Potential to Occur On-site

In addition to the four plant species detected within the Reserve and the five potentially present, there are several other sensitive plant species that have some potential to occur on-site.

San Diego sagewort (*Artemesia palmeri*) is a CNPS List 4 species that occurs in intermittent drainages associated with oak woodlands. This species has a moderate potential for occurrence within the Reserve.

Descanso milk-vetch (*Astragalus oocarpus*) is a CNPS List 1B species that occurs in cismontane chaparral at the edges of meadows. This species has a low potential to occur on-site as many of the reported populations are from montane localities and the reported elevational range of this species is higher than the highest elevations within the Reserve (Beauchamp 1986; Reiser 2001).

Southern black walnut (*Juglans californica*), a CNPS list 4 plant, was found on non-CDFW property in Boden Canyon. Because only a solitary individual was found, potential to occur in the Reserve is low to moderate.

These three species do not have a significant potential for occurring within the Reserve so will not be further discussed in this LMP. If any are found later within the Reserve, as would any other newly detected species, they will be addressed at the time of the next LMP update and managed accordingly in the interim.

Note: Other sensitive plant species that have been recorded in the vicinity of the Reserve are associated with vernal pools (from Ramona) and gabbro soils (Black Mountain). Neither vernal pools nor gabbro soils are present or expected to occur within the Reserve so these will not be addressed in this LMP.

D. Wildlife Resources

The LMP was developed based on all currently available information (biological and otherwise) collected over the years. See the introductory paragraphs of Chapter III of this LMP for the list of surveys known to have been conducted at the Reserve. Appendix B contains the list of plants and animals documented in the Reserve. As mentioned above there are 445 documented plant species on the Reserve (4 of those being considered sensitive). And there are 7 amphibians, 25 reptiles, 162 birds and 49 mammals for a total of 243 wildlife species, including those found in 2020 by the SDNHM under the WCB Grant mentioned earlier in this document. By including information from older surveys 7 fish and 36 butterfly species can be added to the total of 286 for all detected wildlife species on the Reserve.

Depending on available funding, staffing, and/or CDFW expertise, surveys for species not yet inventoried will be initiated and continued as needed. All surveys will follow the best and most appropriate scientific protocol available. There have been 38 sensitive species documented on the Reserve to-date. See Table 4 for Sensitive Species documented on the Reserve and see Appendix B for a list of all wildlife (plants and reptile, amphibian, bird and mammal) species known to occur or reported on the Reserve.

Special status wildlife species are those species that are either legally protected under the federal and/or state Endangered Species Acts (ESAs) or other regulations. Special status species include species listed or proposed for listing as endangered or threatened under the federal ESA (USFWS 1999a) or the California Endangered Species Act (CESA). Additionally, included below are species of importance to CDFW as Species of Special Concern or as Fully Protected species (California Department of Fish and Wildlife, California Natural Diversity Database (CNDDB), Special Animals List, October 2017). Also noted are species considered as "covered species" within the MSCP and/or are

included in the MSP Roadmap for management or monitoring. The MSP categorized each species addressed in that document according to its management need and recommended management focus. The group descriptors for species in the vegetation management focus groups are:

- VG - for species with a limited distribution that should be managed in their vegetation type and having characteristics that need to be specifically managed for
- VF - species with a broader distribution not needing to be specifically managed

Descriptors in the focus management groups for species needing species-specific management rather than vegetation management include:

- SL – for species whose persistence in the MSP Area is at a high risk for loss without immediate action above and beyond daily maintenance activities.
- SO – for species that have one or more occurrences within the MSP Area where persistence is at risk without immediate action beyond normal maintenance activities.
- SS – for species that are more stable, and their persistence is at a lower level but they need species-specific management).

For more information on MSP categorization and risk level definitions, see Chapter IV.C.1.b.

Sensitive species locations are visually represented in Figure 12.

Table 4 lists sensitive species documented on the Reserve and Table 5 lists those sensitive species which were previously reported but remain undocumented or have a potential to occur on the Reserve.

In addition to the four sensitive plant species mentioned above, thirty-seven wildlife species have been documented on the Reserve that are considered sensitive including one invertebrate, two amphibians, six reptiles, eighteen birds, and ten mammals (four of which are bats). Two species are federally listed as endangered (arroyo toad and least Bell's vireo (and the vireo is also state endangered)), one is state Threatened (tri-colored blackbird), three are state Fully Protected (golden eagle, white-tailed kite and ringtail) and twenty are state species of special concern. Fourteen of these 37 wildlife species are covered species under the MSCP and an additional ten, while not in MSCP, are covered in other regional planning efforts and, as such, are MSP Roadmap species with management or monitoring recommendations to consider. Note that some species have more than one sensitive species status as indicated in the columns on Tables 4 and 5 below.

Table 4. Sensitive Species Known to Occur within the Boden Canyon Ecological Reserve

PLANTS

Scientific Name	Common Name	State Listing[1]	Federal Listing	Regional Plan[2]	Other[3]	Known to Occur on ER
Clarkia delicata	Delicate Clarkia	-	-	-	CNPS 1B.2	✓

Scientific Name	Common Name	State Listing[1]	Federal Listing	Regional Plan[2]	Other[3]	Known to Occur on ER
Ericameria palmeri var. *palmeri*	Palmer's goldenbush	-	-	MSCP, MSP, VF	CNPS 1B.1	✓
Lepidium virginicum var. *robinsonii*	Robinson's pepper-grass	-	-	-	CNPS 1B	✓
Quercus engelmannii	Engelmann oak	-	-	MHCP, MSP, VF	CNPS 4.2	✓

INVERTEBRATES

Scientific Name	Common Name	State Listing[1]	Federal Listing	Regional Plan[2]	Other[3]	Known to Occur on ER
Euphyes vestries harbisoni	Harbison's dun skipper	-	Cat 2, U	MHCP, MSP, SL	-	✓

FISH

Scientific Name	Common Name	State Listing[1]	Federal Listing	Regional Plan[2]	Other[3]	Known to Occur on ER
NONE	-	-	-	-	-	-

AMPHIBIANS

Scientific Name	Common Name	State Listing[1]	Federal Listing	Regional Plan[2]	Other[3]	Known to Occur on ER
Anaxyrus (= Bufo) californicus	arroyo toad	SSC	FE	MSCP, NCP, MSP SO	-	✓
Scaphiopus hammondii	western spade-foot toad	SSC	-	-	-	✓

REPTILES

Scientific Name	Common Name	State Listing[1]	Federal Listing	Regional Plan[2]	Other[3]	Known to Occur on ER
Aspidoscelis hyperythra beldingi	orange-throated whiptail	WL	Cat 2, D	MSCP, MHCP, NCP, MSP VG	-	✓
Aspidoscelis tigris stejnegeri	coastal (western) whiptail	SSC	-	-	-	✓

Scientific Name	Common Name	State Listing[1]	Federal Listing	Regional Plan[2]	Other[3]	Known to Occur on ER
Crotalus ruber ruber	northern red-diamond rattlesnake	SSC	Cat 2, U	NCP, MSP VG	-	✓
Phrynosoma coronatum blainvilli	coast (San Diego) horned lizard	SSC	Cat 2, D	MSCP, NCP, MSP VG	-	✓
Salvadora hexalepis virgultea	coast patch-nosed snake	SSC	Cat2, U	-	-	✓
Thamnophis hammondii	two-striped gartersnake	SSC	Cat 2, U	NCP, MSP VG	-	✓

BIRDS

Scientific Name	Common Name	State Listing[1]	Federal Listing	Regional Plan[2]	Other[3]	Known to Occur on ER
Accipiter cooperii	Cooper's hawk	WL	-	MSCP, MHCP, MSP VG	-	✓
Agelaius tricolor	tricolored blackbird	ST	Cat 2, D, BCC	MSCP, MHCP, MSP VG	-	✓
Aimophila ruficeps canescens	southern California rufous-crowned sparrow	WL	Cat2, D	MSCP, MHCP, MSP VG	-	✓
Ammodramus savannarum	grasshopper sparrow	SSC	-	NCP, MSP VF	-	✓
Aquila chrystaeos	golden eagle	WL, FP	BCC, BEA	MSCP, MSP, SO	-	✓
Artemisiospiza belli	Bell's sage sparrow	WL	Cat 2, D	MHCP, NCP, MSP VF	BCC	✓
Branta candensis	Canada goose	-	-	MSCP	-	✓
Buteo regalis	ferruginous hawk	WL	Cat 2, D, BCC	MSCP, MSP VG	-	✓
Chaetura vauxi	Vaux's swift	SSC	-	-	-	✓
Circus cyaneus	northern harrier	SSC	-	MSCP, MSP VG	-	✓
Contopus cooperi	olive-sided flycatcher	SSC	Cat 2, D, BCC	-	-	✓
Dendroica (Setophaga) petechia brewsteri	yellow warbler	SSC	BCC	-	-	✓
Elanus leucurus	white-tailed kite	FP	-	-	-	✓

Scientific Name	Common Name	State Listing[1]	Federal Listing	Regional Plan[2]	Other[3]	Known to Occur on ER
Icteria virens auricollis	yellow-breasted chat	SSC	-	MHCP, NCP, MSP VF	-	✓
Lanius ludovicianus	loggerhead shrike	SSC	BCC	-	-	✓
Pandion haliaetus	osprey	WL	-	MHCP, MSP VG	-	✓
Sialia mexicanus	western bluebird	-	-	MSCP, MHCP, MSP VG	-	✓
Vireo bellii pusillus	least Bell's vireo	SE	FE	MSCP, MSP SO	BCC	✓

MAMMALS

Scientific Name	Common Name	State Listing[1]	Federal Listing	Regional Plan[2]	Other[3]	Known to Occur on ER
Bassariscus astutus	ringtail	FP	-	-	-	✓
Chaetodipus californicus femoralis	Dulzura (California) pocket mouse	SSC				✓
Chaetodipus fallax fallax	northwestern San Diego pocket mouse	SSC	Cat2, D	MHCP, MSP VG	-	✓
Neotoma bryanti (lepida) intermedia	Bryant's (San Diego) woodrat	SSC	Cat 2, U	-	-	✓
Odocoileus hemionus	southern mule deer	-	-	MSCP, MSP SS	-	✓
Puma concolor	mountain lion	-	-	MSCP. MSP SL	-	✓

BATS

Scientific Name	Common Name	State Listing[1]	Federal Listing	Regional Plan[2]	Other[3]	Known to Occur on ER
Antrozous pallidus	pallid bat	SSC	-	NCP, MSP SO	WBWG-H	✓
Corynorhinus townsendii ssp. townsendii	Townsend's big-eared bat	SSC	Cat 2, D	NCP, MSP SO	WBWG-H	✓
Lasiurus blossevillii	western red bat	SSC	-	-	WBWG-H	✓
Nyctinomops femorosaccus	pocketed free-tailed bat	SSC	-	-	WBWG-H	✓

[1] State rankings:

SE State Endangered **FP** Fully Protected **ST** State Threatened

WL Watch List **SSC** California Species of Special Concern **CSE** Candidate for State Endangered

Federal rankings:

FE Federally Endangered **FT** Federally Threatened **BEA** Protected under the Bald Eagle Act
BCC Bird of Conservation Concern

Cat 2, D or 2, U Listing possibly warranted. (D= declining trend, U= trend unknown)

[2] Regional Plan:

MSCP Multiple Species Conservation Plan **NCP** North County MSCP (proposed)
MHCP Multiple Habitat Conservation Plan **MSP** Management and Monitoring Strategic Plan
MSPA Management and Monitoring Strategic Plan Area
MSP SL Species whose persistence in the MSPA is at high risk of loss without immediate management action above and beyond that of daily maintenance activities
MSP SO Species whose persistence of 1 or more significant occurrences in the MSPA is at high risk of loss without immediate management action above and beyond that of daily maintenance activities
MSP VF Species with limited distribution in the MSPA and/or having specific vegetation characteristics that need to be managed for persistence in the MSPA.
MSP VG Species with a wider distribution in the MSPA or that do not have specific vegetation characteristics that need to be managed.

[3] California Native Plant Society (CNPS) listing:

1B Plants rare, threatened, or endangered in California or elsewhere
1B.1 Seriously threatened, over 80% of occurrences are threatened, or have a high degree and immediacy of threat
1B.2 Moderately threatened, 20-80% of occurrences are threatened, or have a moderate degree of immediacy of threat
4 Plants of limited distribution, a watch list
4.2 Watch list plants are of a moderate level of limited distribution
4.3 Watch list plants are of a low level of limited distribution

WBWG – Western Bat Working Group sensitivity ranking:

H High **M** Medium **L** Low

Sensitive species not documented within the Reserve, but with the potential to occur within the Reserve include three sensitive reptile species, the California legless lizard, the San Diego banded gecko and the southern western pond turtle, one sensitive bird species, the California gnatcatcher; and one sensitive mammal, the American badger. Two species which were previously reported and cannot be confirmed are the Jacumba pocket mouse and the California mastiff bat. These seven species too are described below in the species summary accounts. See Table 5 below for sensitive species (plants and animals) that were previously reported but are unconfirmed within the Reserve or those sensitive species that have potential to occur within the Reserve.

Table 5. Sensitive Species previously reported but Unconfirmed in the Reserve, or have a Potential to Occur within the Boden Canyon Ecological Reserve

PLANTS

Scientific Name	Common Name	State Listing[1]	Federal Listing	Regional Plan[2]	Other[3]	Potential to Occur on ER[4]
Chorizanthe leptotheca	Ramona spineflower	-	-	-	CNPS list 4	H

Scientific Name	Common Name	State Listing[1]	Federal Listing	Regional Plan[2]	Other[3]	Potential to Occur on ER[4]
Machaeranthera juncea	rush bristleweed	-	-	-	CNPS list 4	H
Polygala corputa var. *fishiae*	Fish's milkwort	-	-	-	CNPS list 4	H
Scirpus acutus	southwestern spiny rush	-	-	-	CNPS list 4	H
Viguiera laciniata	San Diego County sunflower	-	-	-	CNPS list 4	H

REPTILES

Scientific Name	Common Name	State Listing[1]	Federal Listing	Regional Plan[2]	Other[3]	Potential to Occur on ER[4]
*Anniella pulchra (*now recommended as *A. stebbinsi)*	(southern) California legless lizard	Priority 2 SSC	-	-	-	H
Coleonyx variegatus abbotti	San Diego banded gecko	SSC	Cat 2, U		-	H
Emys marmorata pallida	southern western pond turtle	SSC	-	MSCP, MHCP, NCP, MSP VG	-	U/M

BIRDS

Scientific Name	Common Name	State Listing[1]	Federal Listing	Regional Plan[2]	Other[3]	Potential to Occur on ER[4]
Polioptila californica	coastal California gnatcatcher	SSC	FT	MSCP, MSP VF	-	L

MAMMALS

Scientific Name	Common Name	State Listing[1]	Federal Listing	Regional Plan[2]	Other[3]	Potential to Occur on ER[4]
Dipodomys stephensi	Stephens' kangaroo rat	ST	FE	-	-	U/L
Perognathus longimembris internationalis	Jacumba pocket mouse	SSC	Cat 2, U	-	-	U/0
Taxidea taxus	American badger	SSC	-	MSCP, MSP SL	-	M

BATS

Scientific Name	Common Name	State Listing[1]	Federal Listing	Regional Plan[2]	Other[3]	Potential to Occur on ER[4]
Eumops perotis californicus	California (western) mastiff bat	SSC	Cat 2, U	-	WBWG-H	U

[1] State rankings:

SE	State Endangered	**ST**	State Threatened	**SSC**	California Species of Special Concern
FP	Fully Protected	**WL**	Watch List	**CSE**	Candidate for State Endangered

Federal rankings:

FE	Federally Endangered	**FT**	Federally Threatened	**BEA**	Protected under the Bald Eagle Act
				BCC	Bird of Conservation Concern

Cat 2, D or 2, U Listing possibly warranted. (D= declining trend, U= trend unknown)

[2] Regional Plan:

MSCP	Multiple Species Conservation Plan	**NCP**	North County MSCP (proposed)
MHCP	Multiple Habitat Conservation Plan	**MSP**	Management and Monitoring Strategic Plan

MSPA Management and Monitoring Strategic Plan Area

MSP SL Species whose persistence in the MSPA is at high risk of loss without immediate management action above and beyond that of daily maintenance activities

MSP SO Species whose persistence of 1 or more significant occurrences in the MSPA is at high risk of loss without immediate management action above and beyond that of daily maintenance activities

MSP VF Species with limited distribution in the MSPA and/or having specific vegetation characteristics that need to be managed for persistence in the MSPA.

MSP VG Species with a wider distribution in the MSPA or that do not have specific vegetation characteristics that need to be managed.

[3] California Native Plant Society (CNPS) listing:

1B Plants rare, threatened, or endangered in California or elsewhere

1B.1 Seriously threatened, over 80% of occurrences are threatened, or have a high degree and immediacy of threat

1B.2 Moderately threatened, 20-80% of occurrences are threatened, or have a moderate degree of immediacy of threat

4 Plants of limited distribution, a watch list

4.2 Watch list plants are of a moderate level of limited distribution

4.3 Watch list plants are of a low level of limited distribution

WBWG – Western Bat Working Group sensitivity ranking:

H High **M** Medium **L** Low

E. Sensitive Wildlife Resources

The CNDDB Version 02/2018 (CDFW 2018) was queried to compile a list of possible special status wildlife and fish species present in the project area. A total of six special status wildlife species were identified within the San Pasqual and Rodriguez Mountain 1:24,000 quadrangles (Appendix C) and include three bats, two birds and one reptile. CDFW Environmental Scientists compared specific habitat requirements, life history notes, elevation, species distribution, and other species lists to determine if any other special status species may be present within the Reserve. This effort resulted in a list of 37 special status animal species for the Reserve (Table 4 above). An expanded discussion with species summary accounts are provided for those sensitive

or protected species with a known occurrence within the Reserve. Those sensitive wildlife species not detected on the Reserve, but with a high potential to occur within the Reserve (Table 5 above) are include in summary accounts below as well. Additionally, the Stephen's kangaroo rat, while never found on the Reserve, is included in the species accounts below because of its nearby occurrences, its listed status and local interest.

The following summarized species accounts were obtained from the California Wildlife Habitat Relationships System (CWHR) documents (Zeiner et al. 1990a, b, c) unless otherwise cited and include generalized habitat associations, food habits, cover, along with reproduction and reproduction requirements, seasonal movements, and general locations within the Reserve. All known occurrences for any special status wildlife species were obtained from the CNDDB RareFind database (Appendix C), from direct survey results, from the SDMMP MSP MOM database or from CDFW personnel. Generally, CNDDB element occurrences for birds are tracked as nesting or wintering.

Below are species account summaries of the species, listed alphabetically by scientific name:

Invertebrates

Thirty-five butterfly species were recorded on-site during the Merkel & Associates 2000 surveys, and none of them are considered sensitive. One sensitive butterfly was later documented and is known to occur on the Reserve, the Harbison's Dun Skipper.

Euphyes vestris harbisoni, Harbison's dun skipper:

The Harbison's dun skipper, *Euphyes vestris harbisoni*, has no federal or state listed status, is not covered under the MSCP, but is a covered species in the MHCP and, as such, is addressed in the MSP as a SL species. As an SL species, immediate management actions are recommended so that this species persists in the MSP Area.

The Harbison's dun skipper (*Euphyes vestris harbisoni*) is restricted to southern Orange County, extreme western Riverside County, and San Diego County (Brown and McGuire 1983, Marschalek and Deutschman 2016).

The larvae of this skipper feed only on San Diego sedge (*Carex spissa*) and are generally associated with riparian oak-dominated woodlands. The current list of known nectar sources includes 20 species.

The most common threats to the Harbison's dun skipper are those factors that most directly affect their larval food source; such as: the gold-spotted oak borer, drought, wildfire, and habitat alteration.

***Presence in the Reserve*:**
In 2013 surveys for the skipper at the Reserve reported 5-6 adult individuals being found. In both 2014 and 2016, only a single individual adult was located. Suitable habitat is present within the Reserve.

Vertebrates

Fishes

No listed or sensitive fish species are present in the Reserve.

Amphibians

Two sensitive amphibians are known to occur in the Reserve, the arroyo toad and the western spadefoot toad. The arroyo toad is a CDFW Species of Special Concern (SSC), is federal endangered, and is an MSCP-covered species. The western spadefoot toad is a CDFW SSC and is addressed in the MSP as a VF species. These two species are described below:

Anaxyrus (Bufo) californicus, Arroyo Toad:

The arroyo toad, Anaxyrus (Bufo) californicus, is a CDFW Species of Special Concern and since 1995 is a federal endangered species (Thomson, et al, 2016). It is covered under the MSCP and is an MSP SO species. MSP SO means that one or more significant occurrences are at risk without management actions beyond the normal.

Southwestern arroyo toad at Boden Canyon ER, CDFW file photo by Tim Hovey

Its elevational range extends up to 1950 m (6400 ft) (Jennings and Hayes, 1994). This species is found in semi-arid regions near washes or intermittent streams. Adults are active from March to July (Stebbins 1954, 1985, Behler and King 1979). Adults of this species feed on snails, Jerusalem crickets, beetles, ants, caterpillars, moths, and occasionally they cannibalize newly metamorphosed individuals.

Eggs are laid on the bottom of quiet parts of clear streams or shallow (Stebbins 1954, 1985). Breeding season is primarily from March to July, sometimes to September. Clear, standing water is required for egg deposition. Found in loose gravelly areas of streams in drier portions of its range. Adult toads are primarily nocturnal but may be diurnal during breeding

season. Newly metamorphosed toads are active during the daylight hours and can tolerate much higher temperatures than can adults (Mayhew 1968).

***Presence in the Reserve*:**
Arroyo toads have been documented in Boden Canyon since 1999 (Zimmitti and Mahrdt, 1999) and continue to be found in annual or semi-annual surveys by CDFW staff. The majority of arroyo toads found were documented off the Reserve, however, still in Boden Canyon. The Reserve is not included in the Federal designation of Critical Habitat for Arroyo Toads.

***Spea hammondii*, western spadefoot toad**:

The western spadefoot toad, *Spea hammondii*, is a CDFW Species of Special Concern and while not covered under the MSCP, is a MSP VF species. This means that it is a vegetation management focus group species and has either limited distribution within the MSPA or has vegetation characteristics that need specific management actions for this species to persist within the MSPA.

The western spadefoot is found throughout the Central Valley and in the Coast at elevations ranging from near sea level to 1363 m (4460 ft) in the southern Sierra foothills (Jennings and Hayes 1994). This species occurs primarily in grasslands, but occasional populations also occur in valley-foothill hardwood woodlands. Adults take insects worms, and other invertebrates (Stebbins 1972). They are rarely found on the surface as most of the year is spent in underground burrows up to 0.9 m (36 in) deep (Stebbins 1972).

Breeding and egg laying occur almost exclusively in shallow, temporary pools formed by heavy winter rains. Egg masses containing 10 to 42 eggs are attached to plant material, or the upper surfaces of small submerged rocks (Stebbins 1951) and normally hatch within two weeks. Breeding and egg laying normally occur from late winter to the end of March. Chorusing males may generally be heard during this period.

Presence in the Reserve:
Western spadefoot toads were observed within the Reserve by CDFW staff (CDFW files, 2005). Habitat exists for the western spadefoot in most wet areas of the Reserve.

Reptiles

Six sensitive reptiles are known to occur on the Reserve, five are CDFW Species of Special Concern, two are MSCP-covered species and two additional reptiles are addressed in the MSP Roadmap. Three other sensitive reptile species have not been documented on the Reserve, however, they have the potential to occur. These nine reptiles are described below:

***Aspidoscelis hyperythra beldingi*, Belding's orange-throated whiptail**:

The Belding's orange-throated whiptail, *Aspidoscelis hyperythra beldingi*, is on the CDFW Watch List, is a federal Category 2, D species, meaning that it is possibly appropriate to list but that information is inconclusive, and that it's trend is "Declining". It is also a MSCP covered species and a MSP VG species, meaning that because it has a wide distribution within the MSP Area no specific vegetation management actions are recommended.

The orange-throated whiptail is uncommon to fairly common over much of its range in Orange, Riverside, and San Diego counties west of the crest of the Peninsular Ranges, especially in areas with summer morning fog. Also occurs in southwestern San Bernardino County near Colton. In California its elevational range extends from near sea level to 1040 m (3410 ft) (Jennings and Hayes 1994). This species inhabits low-elevation coastal scrub, chamise-redshank chaparral, mixed chaparral, and valley-foothill hardwood habitats. It forages actively on the surface and scratches through surface debris. Takes a variety of small arthropods (Stebbins 1972), especially termites, which are taken in large numbers when available. Individuals take cover in dense vegetation when pursued.

Little information on habitat requirements for breeding and egg-laying. Eggs are probably deposited in loose, well-aerated soil under or near surface objects, or at the base of dense shrubs. Breeding activities begin in April and egg laying continues to mid-July. Hatchlings emerge in August and early September. The mean clutch size is small (2.3 eggs/clutch), but individuals mature rapidly and females may produce more than one clutch per year.

Presence in the Reserve:
The orange-throated whiptail is common throughout the Reserve. It was also documented in 2020 by SDNHM under the WCB Grant mentioned previously in this document.

***Aspidoscelis tigris stejnegeri*, coastal (western) whiptail**:

The coastal whiptail, or western whiptail, *Aspidoscelis tigris stejnegeri*, is a CDFW Species of Special Concern, and a federal Category 2, D species, meaning that it is possibly appropriate to list but that information is inconclusive, and that it's trend is "Declining".

This whiptail is widely distributed but uncommon over much of its range in California, except in desert regions where it is abundant in suitable habitats. The species occurs in a variety of habitats including valley-foothill hardwood, valley-foothill hardwood-conifer, valley-foothill riparian, mixed conifer, pine-juniper, chamise-redshank chaparral, mixed chaparral, desert scrub, desert wash, alkali scrub, and annual grassland.

Whiptails forage actively on the ground near the base of vegetation taking a wide variety of ground-dwelling invertebrates including grasshoppers, beetles, ants, termites, insect larvae, and spiders (Stebbins 1954). Whiptails occasionally appear to stalk larger prey items such as grasshoppers. Loose soil for foraging and nest construction may be an important habitat element. Reproductive behavior generally occurs from May to August.

Presence in the Reserve:
Coastal whiptails were observed in the Reserve in 2000 by M&A and captured in herp arrays

by CDFW staff in 2001-02. This species is expected to be common throughout Boden Canyon (Merkel and Associates, 2002).

Northern Red Diamond Rattlesnake:

The northern red-diamond rattlesnake, *Crotalus ruber ruber*, (aka *Crotalus exsul*), is a CDFW Species of Special Concern, a federal Category 2, U species, meaning that it is possibly appropriate to list but that information is inconclusive, and that its trend is "Unknown". While not covered in the MSCP, it is a MSP VG species, meaning that because it has a wide distribution within the MSP Area no specific vegetation management actions are recommended.

The red diamond rattlesnake is distributed throughout portions of San Diego, Riverside and San Bernardino counties. It occurs from sea level to 900 m (3000 ft) in chaparral, woodland, and arid desert habitats in rocky areas and dense vegetation.

This snake feeds on rabbits, rodents, lizards, birds and other snakes (Stebbins 1954). The young, usually 5-13 individuals, are live-born and thus require a quiet and safe place for birth, probably in burrows or under substantial cover objects such as large rocks (Stebbins 1954). This snake is active from spring to fall, but the period of greatest activity is from March to June. Kingsnakes, roadrunners, and possibly owls likely prey upon this rattlesnake.

***Presence in the Reserve*:**
Red diamond rattlesnakes were observed in the Boden Canyon in 1994 by Lettieri-McIntyre, however, were not observed by Merkel and Associates or by CDFW during their field surveys. It was also documented in 2020 by SDNHM under the WCB Grant mentioned previously in this document.

***Phrynosoma blainvillii*, coast horned lizard**

Coast horned lizard, CDFW file photo

The coast horned lizard (also called San Diego horned lizard, or Blainville's horned lizard) *Phrynosoma blainvillii*, is a CDFW Species of Special Concern, is a federal Category 2, D species which means that it is possibly appropriate to list but that information is inconclusive, and that it's trend is "Declining". The coast horned lizard is also an MSCP covered species and is in Vegetation Management Focus Group VG due to its wide distribution within the MSP Area. No specific vegetation management actions are recommended.

The horned lizard is uncommon to common in suitable habitat such as: valley-foothill hardwood, conifer, riparian, pine-cypress, juniper, and annual grassland habitats. They occur in the Sierra Nevada foothills and throughout the central and southern California coast. Its elevational range extends up to 1200 m (4000 ft) in the Sierra Nevada foothills and up to 1800 m (6000 ft) in the mountains of southern California.

Horned lizards forage on the ground in open areas, usually between shrubs and often near ant nests. Pianka and Parker (1975) noted that this species, like other horned lizards, consumes many ants. Stebbins (1954) reported other insects as food items, including wasps, grasshoppers, flies, small beetles and caterpillars. This species relies on camouflage for protection and often hesitates to move at the approach of a predator. Horned lizards often bask in the early morning on the ground or on elevated objects such as low boulders or rocks. Predators and extreme heat are avoided by horned lizards by burrowing into loose soil.

Pianka and Parker (1975) reported that egg-laying in southern California extends from late May through June with a mean clutch size of 13 eggs held within nests constructed in loose soil.

***Presence in the Reserve*:**
The horned lizard was reported by Lettieri-McIntyre in 1994 and was in the 2000 M&A report. Horned lizards were captured in the Reserve in herpetile arrays by CDFW staff in 2001-02. It was also documented in 2020 by SDNHM under the WCB Grant mentioned previously in this document. It is expected to be common throughout Boden Canyon.

***Salvadora hexalepis*, coast patch-nosed snake:**

The coast patch-nosed snake, *Salvadora hexalepis*, is a CDFW Species of Special Concern and a federal Category 2, U species, meaning that it is possibly appropriate to list but that information is inconclusive, and that its trend is "Unknown".

The coast, or western, patch-nosed snake is found in coastal chaparral, desert scrub, washes, sandy flats and rocky areas in areas that can reach up to 2120 meters (7000 feet) in elevation. It seems to be more common in coastal areas than desert but there is little information on abundance (Bogert 1939, 1945, Stebbins 1954).

This snake seems to be an opportunistic feeder, reportedly consuming lizards, small mammals, and the eggs of lizards and snakes. It probably eats anything it can overpower

(Stebbins 1954). This is an active, diurnal snake, able to thrive in most environments, making use of whatever cover is available (Stebbins 1954). Mating probably takes place from April to June. Clutches average 5 to 6 eggs. Gravid females have been found from May to August (Fitch 1970).

The western patch-nosed snake is probably preyed upon by raptors, roadrunners, most diurnal mammalian carnivores, kingsnakes and other snake predators, but no records of predation are known. This species is widely distributed and poorly known.

Presence in the Reserve:
The coast patch-nosed snake was observed in Boden Canyon by Merkel and Associates (2001) and as well was documented in the Reserve by CDFW staff (CDFW, Comrack, et al. 2003).

***Thamnophis hammondii*, two-striped gartersnake:**

The Two-striped gartersnake, *Thamnophis hammondii*, is a CDFW Species of Special Concern and a federal Category 2, U species, meaning that it is possibly appropriate to list but that information is inconclusive, and that its trend is "Unknown". While not covered in the MSCP, it is a MSP VG species, meaning that because it has a wide distribution within the MSP Area no specific vegetation management actions are recommended.

Two-striped Gartersnake at Boden Canyon ER, CDFW file photo by John Ekhoff

Historically common, it is associated with permanent or semi-permanent bodies of water in a variety of habitats from sea level to 2,400 m (8,000 ft). It is now gone from about 40% of its historical range (Jennings and Hayes 1994).

The two-striped gartersnake is now common only in eastern San Diego County (Jennings and Hayes 1994). Populations have been affected by the elimination of natural sloughs and

marshy areas, loss of riparian habitat through agricultural practices and urban development, predation by introduced bullfrogs, fishes, and feral pigs, and loss of amphibian prey (Jennings and Hayes 1994).

Presence in the Reserve:
The two-striped gartersnake was documented in Boden Canyon by Lettieri-McIntyre in 1994, by Merkel and Associates in 2000-02, and within the Reserve by CDFW staff in 2001-02 (CDFW, Comrack, et al. 2003). It was also documented in 2020 by SDNHM under the WCB Grant mentioned previously in this document.

Sensitive reptiles not documented on site but with the potential to occur:

***Anniella pulchra,* California legless lizard:**

The California legless lizard, *Anniella pulchra*, is a CDFW Priority 2 Species of Special Concern. CDFW's Amphibian and Reptile Species of Special Concern (Thompson, et al. CDFW, 2016) currently treats all California animals in *A. pulchra* as a single species, however taxonomic changes were recommended in 2013 (Papenfuss and Parham, 2013) and separated the five glades into five distinct species. This recommendation would rename *A. pulchra* to *A. stebbinsi* (Southern California legless lizard).

Most of the range of *A. pulchra* occurs in California, from Contra Costa County south through the Coast Ranges, and into northern Baja California (Hunt 1983, Jennings and Hayes 1994). Although most commonly found within 100 km of the coast, *A. pulchra* ranges in elevation from sea level to about 1800 m (Hunt 1983).

Anniella pulchra is a medium-sized (11.1 – 17.8 cm SVL), elongate, legless lizard that is snakelike in body form and possessing several characteristics that are related to an underground burrowing lifestyle. The dorsal coloration is generally metallic light silver or golden with a black mid-dorsal line down the length of the body and black lateral stripes. Ventral coloration is typically lemon yellow.

This species is unlikely to be confused with other lizard species in California because it is our only legless lizard. Though *A. pulchra* bears a superficial resemblance to some snake species, the presence of moveable eyelids effectively distinguishes it.

Breeding occurs between early spring and July in these live-bearing lizards with 1 – 4 young born in a litter. *Anniella pulchra* is rarely seen active on the surface, but they do use the soil/litter interface for feeding and mating (Miller 1944). Coastal and southern populations are likely active year-round. (Banta and Morafka 1968, Zeiner et al. 1988). *Anniella pulchra* is a generalist sit-and-wait insectivore (Coe and Kunkel 1906, Miller 1944) that eats larval insects (e.g., microlepidopterans and beetles), adult beetles, termites, and spiders (L. Hunt pers. comm. in Jennings and Hayes 1994).

Presence in the Reserve:
The California legless lizard (AKA silvery legless lizard) has not been documented on the Reserve, however habitat exists and there is a potential for this species to occur.

***Coleonyx variegatus abbotti*, San Diego banded gecko:**

The San Diego banded gecko, *Coleonyx variegatus abbotti*, is a CDFW Species of Special Concern, and a federal Category 2, U, meaning that it is possibly appropriate to list but that information is inconclusive, and that its trend is "Unknown".

The San Diego banded gecko occurs in coastal and cismontane southern California from interior Ventura Co. south, although it is absent from the extreme outer coast. It is uncommon in coastal scrub and chaparral, most often occurring in granite or rocky outcrops in these habitats (Klauber 1945, Stebbins 1972).

Banded geckos are opportunistic foragers on insects and other arthropods including beetles, termites, spiders, grasshoppers, sowbugs, and insect larvae (Klauber 1945, Pianka and Parker, 1975). Banded geckos hibernate in burrows (Parker 1972). Eggs are probably buried in ground or under rocks (Mayhew 1968). Water is obtained from food (Miller and Stebbins 1964).

Presence in the Reserve:
San Diego banded gecko has not been documented on the Reserve, however habitat exists and there is a potential for this species to occur.

***Emys marmorata pallida*, southern western pond turtle:**

The southern western pond turtle, *Emys marmorata pallida*, is a CDFW Species of Special Concern, a federal Category 2, U species (meaning that it is possibly appropriate to list but that information is inconclusive, and that its trend is "Unknown"), is an MSCP covered species and is an MSP SL species. An MSP Species Focus Group SL species means it is a species whose persistence in the MSPA is at high risk of loss without immediate management action above and beyond that of daily maintenance activities. See Section IV.C.2.b. for proposed management activities to benefit this species.

The pond turtle is uncommon to common in suitable aquatic habitat throughout California, west of the Sierra-Cascade crest and absent from desert regions, except in the Mojave Desert along the Mojave River and its tributaries. Elevation range extends from near sea level to 1430 m (4690 ft) (Jennings and Hayes 1994). It is associated with permanent or nearly permanent water in a wide variety of habitat types. Aquatic plant material, including pond lilies, beetles and a variety of aquatic invertebrates as well as fishes, frogs, and even carrion have been reported among their food (Stebbins 1972, Nussbaum et al. 1983).

Pond turtles require basking sites such as partially submerged logs, rocks, mats of floating vegetation, or open mud banks. Individuals are active all year where climates are warm but in colder areas, hibernation occurs underwater in the mud on the bottom of ponds. Nesting occurs from March to August depending on local conditions. Three to eleven eggs are laid in soil that is at least 10 cm (4 inches) deep. Hatchlings may be subject to rapid death by desiccation if exposed to hot, dry conditions and are preyed upon by a variety of vertebrate predators including certain fishes, bullfrogs, garter snakes, wading birds, and some mammals. During the spring or early summer, females move overland for up to 100 m (325

ft) to find suitable sites for egg-laying. Other long-distance movements may be in response to drying of local bodies of water or other factors.

This is the only abundant native turtle in California.

Presence in the Reserve:
Unconfirmed sighting within the Reserve in the past, unknown if suitable habitat exists currently. The Reserve may be a potential release site in the future, if habitat suitability is confirmed and consistent.

Birds

Eighteen sensitive bird species have been documented on the Reserve, including one endangered (CE, FE), one state Threatened, two state Fully Protected, and seven CDFW Species of Special Concern. Nine are MSCP-covered species and four additional species, while not covered in the MSCP, are MSP Roadmap species. There is one sensitive bird species that has not been documented on the Reserve and has a low potential to occur.

Accipiter cooperii, Cooper's hawk:

The Cooper's hawk, Accipiter cooperii, is a CDFW Species of Special Concern and is covered under the MSCP. It is an MSP VG species, meaning that it has a wide distribution within the MSP Area and that no specific vegetation management actions are recommended.

This species is a breeding resident throughout most of the wooded portion of the state. Breeds in southern Sierra Nevada foothills and other local areas in southern California. Ranges from sea level to above 2700 m (0-9000 ft). Dense stands of live oak, riparian deciduous or other forest habitats near water used most frequently.

These hawks are avid predators of small birds, especially young during nesting season, and small mammals; also takes reptiles and amphibians. Nesting and foraging usually occur near open water or riparian vegetation. They breed from March through August, producing a single brood consisting of a clutch varying in size from 2-6 eggs.

Presence in the Reserve:
There are known occurrences of Cooper's hawks foraging within the Reserve, with potential breeding and foraging habitat present.

***Agelaius tricolor,* tricolored blackbird:**

The tricolored blackbird, *Agelaius tricolor*, effective March 18, 2019, was listed as a Threatened species by the state. The tricolored blackbird is a federal Bird of Conservation Concern and a federal Category 2, D species, which means that it is possibly appropriate to list under ESA but that information is inconclusive, and that its trend is "Declining". It is also a MSCP covered species and an MSP Species Focus Group SL species, meaning it is a species whose persistence in the MSPA is at high risk of loss without immediate management action above and beyond that of daily maintenance and management activities.

This species is common locally throughout the Central Valley and in coastal districts from Sonoma County south. Breeding occurs in northeastern California near fresh water, preferably in emergent wetland with tall, dense cattails or tules, but also in thickets of willow, blackberry, wild rose, and tall herbs. They feed in grassland and cropland habitats.

It feeds on animal matter, mostly insects and spiders, seeds and cultivated grains, such as rice and oats. Individuals forage on the ground in croplands, grassy fields, flooded land, and along edges of ponds.

The usual breeding season is mid-April into late July. Nests are usually built in dense vegetation (cattails or tules; also nests in thickets of willow, blackberry, wild rose, tall herbs). The species is colonial; nesting areas must be large enough to support a minimum colony of about 50 pairs (Grinnell and Miller 1944). Nests may be located up to 6.4 km (4 mi) from foraging areas. A colony varies in size from a minimum of about 50 nests (Grinnell and Miller 1944) to over 20,000 in an area of 4 ha (10 ac), or less (DeHaven et al. 1975).

Tricolored blackbird, CDFW file photo

Presence in the Reserve:
Tricolored blackbirds were detected during breeding during surveys in 2000 at the central pond (M&A, 2001) and again were documented breeding in 2001 by CDFW staff. CDFW reports that a colony of about 100 individuals were present on the west side of the pond in dense cattails. The pond dried up following fire suppression activities that summer (August 2001) and without standing water or suitable cattail habitat present in 2002 no tricolored blackbirds returned. Two individuals were seen in 2003. None were seen in 2004 (CDFW files). Tricolored blackbirds have not been observed in the Reserve since 2004.

***Aimophila ruficeps*, Southern California rufous-crowned sparrow:**

The southern California rufous-crowned sparrow, *Aimophila ruficeps*, is on the CDFW Watch List, is a federal Candidate 2, D, meaning that it is possibly appropriate to list but that information is inconclusive, and that it's trend is "Declining". It is covered under the MSCP and is a MSP VG species, meaning that it is in Vegetation Management Focus Group VG because it has a wide distribution within the MSP Area and no specific vegetation management actions are recommended.

This sparrow is a common resident of sparse, mixed chaparral and coastal scrub habitats (especially coastal sage) from Mendocino and Tehama counties south to the Mexican border. Frequents relatively steep, often rocky hillsides with grass and forb patches; also grassy slopes without shrubs, if rock outcrops are present.

It breeds and feeds on steep, dry, herbage-covered hillsides with scattered shrubs and rock outcrops. Diet consists of seeds and insects. Breeds from mid-March to mid-June with a peak in May, clutch size 2-5 eggs, usually 3 or 4. Eggs and nestlings preyed upon by snakes and small mammals. Zeiner et al. in CWHR stated Friedmann recorded the first cowbird parasitism in this species.

Presence in the Reserve:
There are known occurrences of southern California rufous-crowned sparrow within the Reserve and suitable breeding and foraging habitat exists.

***Ammodramus savannarum*, grasshopper sparrow:**

The grasshopper sparrow, *Ammodramus savannarum*, is a CDFW Species of Special Concern. While not covered in the MSCP, it is a MSP VF species. This means that it is has either limited distribution within the MSPA or has vegetation characteristics that need specific management actions for this species to persist within the MSPA. It is an uncommon, localized summer resident and a very rare winter visitor. The species occurs in areas of tall grass, often mixed with a few shrubs typical of coastal sage scrub, such as flat-topped buckwheat (*Eriogonum fasciculatum*). Localities of the bird are scattered throughout the inland valleys of the coastal lowland.

Diet of the grasshopper sparrow includes invertebrates, grass, and forb seeds. The extent of suitable grasshopper sparrow habitat in San Diego County is diminishing rapidly with urban development of the coastal lowland (Unitt 1984).

Presence in the Reserve:
There are known occurrences of grasshopper sparrow within the Reserve, as reported by the Palomar Audubon Society in May of 1997 to M&A by Barber and Mahrdt (M&A, 2000).

***Aquila chrysaetos*, golden eagle:**

The golden eagle, *Aquila chrysaetos*, is a California Species of Special Concern, is State Fully Protected (designated in 1957, Fish and Game Code Section 3511), is protected under the federal Bald Eagle Protection Act, and is a federal Bird of Conservation Concern. It is also a covered species in the MSCP and is a MSP SO species, meaning that one or more significant occurrences are at risk without management actions beyond the normal. Generally, occurrences for birds are tracked as nesting or wintering and not as an incidental sighting.

This raptor is a year-round resident in southern California and can be found from sea level to 11,500 feet in rolling foothills, open mountain slopes with cliffs and rocks, sage-juniper flats, and desert vegetation communities. Diet consists primarily of lagomorphs (rabbits) and rodents, but the species also preys on other mammals, birds, reptiles, and carrion. The golden eagle nests on cliffs and in large trees.

Breeding occurs from late January to August. Clutch size is one to three. Eggs are incubated for 43 to 45 days. The golden eagle may abandon its nest in early incubation if disturbed by humans.

Presence in the Reserve:
There is at least one known occurrence of golden eagle foraging within the Reserve; however, no documented breeding/nesting has occurred within the Reserve. A juvenile golden eagle was observed on a hill overlooking a recently burned area in August of 2001. Suitable foraging and potential breeding habitat is present in the Reserve.

***Artemisiospiza belli*, Bell's sage sparrow:**

The Bell's sage sparrow, *Artemisiospiza belli*, is on the CDFW Watch List, is a federal Bird of Conservation Concern, and is a federal Category 2, D species, meaning that listing is possibly appropriate but information is inconclusive, and the trend is "Declining". While not covered in the MSCP, it is an MSP VF species. This means that it is in Species Management Focus Group for Vegetation VF and that this species has either limited distribution within the MSPA or has vegetation characteristics that need specific management actions for this species to persist within the MSPA.

This species is a common to uncommon resident and summer visitor in California. In summer, uncommon to common east of Cascade Range and Sierra Nevada, in foothills bounding Central Valley, and in the Transverse, Peninsular, and coastal ranges from Trinity County south to Mexican border. Occurs only locally at montane elevations, mostly in southern California.

It feeds mostly on insects, spiders, and seeds while breeding, and mostly on seeds in winter; also takes green foliage. Depending on locality, frequents *Artemisia, Atriplex, Purshia, Adenostoma*. Uses more arid, open shrub habitats in winter. Breeds from late March to mid-August with a peak in May and June.

Presence in the Reserve:
There are known occurrences of Bell's sage sparrow within the Reserve and suitable habitat exists.

***Branta canadensis*, Canada goose:**

The Canada goose, *Branta canadensis*, is not listed nor is it a species of concern for either the state or federal government. It is a game species widely hunted across the U.S. however, it is an MSCP covered species. It is not a species included in the MSP. It was included as an MSCP species because it utilizes a variety of wetland and grassland habitats that are in decline throughout San Diego County and they are important habitats to conserve regionally.

The Canada goose is a widespread migrant and common winter resident throughout United States and Canada. Preferred habitats include lacustrine, fresh emergent wetlands, and moist grasslands, croplands, pastures, and meadows.

Canada geese feed mainly on green shoots and seeds of cultivated grains and wild grasses and forbs, by grazing and gleaning in moist fields. Also feeds on aquatic plants, sometimes by tipping. Regularly seeks grit. Typically roosts on open water of lakes or ponds. In winter, prefers to feed in fields near safe roosting areas on open water of lakes and ponds.

Presence in the Reserve:
On one occasion, Canada geese were observed at the central pond in the Reserve and flying over the Reserve. Boden Canyon is not considered an essential area or resource to this MSCP species (M&A, 2001). Absent water in the central pond and suitable habitat for them, Canada geese are not expected to frequent the Reserve. The closest reservoirs with suitable habitat for Canada geese and their distances from the center part of the Reserve include Lake Wohlford (6.7 miles), Lake Sutherland (7 miles), Lake Henshaw (11.5 miles) and Lake Hodges (11.5 miles).

***Buteo regalis*, ferruginous hawk:**

The ferruginous hawk, *Buteo regalis*, is on the CDFW Watch List, is a federal Bird of Conservation Concern and a federal Category 2, D species, meaning that listing is possibly appropriate, but information is inconclusive, and the trend is "Declining". It is an MSCP covered species and is an MSP VG species. This means that no specific vegetation management actions are recommended.

This species is an uncommon winter resident and migrant at lower elevations and open grasslands in the Modoc Plateau, Central Valley, and Coast Ranges of California. It is a fairly common winter resident of grasslands and agricultural areas in southwestern California (Garrett and Dunn 1981). It forages for prey from low flights over open, treeless areas, and glides to intercept prey on the ground. Also hovers, and hunts from high mound perches. Mostly eats lagomorphs, ground squirrels, and mice; also takes birds, reptiles, and amphibians. No breeding records from California. This species generally arrives in California in September and departs by mid-April. Breeds from Oregon into Canada. Urban development may contribute to loss of suitable wintering habitat in California.

Presence in the *Reserve:*
There are known occurrences of ferruginous hawks foraging within the Reserve.

***Chaetura vauxi*, Vaux's swift:**

Vaux's swift, *Chaetura vauxi*, is a CDFW Species of Special Concern.

It has a breeding range mostly in northern California, generally following the coast redwood zone from the Oregon-California border south to Santa Cruz. The southern limit of confirmed breeding is Sequoia National Park, again associated with old growth redwoods. It occurs primarily as a migrant and summer resident from mid-April to mid-October, and breeds May to mid-August. It occurs rarely and irregularly in winter in southern California. These swifts nest in cavities in a variety of trees and less frequently in artificial structures, particularly chimneys.

Very little to no information on this species utilizing southern California except as a rare visitor.

Presence in the Reserve:
One documented sighting of Vaux's swift occurred by CDFW staff in 2001-02 (CDFW files, Comrack, et al. 2003).

***Circus cyaneus*, northern harrier:**

The northern harrier, *Circus cyaneus*, is a CDFW Species of Special Concern and is covered under the MSCP. It is an MSP SO species, meaning that one or more significant occurrences are at risk without management actions beyond the normal. Generally, CNDDB occurrences for birds are tracked as nesting or wintering rather than incidental sightings.

This species occurs in annual grasslands, lodgepole pine, and alpine meadow habitats up to elevations of 10,000 feet. Mostly found in flat open areas of tall dense grasses, moist or dry shrubs, and open edges where suitable habitat is available. Breeding habitat is much reduced due to loss of wetlands, native grasslands, moist meadows, and burning and plowing of breeding areas.

Diet consists primarily of small mammals, but birds, frogs, small reptiles, insects, and occasionally, fish are also eaten. This species roosts and nests on the ground, using tall grasses and forbs for cover. Breeding occurs from April to September. Clutch size ranges from four to nine with an average of five eggs.

Presence in the Reserve:
There are known occurrences of northern harrier foraging within the Reserve, with potential breeding and foraging habitat also present.

***Contopus cooperi*, olive-sided flycatcher:**

The olive-sided flycatcher, *Contopus cooperi*, is a CDFW Species of Special Concern, is a federal Bird of Conservation Concern, and is a federal Category 2, D Species. This means that listing is possibly appropriate but information is inconclusive, and the trend is "Declining".

It occurs in a wide variety of forest and woodland habitats at elevations above 9,000 feet throughout California. The species is associated with edges and openings usually preferring tall trees from which to perch.

Diet consists of insects and bees that are foraged using high, conspicuous perches overlooking adjacent shrub-covered slopes, meadows, and clearings. Breeding occurs from early June to early July, with a clutch size of three to six (average four to five eggs). Predators include small mammals, accipiters, corvids, and snakes. Cowbird parasitism is common.

Presence in the Reserve:
There are known occurrences of olive-sided flycatcher, along with suitable breeding and foraging habitat, within the Reserve.

***Dendroica (Setophaga) petechial brewsteri*, yellow warbler:**

The Yellow warbler, *Dendroica (Setophaga) petechial brewsteri*, is a CDFW Species of Special Concern and a federal Bird of Conservation Concern.

It is associated with riparian woodlands dominated by willows, cottonwoods, sycamores, alders, mature chaparral, or shrubbery in open coniferous forests. The species frequent medium density woodlands and forest with a heavy brush understory. Populations have been reduced due to habitat loss.

Diet consists of insects and spiders, which are primarily gleaned from the upper canopy. Yellow warblers occasionally eat berries or hawk insects in flight. Breeds from April through early August, with a clutch size of three to six (average four to five eggs). Predators include small mammals, accipiters, corvids, and snakes. Cowbird parasitism is common.

Presence in the Reserve:
There are known occurrences of yellow warbler along riparian areas within the Reserve. Breeding and foraging habitats are also present.

***Elanus leucurus*, white-tailed kite:**

The white-tailed kite, *Elanus leucurus*, is a CDFW Fully Protected species (designated in 1957, Fish and Game Code Section 3511).

It is typically associated with open stages of most habitats, primarily in cismontane California. The birds are residents throughout most of their breeding range and prefer agricultural areas due to prey abundance.

Diet consists of small mammals. White-tailed kites nest in dense tree stands usually 20 feet to 100 feet above ground. Breeding occurs from February to October, with a peak period in March and April, producing clutch sizes ranging from three to six.

Great horned owls may prey on adults and young.

Presence in the Reserve:
There are known occurrences of white-tailed kites, along with suitable breeding and foraging habitat, within the Reserve.

***Icteria virens*, yellow-breasted chat:**

The yellow-breasted chat, *Icteria virens*, is a CDFW Species of Special Concern, and while not covered in the MSCP, is an MSP VF (riparian) species. This means that it is has either limited distribution within the MSPA or has vegetation characteristics that need specific management actions for this species to persist within the MSPA.

The species is associated with brushy dense thickets near water in riparian woodlands. Populations have declined in California primarily due to loss of riparian habitat and cowbird parasitism.

Diet consists primarily of insects and spiders gleaned from the foliage of shrubs and low trees.

Breeding occurs from early May to early August. Nests containing three to six eggs are found 2 feet to 8 feet above ground in dense shrubs along a stream or river.

Presence in Reserve:
There are known occurrences of yellow-breasted chat along riparian areas within the Reserve. Breeding and foraging habitat is also present on-site. This species was observed in 2020 by the SDNHM during surveys conducted through the WCB Grant mentioned elsewhere in this document.

***Lanius ludovicianus*, loggerhead shrike:**

The loggerhead shrike, *Lanius ludovicianus*, is a CDFW Species of Special Concern and a federal Bird of Conservation Concern.

It frequents open habitats with sparse shrubs and trees, other suitable perches, bare ground, and low or sparse herbaceous cover. In San Diego County, this species is associated with grassland or open habitats with bare ground and sparse shrub and/or tree cover for nesting and perching.

Diet consists mostly of large insects, but loggerhead shrikes will also take small birds, mammals, amphibians, reptiles, and other invertebrates. The birds frequently skewer prey on-thorns, sharp twigs, barbed wire, or forces the prey into a tree crotch to feed on or cache for later feeding. They breed from March through May, with a clutch size of four to eight eggs.

Presence in the Reserve:
There are known occurrences of loggerhead shrike, along with breeding and foraging habitat, within the Reserve.

***Pandion haliaetus*, osprey:**

The osprey, *Pandion haliaetus*, is on the CDFW Watch List and, while not an MSCP species, is an MSP VG species, meaning that it has a wide distribution within the MSP Area and that no specific vegetation management actions are recommended.

Ospreys are an uncommon breeder along the southern Colorado River, and an uncommon winter visitor along the coast of southern California (Garrett and Dunn 1981). Associated strictly with large, fish-bearing waters, primarily in ponderosa pine through mixed conifer habitats.

Preys mostly on fish; also takes a few mammals, birds, reptiles, amphibians, and invertebrates. Requires open, clear waters for foraging. Nests on platform of sticks at the top of large snags, dead-topped trees, on cliffs, or on human made structures. Nest usually within 400 m (1312 ft) of fish-producing water, but may nest up to 1.6 km (1 mi) from water.

Presence in the Reserve:
There are known occurrences of osprey foraging within the Reserve, at times when open water and prey fish occur in the central pond. Absent water and fish in the central pond and suitable habitat for them, osprey are not expected to frequent the Reserve. The closest reservoirs with foraging opportunities for osprey and their distances from the central part of the Reserve are Lake Wohlford (6.7 miles), Sutherland (7 miles), Lake Henshaw (11.5 miles) and Lake Hodges (11.5 miles).

***Sialia Mexicana*, western bluebird:**

The western bluebird, *Sialia mexicana*, is an MSCP covered species and is an MSP VG species, which means that it has a wide distribution within the MSP Area and that no specific vegetation management actions are recommended.

It is a common year-round resident throughout much of California, excluding the higher mountains and eastern deserts. Breeds in open woodlands of oaks, riparian deciduous trees, or conifers with herbaceous understory. Primarily eats insects, including grasshoppers, caterpillars, beetles, and ants; also eats earthworms, snails, and other small arthropods. In nonbreeding season, supplements diet with berries of mistletoe, poison-oak, elderberry, and other species. Presence of mistletoe berries may govern local occurrence in winter (Grinnell and Miller 1944).

It usually nests in old woodpecker holes in snag, tree, or stump; also uses other cavity or nest box. Occasionally uses nest of cliff swallow or other species. Breeds from April into July. Clutch size 3-8, average 5.

Presence in the Reserve:
There are known occurrences of western bluebirds, along with breeding and foraging habitat, within the Reserve.

***Vireo bellii pusillus*, least Bell's vireo:**

The least Bell's vireo, *Vireo bellii pusillus*, is both federally listed (6/2/1986) and state listed (10/2/1980) as endangered and is covered in the MSCP. It is an MSP SO species, meaning that one or more significant occurrences are at risk without management actions beyond the normal.

The vireo is an uncommon and much localized summer resident, and a very rare migrant and winter visitor in San Diego County. The species was formerly common or even abundant locally under favorable habitat conditions. The least Bell's vireo is restricted in its breeding range to primarily dense riparian vegetation, such as southern willow scrub that is dominated by willows, with a lush understory of vegetation generally found within the coastal lowlands. Vireos prefer low, riparian habitat either in the vicinity of water or along dry river bottoms. The majority of the species' activity occurs within 3.28 feet to 9.84 feet off the ground, in the fairly open canopy below the foliage of willow and cottonwoods. Diet consists of a variety of insects gleaned from leaves and branches.

Vireos breed in riparian areas in southern California and northwestern Baja California, Mexico. Peak egg laying occurs from May to early June, with an average clutch size of four eggs (range three to five).

Nests are known to be heavily parasitized by cowbirds.

Presence in the Reserve:
Least Bell's vireos were detected during surveys in 2000 in riparian habitats within Boden Canyon (M&A, 2001). In 2017, CDFW staff conducted three presence/absence surveys along Santa Ysabel Creek within the Reserve and did not detect any least Bell's vireo. However, breeding and foraging habitat does exist in areas with riparian habitat in the Reserve. The Reserve is not included in the Federal designation of Critical Habitat for least Bell's vireo.

Sensitive bird species not documented on the Reserve but with potential to occur on site

***Polioptila californica californica*, coastal California gnatcatcher:**

The coastal California gnatcatcher, *Polioptila californica californica*, is a federal threatened species (3/30/1993) and a CDFW Species of Special Concern. It is an MSCP covered species and a MSP VF species. This means that it is has either limited distribution within the MSPA or has vegetation characteristics that need specific management actions in order for this species to persist within the MSPA.

The California gnatcatcher and the black-tailed gnatcatcher (*P. melanura*) were elevated from subspecies to the specific level (Atwood 1993, American Ornithologists' Union 1989). Each is distinct in plumage, voice, habitat preference, and abundance. *P. c. californica* is a local, uncommon, obligate resident of arid coastal scrub below about 500 m (1,500 ft) from eastern Orange and southwestern Riverside cos. South through the coastal foothills of San Diego Co; along the immediate coast at Palos Verdes Peninsula, Los Angeles Co.; at Camp Pendleton and in Tijuana River Valley, San Diego Co.

It gleans insects and spiders from foliage of shrubs, especially California buckwheat and coastal sage (Atwood 1993) and is also a seed eater. Shrubs provide roosting, nesting, and other cover. *P. c. californica* is most numerous in low, dense coastal scrub habitat in arid washes, on mesas, and on slopes of coastal hills. California buckwheat, coastal sage, and patches of prickly pear are particularly favored. A breeding territory varies from 10 to 27 ha (4-11 ac; Atwood 1993). Monogamous with peak egg laying, of clutches consisting of 2-5 eggs, in April and May (Atwood 1993). Brood parasitism by cowbirds occurs in most of the counties where California gnatcatchers historically occurred. Eggs and nestlings subject to predation by a variety of mammals, birds, and reptiles (Atwood 1993).

Presence in the Reserve:
Coastal California gnatcatchers have been surveyed for since 2001 but have not been found utilizing the Reserve. On-site habitat is not well-suited to the California gnatcatcher, with vegetation often being more dense and/or tall than typically occupied habitat. Boden Canyon lies toward the eastern range limit for the species. However, they are present in the

San Pasqual Valley, in limited numbers in Ramona, and a territory was identified at Pamo Valley by Pacific Southwest in 1994. Boden Canyon is believed to have low potential to support one or more breeding pairs of California gnatcatchers. It is more likely to support dispersing juveniles for brief periods in the late summer and fall (M&A 2001). Depending upon the occurrence and frequency of wildfires and any post fire recovery of coastal sage scrub, the habitat suitability could improve.

Mammals

Ten sensitive mammal species are known to occur on the Reserve, including one State Fully Protected species and six CDFW Species of Special Concern. Of these ten, two are covered under the MSCP. An additional three mammal species, while not covered in the MSCP, are addressed by the MSP Roadmap. Four of these 10 sensitive mammal species are bats. All four of these bats are California Species of Special Concern and none are covered under the MSCP. Three sensitive mammals (American badger, Jacumba pocket mouse and California (western) mastiff bat) were not documented on the Reserve but were previously reported or thought present. Old badger dens were observed which puts this species as potentially occurring, however, the Jacumba pocket mouse and California mastiff bat remain as unconfirmed species. Additionally, the Stephen's kangaroo rat (SKR, *Dipodomys stephensii*), state listed as threatened, and federally listed as endangered, occurs in the vicinity of the Reserve but has not been found on-site. Existing grassland habitat is limited and not suitable for the SKR. Below are species account summaries of the ten documented mammal species from the Reserve, the three previously reported species, and the unreported but locally important Stephen's kangaroo rat.

***Bassariscus astutus*, ringtail:**

The ringtail, *Bassariscus astutus*, is a CDFW Fully Protected species (designated in 1957, Fish and Game Code Section 4700).

Ringtails may occur in chaparral, oak woodlands, coniferous forest, riparian areas or palm oases, typically where there are vertical rock surfaces or trees where it can use its climbing abilities up steep surfaces. It is primarily carnivorous but can be omnivorous as well, breeds February-May, is nocturnal and active throughout the year. It can live up to 16 years in captivity. Ringtails were once sought for their fur. It appears they may be sensitive to habitat loss and loss of connectivity due to urbanization.

Presence in the Reserve:
Ringtails have been documented (Lettieri-McIntyre and Assoc, 1994) and there is suitable habitat within the Reserve.

***Chaetodipus californicus femoralis,* Dulzura pocket mouse:**

The Dulzura pocket mouse is a CDFW Species of Special Concern found in a variety of habitats including coastal sage scrub, grassland, chaparral, and grass-chaparral edges in San Diego County. It is not covered under the MSCP or the MHCP but is covered under the SDG&E and San Diego County Water Authority Habitat Conservation Plans. It is common in

San Diego County however its range in California is confined to only San Diego County (2021 Small Mammal Trapping Report for Boden Canyon Ecological Reserve, SDNHM).

Diet consists primarily of the seeds of annual grasses and forbs; and the species may compete with other granivores for food. Generally, the Dulzura pocket mouse forages on the ground, but will climb into shrubs. The mammal is nocturnal and shows reduced activity above ground during winter months. Young are born between April and July with an average litter size of four. Predators include coyotes, bobcats, owls, and snakes.

Potential Presence in the Reserve:

Occurrences of the Dulzura pocket mouse were documented during the 2020 small mammal trapping surveys conducted by SDNHM per the WCB Grant. The majority of these were found in the California sagebrush-California Buckwheat Scrub/Chamise-Mission Manzanita Chaparral habitats (SDNHM, 2021).

***Chaetodipus fallax fallax*, northwestern San Diego pocket mouse:**

The northwestern San Diego pocket mouse, *Chaetodipus fallax*, is a CDFW Species of Special Concern. It is also a former federal Category 2, D species. This means that it was possibly appropriate to list but that information is inconclusive, and that its trend is "Declining". It is not an MSCP covered species but is an MSP VG species meaning that it is in Vegetation Management Focus Group VG because it has a wide distribution within the MSP Area and no specific vegetation management actions are recommended.

The San Diego pocket mouse is a common resident of sandy herbaceous areas, usually in association with rocks or course gravel (Miller and Stebbins 1964) in southwestern California. The range of the subspecies *C. f. fallax* (northwestern San Diego pocket mouse) reported from Boden Canyon extends north into the San Bernardino and San Gabriel mountains, east through the San Jacinto Mountains, and south along the coastal slope of San Diego County and northern Baja California to the San Pedro Mártir. The range of the other subspecies in San Diego County, *C.f. pallidus* (the pallid San Diego pocket mouse) is found on the desert slopes east of *C. f. fallax* (San Diego County Mammal Atlas, 2017).

Habitats of the San Diego pocket mouse include coastal scrub, chamise-redshank chaparral, mixed chaparral, sagebrush, desert wash, desert scrub, desert succulent shrub, pinyon-juniper, and annual grassland. It forages on seeds of forbs, grasses, and shrubs; as well as, some insects. Burrows are excavated in gravelly or sandy soil and used for daytime resting, predator escape, and care of young. It is nocturnal and active year-round although surface activity reduced during cold spells. Breeding occurs chiefly from March to May. An average of 4 young comprise a litter. Predators include foxes, coyotes, badgers, owls, and snakes. Urban encroachment, habitat fragmentation and association with activities that can trample or crush burrows are threats to the pocket mouse.

Presence in the Reserve:
The northwestern San Diego pocket mouse was documented on site during small mammal trapping in 1994 (Lettieri-McIntyre, 1994), and captured in the 2020 SDNHM small mammal

trapping effort in a variety of habitats across the Reserve (2021, SDNHM). It is expected to be common throughout the site in coastal sage scrub and open chaparral habitats in the Reserve (M&A, 2001).

***Neotoma bryanti intermedia*, Bryant's woodrat (formerly desert woodrat):**

Bryant's woodrat, *Neotoma bryanti intermedia*, recently reclassified as a distinct species from *Neotoma lepida intermedia*, the San Diego desert woodrat, is a CDFW Species of Special Concern and a federal Category 2, U species, meaning that listing is possibly appropriate but information is inconclusive, and its trend is "unknown".

Common to abundant in Joshua tree, pinyon-juniper, mixed and chamise-redshank chaparral, sagebrush, and most desert habitats. Elevational range from sea level to 1230 m.

Bryant's Woodrat. CDFW file Photo

This woodrat eats buds, fruits, seeds, bark, leaves, and young shoots of many plant species. In coastal scrub, prefers live oak, chamise, and buckwheat as food plants (Meserve 1974). The house usually is built against a rock crevice, at the base of creosote or cactus, or in the lower branches of trees. Nests of dried vegetation, usually fibrous grass parts or shredded stems, are located within the stick house.

Breeds from October to May, depending on the habitat. Nesting is solitary with a litter size ranging from 1-5. (MacMillen 1964). Woodrat houses provide shelter for a variety of small vertebrates. Predators include snakes, owls, and predatory mammals.

Presence in the Reserve:
The Bryant's woodrat, (San Diego desert woodrat at that time) was documented on site during small mammal trapping in 1994 (Lettieri-McIntyre, 1994) and again in 2020 during the SDNHM small mammal trapping effort. During this latest effort SDNHM noted this species' preference for habitat that includes open scrub/chaparral combined with boulder outcrops (SDNHM, 2021).

***Odocoileus hemionus*, mule deer:**

The mule deer, *Odocoileus hemionus*, is a game animal in California and is hunted throughout its range in the western United States. The mule deer subspecies that occurs in San Diego County is *O. h. fuliginatus*. The mule deer is not a sensitive species per any state or federal status, but is an MSCP-covered species and is an MSP Species Focus Group SS species. This means it has occurrences considered more stable and their persistence is at lower risk of loss compared to SL and SO species; however, these species still require species-specific management actions.

Mule deer are common to abundant, yearlong residents or elevational migrants with a widespread distribution throughout most of California, except in deserts and intensively farmed areas without cover (Ingles 1965). They occur in early to intermediate successional stages of most forest, woodland, and brush habitats. Prefer a mosaic of various-aged vegetation that provides woody cover, meadow and shrubby openings, and free water. Food preferences vary with season, forage quality, and availability. Forbs and grasses are important in spring. Feed heavily on acorns where available, primarily in autumn.

Rutting season occurs in autumn. Fawns are born from early April to midsummer, in moderately dense shrublands and forests, dense herbaceous stands, and high-elevation riparian and mountain shrub habitats, with available water and abundant forage.

Natural predators of deer have been reduced in numbers in most areas. Overpopulation, with resultant winter die-offs and destruction of habitat, occurs periodically in California, as in other states. In general, mule deer are preyed upon regularly by mountain lions and coyotes, and occasionally by bobcats, black bears, and domestic dogs. Deer populations can respond rapidly to habitat management. However, populations can decline in response to fragmentation, degradation, or destruction of habitat caused by urban expansion, incompatible use of land resources (e.g., timber, water, rangeland), and disturbances by humans.

Presence in the Reserve:
Mule deer are regularly observed in the Reserve and were observed in 2020 by SDNHM while conducting small mammal surveys on the Reserve.

***Puma concolor*, mountain lion:**

The mountain lion, *Puma concolor*, is an MSCP-covered species and it is also a MSP Species Focus Group SL species, meaning it is a species whose persistence in the MSPA is at high risk of loss without immediate management action above and beyond that of daily maintenance activities. In California, the mountain lion is classified as a "special status species" and its being hunted for sport is prohibited as dictated by Proposition 117, passed by popular vote in 1990. Proposition 117 also set aside $30 million yearly from state general funds for habitat conservation specifically intended to promote conservation of the mule deer and mountain lion (San Diego County Mammal Atlas, 2017).

Mountain lions are widespread in the west, however they are locally uncommon and are of local interest. Most abundant in riparian areas, and brushy stages of most habitats.

Mountain lions are carnivorous with mule deer making up about 60-80% of their diet throughout year. They also eat rabbits and hares, rodents, porcupines, skunks, coyotes, and, occasionally, domestic stock. Grouse, turkey, fish, insects, grass, and berries also have been reported in the diet.

Fragmentation of habitats by spread of human developments and associated roads, power transmission corridors, and other support facilities, restricts movements and increases association with humans. These changes are detrimental to mountain lion populations.

Statewide and local studies have been ongoing for the past decade or longer and these cooperative efforts by CDFW, UC Davis, The Nature Conservancy, SanDAG and others have been able to document mountain lion use in and through multiple conserved lands in San Diego County, including Boden Canyon.

Presence in the Reserve:
Collared mountain lions were reported moving through Boden Canyon in 2010, 2012 and in 2014. They were also detected in 2020 by SDNHM while conducting small mammal surveys on the Reserve. Suitable habitat occurs and habitat linkages are still in-tact that allow movement to occur in and through the Reserve (for more on wildlife corridors, see Chapter III. F of this LMP).

BATS

***Antrozous pallidus*, pallid bat:**

Pallid bat. CDFW File Photo.

The pallid bat, *Antrozous pallidus*, is a CDFW Species of Special Concern, and, while not covered in the MSCP, is an MSP Species Focus Group SL species, meaning it is a species whose persistence in the MSPA is at high risk of loss without immediate management action above and beyond that of daily maintenance activities. The pallid bat is also considered a Western Bat Working Group (WBWG) High-priority species.

The pallid bat is a locally common species of low elevations in California. It occupies a wide variety of habitats, including grasslands, shrublands, woodlands, and forests from sea level up through mixed conifer forests. The species is most common in open, dry habitats with rocky areas for roosting. A yearlong resident in most of the range.

There are two subspecies in San Diego County, the coastal form *A. pallidus pacificus* and *A.p. pallidus* in the desert (San Diego County Mammal Atlas, 2017).

Pallid bats take a wide variety of insects and arachnids, including beetles, orthopterans, homopterans, moths, spiders, scorpions, solpugids, and Jerusalem crickets.

Day roosts are in caves, crevices, mines, and occasionally in hollow trees and buildings. Mates from late October-February, with delayed fertilization. Owls and snakes are known predators. Pallid bats are very sensitive to disturbance of roosting sites.

The San Diego County Mammal Atlas states that pallid bats were considered abundant in 1948 and now appear to be rare on the coastal plains. Since 2014, only one colony (35 individuals) has been documented on the coast, at Camp Pendleton. Recent records include only Chula Vista and Camp Pendleton. Rural sites in inland valleys and the foothills have had recent records of individuals and day and night roosts (San Diego County Mammal Atlas, 2017), however breeding colony information, other than the Camp Pendleton site, was not specified.

Presence in the Reserve:
Pallid bats are listed in the SDMMP MOM database as being present in the Reserve, but not noted in the 1994 species list (Lettieri-McIntyre) nor was it a species detected by CDFW staff in the Reserve in 2016. It was noted as a "flyover" in Merkel and Associate's 2001 (M&A, 2001) species list. No pallid bat breeding colonies have been documented in Boden Canyon.

***Corynorhinus townsendii ssp. townsendii*, Townsend's big-eared bat:**

The Townsend's big-eared bat, *Corynorhinus townsendii ssp. townsendii*, is a CDFW Species of Special Concern, a federal Category 2 D species, meaning that it is possibly appropriate to list but that information is inconclusive, and that its trend is "Declining". While this bat is not covered in the MSCP, it is a MSP SO species, meaning that one or more significant occurrences are at risk without management actions beyond the normal. This bat is a WBWG High-priority species.

Townsend's big-eared bat occurs throughout California, but the details of its distribution are not well known. This species is found in all but subalpine and alpine habitats and may be found at any season throughout its range. Once considered common, Townsend's big-eared bat is now considered uncommon in California. It is most abundant in mesic habitats.

Small moths taken on the fly by echolocation are the principal food, but beetles and a variety of soft-bodied insects also are gleaned from foliage. Townsend's bats require caves, mines, tunnels, buildings, or other human-made structures for roosting.

Most mating occurs from November-February, and sperm is stored until ovulation occurs in spring. Births, usually just one pup, occur in May and June.

This species is extremely sensitive to disturbance of roosting sites. A single visit may result in abandonment of the roost. Numbers reportedly have declined steeply in California.

In San Diego County Townsend's big-eared bats are found throughout the rural areas, but it is uncommon to rare. It is considered one of the most threatened local bats. Protecting roosts is the highest conservation priority because of its wing morphology it does not undertake long-distance flights and may be vulnerable to habitat fragmentation. Its distribution occurs where there are caves and cave analogs including buildings. It is found in old mining areas and in areas with boulder outcrops. (San Diego County Mammal Atlas, 2017).

Presence in the Reserve:
A single call of a Townsend's big-eared bat was detected by CDFW staff in February 2016 in the Reserve (CDFW Dillingham et al. 2016).

***Lasiurus blossevillii*, western red bat:**

The western red bat, *Lasiurus blossevillii*, is a CDFW Species of Special Concern and a WBWG High-priority species.

The red bat is found throughout western North America from Canada to Mexico and is locally common in some areas of California. Roosting habitat includes forests and woodlands from sea level up through mixed conifer forests. Feeds over a wide variety of habitats including grasslands, shrublands, open woodlands and forests, and croplands. Not found in desert areas.

The western red bat feeds on a variety of insects. The most important prey are moths, crickets, beetles, and cicadas. Roosts primarily in trees and less often in shrubs; are often in edge habitats adjacent to streams, fields, or urban areas.

Mating occurs in August and September. After delayed fertilization there is an 80-90 day gestation. Births are from late May through early July. Most females bear 2 or 3 young, though the single litter may have 1-5. A variety of animals prey on red bats, including owls, hawks, opossums, cats, and jays.

In San Diego County, western red bats are broadly distributed on the coastal slope, primarily in riparian area or other areas with trees (parks, neighborhoods). It has been found from the Tijuana River valley to Camp Pendleton and up to 1600 meters in the Laguna Mountains. There are also records in the Borrego Valley. It is most threatened by loss of riparian habitat and potentially by extended periods of drought (San Diego Mammal Atlas, 2017).

Presence in the Reserve:
Western red bats were detected in CDFW surveys in February 2016. A small number of calls were identified as this species in the Reserve. They were also listed as a "flyover" in Merkel and Associates 2001 species list.

***Nyctinomops femorosaccus*, pocketed free-tailed bat:**

The pocketed free-tailed bat, *Nyctinomops femorosaccus*, is a CDFW Species of Special Concern and a WBWG Medium-priority species.

The pocketed free-tailed bat is rare in California but is more common in habitats that include pinyon-juniper woodlands, desert scrub, desert succulent shrub, desert riparian, desert wash, alkali desert scrub, Joshua tree, and palm oasis. It feeds on flying insects detected by echolocation high over ponds, streams, or arid desert habitat. Large moths are the principal food, but a wide variety of insects is taken. Prefers rock crevices in cliffs as roosting sites. Reproduces in rock crevices, caverns, or buildings. Gives birth to one young per year, usually in early July. Prefers rocky desert areas with high cliffs or rock outcrops.

Probably a yearlong resident. Usually roosts in small groups. Young are born in June and July, peaking in late June. The single litter has one young. Lactation occurs in July and August.

The status of this species in California is poorly known, but it appears to be rare.

In San Diego County, the pocketed free-tailed bats appear to be widespread. They are a year-round resident in the county and may make local seasonal migrations while some roosts are known to be used year-round. The primary threat to this species is the loss of rocky habitat through rock quarrying/mining, water impoundments and road construction (San Diego Mammal Atlas, 2017).

Presence in the Reserve:
Pocketed free-tailed bats were detected by CDFW staff in larger numbers than other bat species at two locations in the Reserve (CDFW, Dillingham et al, 2016). CNDDB also contains pocketed free-tailed bat occurrence(s) at Boden Canyon.

Small Footed Myotis. Photo by Tim Dillingham, CDFW

A total of thirteen bat species have been documented on the Reserve, including *Myotis ciliolabrum*, small-footed myotis.

Sensitive mammals not documented within the Reserve but with the potential (or were previously reported) to occur on-site

***Taxidea taxus*, American Badger:**

The American badger, Taxidea taxus, is a CDFW Species of Special Concern, is covered in the MSCP and is an MSP Species Focus Group SL species, meaning it is a species whose persistence in the MSPA is at high risk of loss without immediate management action above and beyond that of daily maintenance activities.

The badger is an uncommon, permanent resident found throughout most of the California, with two subspecies occuring in San Diego, *Taxidea taxus jeffersonii* on the coastal slope and *T. t. berlandieri* in the Anza Borrego Desert (San Diego County Mammal Atlas, 2017).

Badgers are most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils. In San Diego County, badgers were originally likely widespread in open valleys, grasslands and the sandy desert. Currently its numbers and distribution are poorly known (San Diego County Mammal Atlas, 2017).

Badgers are carnivorous eating fossorial rodents: rats, mice, chipmunks, and especially ground squirrels and pocket gophers. Badgers also eat some reptiles, insects, earthworms, eggs, birds, and carrion. Diet shifts seasonally and yearly in response to availability of prey. Young are born in burrows dug in relatively dry, often sandy, soil, usually in areas with sparse overstory cover.

Suitable habitat for badgers is characterized by herbaceous, shrub, and open stages of most habitats with dry, friable soils. Badgers mate in summer and early fall with the young born mostly in March and April (Long 1973).

Somewhat tolerant of human activities, however predator control using indiscriminate trapping and persistent poisons causes extensive losses.

Presence in the Reserve:
Badgers have not been observed in the various surveys and site visits conducted from 1994 to present, however, Merkel and Associates did report seeing old dens in the northern portion of Boden Valley that may have been used by badgers. They also reported that there are known badger occurrences in the grassland habitats in nearby Pamo Valley and Guijito Ranch (Merkel and Associates, 2000). Grassland habitat in the Reserve is present, however is not extensive, and whether or not it is suitable for or is currently occupied by badgers is unknown.

***Eumops perotis californicus*, California (Western) Mastiff Bat:**

The California, or western, mastiff bat, *Eumops perotis californicus*, is a CDFW Species of Special Concern, a federal Category 2 U species, meaning that it is possibly appropriate to list but that information is inconclusive, and that its trend is "Unknown". It is a WBWG High-priority species.

It is North America's largest bat with a wingspan of 56 cm (approx. 22 inches). In San Diego County, it occurs from the coastal plains to the Laguna Mountains to desert flats. It roosts in colonies of a few to less than 100 in crevices and fractures of steep, rocky cliffs, rocky outcrops and abandoned mines.

It is associated with coastal and desert scrub, riparian, oak woodlands and pine forests. It may also forage opportunistically over urban areas (lighted fields and ball parks) while commuting to preferred habitats. It eats large moths, other insects, including beetles, crickets, dragonflies and katydids.

This species mates in early spring with young being born as early as mid-June but juveniles have been found as late as mid-November. Predators include birds of prey, small carnivores and snakes. Its primary threat is loss of rocky habitat through quarry and mining activities and construction (San Diego County Mammal Atlas, 2017).

Presence in the Reserve:
The California mastiff bat was listed on the species report generated for a draft LMP in 2005 (EDAW, 2005) but not reported by Lettieri-McIntyre (1994) or Merkel and Associates (2001) and was not detected in the Reserve by CDFW during bat surveys in 2016. Without documentation it will remain as unconfirmed in the Reserve.

***Perognathus longimembris internationalis*, Jacumba Pocket Mouse:**

The Jacumba pocket mouse, *Perognathus longimembris internationalis*, is a CDFW Species of Special Concern and a federal Category 2, D species meaning that it is possibly appropriate to list but that information is inconclusive, and that its trend is "Declining".

The little pocket mouse is found in the western U.S. from Idaho west to Washington and down into Sonora, Mexico. There are four subspecies of the little pocket mouse in San Diego County, and all four subspecies are listed as CDFW Species of Special Concern. The Jacumba pocket mouse is the largest of San Diego County's subspecies of the little pocket mice and is limited to central and southern San Diego County on the desert side of the mountains (San Diego County Mammal Atlas, 2017).

The little pocket mouse is found at elevations from sea level up to about 1300 meters, and generally on flat terrain with friable soils and sparse vegetation (SDNHM, Mammal Atlas). Little pocket mice forage for seeds that are small enough to fit in their cheek pouches. They excavate tunnels with resting/nesting chambers and can remain inactive for long periods of time at any time of the year. They breed in the spring with juveniles emerging in April-May.

Records and range maps provided in the San Diego County Mammal Atlas indicate there are no little pocket mice that range between the very coastal Pacific pocket mouse and the more inland Los Angeles pocket mouse in northern San Diego County (Oak Grove and Warner Pass area). Additionally, no pocket mice range between the coast and the desert side of the mountains in central and southern San Diego County where the Jacumba pocket mice reside. This leaves the Boden Canyon area void of any little pocket mouse species.

Presence in the Reserve:
While the Jacumba pocket mouse was reported in 1994 (Lettieri-McIntyre, 1994), it was not

reported on the 2001 species list (M&A, 2001). It was shown as "detected" in a previous version of the draft LMP in 2005 presumably because of the 1994 report. No detailed trapping information from 1994 was located that could confirm the presence of Jacumba pocket mouse. This, combined with recent range and distribution data contained in the San Diego County Mammal Atlas mentioned above, has lead CDFW staff to conclude that this species is not likely to be present in Boden Canyon and the species is considered unconfirmed within the Reserve.

Small mammal surveys were conducted in 2020 by the SDNHM under a WCB Grant and it was determined by them that the 1994 observation was assigned to the incorrect subspecies; the Jacumba pocket mouse range is well over 20 miles away from the Reserve. They state that the previously observed animal may have been the Los Angeles pocket mouse (*Perognathus longimembris brevinasus*) that is known from nearby Warner Ranch (approximately 11 miles northeast). Neither the LA pocket mouse nor the Jacumba pocket mouse were detected during their 2020 surveys (SDNHM, 2021).

***Dipodomys stephensi*, Stephens' kangaroo rat**

(Account information below taken primarily from SDMMP, MSP, Volume 2D Goals and Objectives, section 7.0 Mammals, SKR species 7.2)

The Stephens' kangaroo rat (SKR) is federally listed as endangered, and state listed as threatened. It is not an MSCP-covered species, however it is an SO species in the MSP roadmap. SO means the persistence of one or more significant occurrences in the MSPA is at high risk of loss without immediate management action above and beyond that of daily maintenance activities and because management of its grassland habitat alone will not ensure its persistence. There are limited occurrences of Stephens' kangaroo rat within the MSPA.

The SKR is endemic to southern California. It is a small nocturnal mammal native to open grasslands and sparse coastal sage scrub that consists of both native and nonnative herbs and grasses and filaree (USFWS 1997; Spencer 2005). They are currently found primarily in western Riverside County, northern San Diego County, and southwestern San Bernardino County (USFWS 1997).

Reported home ranges of individuals vary from approximately 0.05 hectare to nearly 0.2 hectare (USFWS 1997). It is a nocturnal, solitary, and burrow-dwelling mammal (Burke, et al. 1991 and Spencer, 2005). Breeding season may occur in late spring and early summer (Bleich. 1997). Average litter size is 2.5 (Lackey. 1967). SKR's construct burrows to serve as sleeping quarters and nesting sites (Bleich. 1977 and Jones. 1987). It primarily eats seeds, along with some green vegetation and occasional insects. Highly evolved to survive arid conditions, can persist indefinitely without drinking free water (Spencer 2005).

Within the MSPA, the Stephens' kangaroo rat has historically had occurrences in MUs 5, 6, 8, and 9. On Conserved Lands, 1 population can be found on the Ramona Grasslands Preserve in MU5. Other populations are found at MCB Camp Pendleton, Naval Weapons Station Fallbrook, Rancho Guejito, and Lake Henshaw/Warner Springs (Shier and Navarro n.d).

Threats to the Stephens' kangaroo rat include isolation, habitat fragmentation, loss of connectivity between occurrences, potentially low genetic diversity due to small population size, degradation of habitat quality, and predation from domestic cats. The increase of nonnative grasses and thatch in the MSPA has also inhibited movement of the species (USFWS 2011).

Presence in the Reserve:

Stephens' kangaroo rat has not been observed or recorded from within the Reserve. It has been found to the west on Rancho Guejito and in Ramona. The grassland/grassland-coastal sage scrub habitat on the Reserve is unsuitable (M&A, 2000) for SKR.

In a focused effort to update the existing small mammal data, CDFW partnered with WCB to provide a Grant to the SDNHM. The small mammal surveys that SDNHM conducted took place in 2020 with a specific goal to determine if Stephen's kangaroo rat is present or if suitable habitat exists in the Reserve for the SKR. SDNHM did not detect any SKR in 2020. The Report states "the Stephen's kangaroo rat prefers large tracts of open grassland, which occur and are known to support the species on adjacent lands at Rancho Guejito and at Warner Valley, 11 miles northeast of the Reserve. Within the ER, grassland occurs as small patches, completely surrounded by large stands of scrub, chaparral, or woodland, Therefore, the potential for the Stephen's kangaroo rat to occur within the ER is very low." (SDNHM, 2021).

F. Wildlife Corridors

Biological corridors or linkages are interconnected tracts of land characterized by significant natural resource value through which native species can disperse. Corridors provide pathways for gene flow, seed dispersal, daily movement between habitats (home range movements), migration (seasonal or altitudinal), and dispersal habitat for juveniles. Corridors can function at various temporal and spatial scales. Temporally, it allows for both daily and seasonal movements, as well as movements over many generations. Spatially, corridors can function on a large regional, or landscape/ecosystem scale (landscape size can vary) or at smaller scale, such as home range.

Though natural landscapes have an inherent degree of connectivity, recently (within the past 50 years) habitat alteration has greatly reduced this connectivity (Penrod et al. 2005). Establishing connections between isolated or fragmented habitat patches is essential for sustaining natural ecological processes, population viability, and biological diversity (Noss and Cooperrider 1994). The Reserve functions as part of a regional biological corridor complex.

Multiple documents discussed in this section of the LMP were researched to identify where the Reserve sits within regional framework for connectivity. In 2001, Penrod et al (Missing Linkages: Restoring Connectivity to the California Landscape) devoted Chapter 6 to the South Coast Ecoregion linkages. Figures 6.1 and 6.7 show Boden Canyon just to northwest of Linkage SC05. The Reserve contributes to this functioning wildlife corridor. The Reserve is within the "Stewardship Zone #14 and within an NCCP Core Area. Additionally, in 2008, the Science and Collaboration for Connected Wildlands (formerly the South Coast Wildlands), working with various federal, state, and local agencies identified the Peninsular-Borrego Connection within its South Coast Missing Linkages

Regional Report. (SCML Regional Report, pages 28-29, South Coast Missing Linkages: A Wildland Network for the South Coast Ecoregion, March 2008. http://www.scwildlands.org/reports/SCMLRegionalReport.pdf)

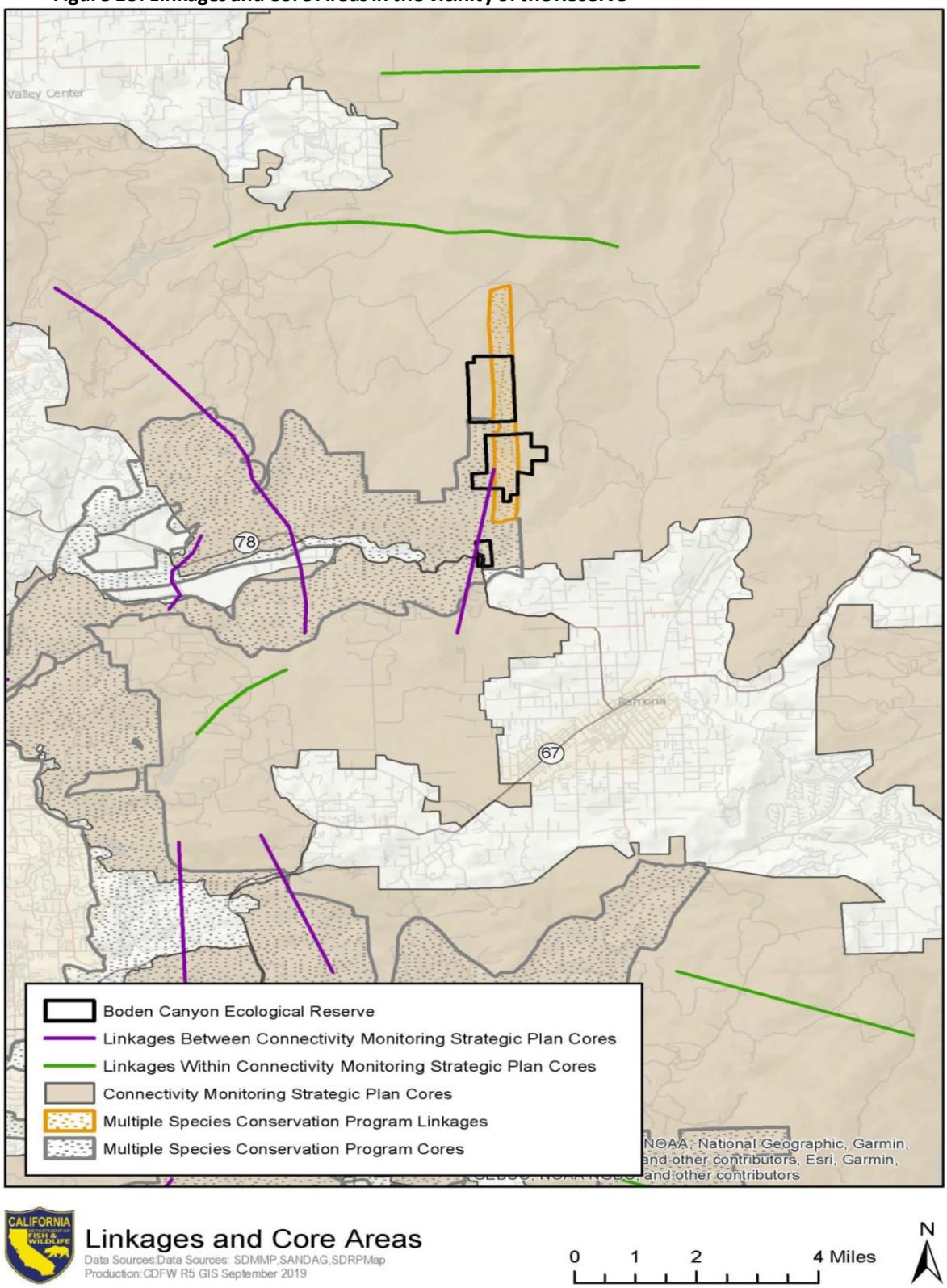
The Reserve lies to the west of the identified "central strand", however, the entire Boden Canyon as a conserved land is important to this corridor as stated below from the 2008 document:

> *"The central strand extends from Black Mountain in Cleveland National Forest and encompasses riparian and upland habitats along Bloomdale, Witch, and Santa Ysabel creeks, Santa Ysabel Valley, the southern extent of the Volcan Mountains, Banner Canyon, and San Felipe Creek, and enters Anza-Borrego Desert State Park between Pinyon Ridge and Grapevine Mountain. This strand was delineated by the landscape permeability analysis for mountain lion but is also intended to serve other species such as mule deer, badger, and granite night lizard. Santa Ysabel Creek is especially important for species requiring a contiguous riparian connection. State Routes 78 and 79 are the major transportation routes and pose the most substantial barriers to movement. SR-79 bisects the linkage for a distance of roughly 27 miles, while SR-78 passes through the central and southern strands of the linkage."*

Corridors can be classified as local or regional. Regional corridors are defined as those linking two or more large areas of natural open space. Local corridors are defined as those allowing resident animals to access critical resources (food, cover, and water) in a smaller area that might otherwise be isolated by urban development and are often used on a daily basis. By connecting two or more small or isolated habitat patches, local corridors allow the patches to function as a larger block of habitat. Such connections may allow persistence of species or populations that could not be accommodated by any one of the component patches.

Boden Canyon provides a continuous natural habitat connection between the San Dieguito River Valley and Rancho Guejito and is identified as an important biological linkage to habitat segments within the MSCP (see Figures 2 and 3). The presence of this regional corridor was instrumental in the approval of the State's acquisition of its parcels in Boden Canyon (State of California, WCB minutes, 1998). It forms one of the longest continuous natural habitat connections in San Diego County, extending east to Pamo Valley and north to Riverside County. Boden Canyon lies within a large block of undeveloped habitat that encompasses regional features including San Pasqual Valley, Cuyamaca Mountain, the Laguna Mountains, and Palomar Mountain. Within this habitat linkage are a number of local and regional wildlife corridors. Figure 13 shows core and linkage areas near the Reserve.

Figure 13. Linkages and Core Areas in the vicinity of the Reserve



An important feature of any habitat linkage or wildlife corridor, especially regional corridors, is that they provide some measure of cover/protection from potential predators; greater amounts of cover and increased width is preferred over constricted, relatively open corridors. The sources of food and water are other potentially important factors. All of these preferred features are well- represented in the lush oak/riparian woodlands of both Boden Canyon and Santa Ysabel Creek. These drainages provide excellent cover and resources to facilitate regional wildlife movement, particularly for larger species such as the mountain lion and mule deer. In addition to the riparian woodlands, regional movement is expected to occur across ridgelines within and adjacent to Boden Canyon, as well as on the existing and historic dirt roads and trails passing through the Reserve.

When addressing regional corridor issues, planners often consider larger, wide-ranging species such as the mountain lion. If a corridor can accommodate the movement needs of a mountain lion, it will likely facilitate movement of smaller vertebrates. Mule deer are also often considered in addressing regional corridor issues, and they use regional corridors during periods of dispersal. Local corridors are present in the Reserve where a species is dependent upon a single habitat type that occurs in relatively small patches.

Collared mountain lions, CDFW file photo

As further evidence of Boden Canyon being used as a regional biological corridor, reports by CDFW staff and University of California at Davis (UCD) have documented mountain lion movements in and through Boden Canyon for years. The Reserve was recently utilized by at least two collared mountain lions over a course of several years (Vickers, UC Davis, 2014). UCD was contracted by SanDAG to conduct wildlife corridor research for conserved lands in San Diego County. Two male mountain lions (M109 and M110) in the UCD study frequented the Reserve after being collared in the Ramona area. M109 data points were dense within Boden Canyon and he traversed in all directions. His use area was roughly 244 square miles and he traveled mostly eastward, south to an area east of El Capitan Reservoir, staying north of I-8 and west of SR-79. The furthest north that

M109 ventured was just east of Valley Center, but he stayed south of SR-76. According to the data points, M110 appeared to frequent the southern area of the Reserve and ventured more westerly than did M109 in his travels north and south. M110's furthest southern data point was near Descanso, also staying north of I-8 and his most northward point was just west of Valley Center east of I-15. M110 had a use area of approximately 241 square miles. Both M109 and M110 died during the study from lethal or sublethal interactions with vehicles.

The identified corridor in Boden Canyon in the UCD mountain lion study is 12-13, and in MSCP documents Boden Canyon is included as Linkages 11-12 and 12-13. In the 1996 Ogden documents for the MSCP the linkage containing Boden Canyon is called L-2, Lake Hodges-San Pasqual Valley. This linkage connects conserved core lands along the San Dieguito River drainage west from Lake Hodges through San Pasqual to Pamo Valley and Cleveland National Forest. A recent study by USGS "Wildlife Linkages within the San Diego County Preserve System" prepared for SanDAG by USGS (Rochester, et al. 2013), on wildlife corridors in the MSCP evaluates the top 10 priority linkages of the MSCP (Ogden, 1996). It mentions the two linkages that incorporate Boden Canyon, and states that both Linkage 11-12 (Lake Hodges east to Boden Canyon and the Ramona grasslands) and Linkage 12-13 (Ramona grasslands to Mt. Woodson) may not have been fully functioning at the time of the report, in 2014. Linkage 11-12 may have been dependent upon water levels in Lake Hodges and also tied to having sufficient access for movement in and through this area. Linkage 12-13 may have been poorly functioning due to urban sprawl in the Ramona area. Recommendations from that 2014 report include allowing (managing) for periods of low water or fluctuation water levels that could increase riparian habitat at Lake Hodges (L11-12) and installation of wildlife infrastructure could improve movement as well (L12-13). Both recommendations, if implemented, would benefit biological corridors in and through Boden Canyon.

Under the WCB Grant to the SDNHM, a wildlife corridor study was conducted in 2020 and continues presently in 2021 at the Reserve. SDNHM is using remote cameras and looks for sign to detect the current use of Boden Canyon by animals. The goal of the study is to determine the wildlife corridor functionality of the Reserve and be able to conclude that the Reserve is indeed providing connectivity and habitat for wildlife as projected. The hope is that, at the larger scale, the various federal, state, and local regional planning efforts, including acquisition and management of lands in the preserve systems such as Boden Canyon, are contributing to priority wildlife corridors and habitats. Results of the study will be incorporated into this LMP as they become available; any recommendations will also be incorporated and implemented as funding and staffing allow.

IV. MANAGEMENT GOALS, TASKS AND ENVIRONMENTAL IMPACTS

This Section describes the management direction and CEQA documentation for management actions on Reserve through the development of management goals and tasks associated with each element. The goals and tasks guide all management decisions until the LMP is revised or updated. Chapter IV provides documentation required by federal and state laws pertinent to environmental impacts and endangered species protection. In general, goals and tasks for the Reserve are structured to promote best management practices (BMPs) and, where appropriate, are coordinated with larger regional planning goals.

Implementation of tasks for all elements will be prioritized for funding and staffing based on: 1) critical safety need for staff and/or the public, 2) compliance with a legal requirement, 3) need for immediate resource protection, 4) need for necessary management or enforcement to achieve CDFW mission, and 5) opportunity to maximize funding or partnership efforts to achieve a larger benefit for the Reserve and Region.

The terms and definitions used in this LMP are described below:

A. Elements of the LMP

Elements relate to broad categories of consideration, goals define the purposes within these elements, and tasks establish the specific actions required to attain those management goals. Together, elements, goals, and tasks express the policy direction that guides the management of the Reserve.

An element, as defined by the *Guide and Annotated Outline for Writing Land Management Plans* (CDFW, November 2014), refers to any biological unit, public use activity, or facility maintenance program, cultural resource protection activity, or resource coordination effort as defined within this LMP for which goals and tasks have been prepared specific to that element. This LMP includes the following elements:

- **Biological Elements**: The Biological Elements refer to species, vegetation communities, and ecological processes for which specific management goals and objectives have been developed.
- **Biological Monitoring Elements**: These Elements refer to adaptive management strategies for continually improving the diversity, habitat integrity, and environmental health of the Biological Elements identified in this LMP.
- **Public Use Elements**: These Elements consists of recreational, scientific or other use activity appropriate to and compatible with the purpose(s) for which the Reserve was acquired.
- **Facility Maintenance Elements**: These elements describe the general maintenance and administrative program which helps maintain orderly, efficient, and beneficial management of the Reserve.
- **Fire Management Elements**: These elements describe the pre-, during, and post-fire actions and coordination efforts necessary to ensure a healthy ecosystem while protecting life, property and public trust assets.
- **Cultural Resource Elements**: The Cultural Resource Elements refer to the protection of significant historical and archaeological resources that may be present and that may yield information important to the prehistory or history of the Reserve.

B. Goals and Tasks within the LMP

Goals

Goals are broad, concise, visionary statements that set overall direction for management and monitoring, while well-defined tasks enable a land manager to meet the goal. This LMP includes the following Goals:

- **Biological Goal**: A biological goal is a statement describing management and intended long-term results for a Biological Element. A biological monitoring goal is a statement describing adaptive **management** and intended implementation results for a phase of a biological monitoring element.
- **Public Use Goal**: A public use goal is a statement describing the type and level of public use that is compatible with the Biological Element goals specified in this LMP.
- **Facility Maintenance Goal**: A facility maintenance goal is a statement describing the type and level of grounds and facility **maintenance** that is needed to attain the goals for the biological and Public Use Elements specified in this LMP.
- **Fire Management Goal**: A fire management goal is a statement describing the management and intended results for the **Fire** Management Element.
- **Cultural Resource Goal**: A cultural resource goal is a statement describing the management and intended results for the **Cultural** Resources Element.
- **Resource Coordination Goal**: A resource coordination goal is a statement describing the type and level of management **coordination** activities needed to achieve the goals specified in this LMP.

Tasks

Tasks are the individual projects or work elements that implement the goals and objectives specified in this LMP. They should be used to develop both immediate and long-term operation and maintenance schedules and budgets for Reserve.

Adaptive management is a dynamic strategy in which management efforts are monitored regularly to assess their status and effectiveness. Adaptive management begins with collecting baseline data and testing long-term strategies for monitoring and evaluating changes to the baseline. Information and knowledge gained in this process are used to update management goals and tasks. The goal of adaptive management is continual improvement and long-term sustainability. An adaptive management approach has been applied to all elements within this LMP.

Each element includes a section on the potential environmental impacts that may occur as a result of the proposed management goals and tasks. Through the development of Impact Guidelines noted in each element, CDFW attempts to avoid and/or minimize these potential impacts.

C. Biological Elements Goals, Tasks and Impact Guidelines

The overall biological management goal for CDFW Ecological Reserves is to optimize ecological and habitat productivity for all species, in balance with the needs of the public. To accomplish this, CDFW strives to protect and maintain the physical processes that contribute to the ecological productivity of its flora and fauna, with an emphasis on habitat management programs.

The Biological Elements in this LMP are divided into three categories: 1) Habitat Management, 2) Species Management and 3) Biological Monitoring. Biological Elements are further broken down into goals and tasks that are organized around improving ecosystems. Biological corridors and buffers

have been included in the Habitat Management category. The Impact Guidelines for all biological Elements follows each of these three sections.

1. Habitat Management

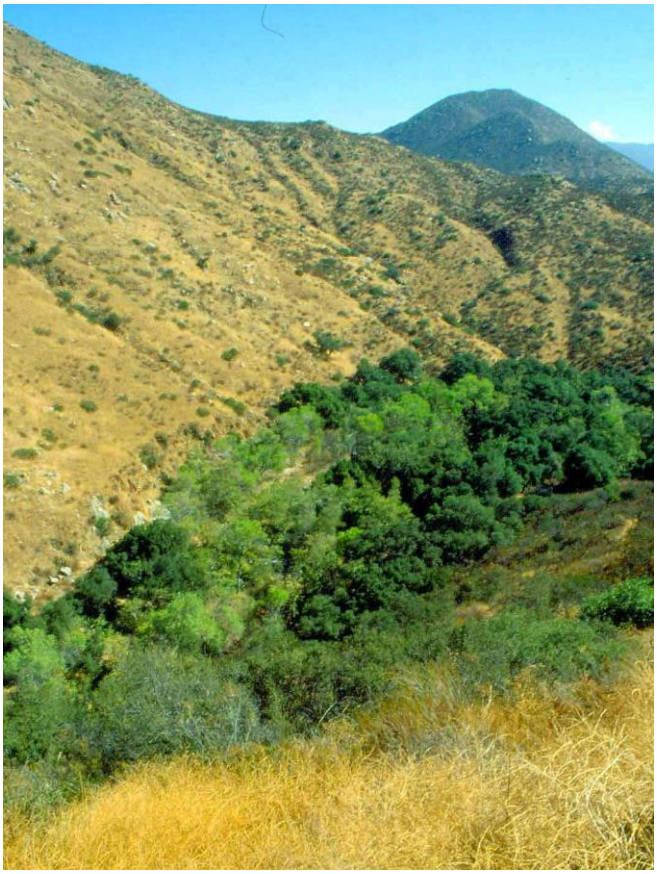
Habitat Management is a high priority for CDFW and includes the conservation, enhancement, and restoration of the terrestrial and wetland habitats on the Reserve. Improving the quality of the habitat will ensure that the Reserve continues to support healthy populations of native species, prevent the proliferation of non-native and invasive species within the Reserve, and so that the Reserve continues to function both as an important wildlife core and corridor.

Habitat Management includes three groupings of vegetation communities:

1. Riparian and Other Wetland Communities;
2. Oak Woodland;
3. Chaparral, Scrub, and Grasslands.

Riparian and Other Wetland Communities

This community includes the California Sycamore Woodlands, Southern Riparian Woodlands, and Open Water (Pond) which are all found on the Reserve and when combined encompass approximately 80 acres. These vegetation communities occur along the main Boden Canyon drainage and tributaries, and along Santa Ysabel Creek.



Boden Canyon, oak riparian habitat, CDFW file photo

Overall, riparian areas provide food, water, cover, and migration and dispersal corridors for an abundance of wildlife, including the federally listed arroyo toad and least Bell's vireo (FE and CE). The tri-colored blackbird has been found on the Reserve, although not recently; it was listed as a threatened species in 2019). Other special-status species found on the Reserve that occur in these habitats include the southwestern pond turtle, two-striped garter snake, western spadefoot toad, yellow warbler, yellow-breasted chat, Cooper's hawk, western mastiff bat and Harbison's dun skipper. Over half of the avian species observed on Reserve were detected in riparian or wetland communities. Public access into wetland areas is a possible management concern; however, this will be discussed in Section IV. D.

Public Use Element: Goals, Tasks, and Impact Guidelines. Other management concerns include the potential for undercutting along riparian corridors due to erosion or sediment transport, and the occurrence of detrimental nonnative plant and animal species, including pests.

CDFW began controlling nonnative plants in the riparian and wetland communities soon after the agency acquired the properties in 1998. Initially, CDFW prioritized and targeted larger, nonnative species such as eucalyptus (*Eucalyptus sp.*), tamarisk (*Tamarix ramosissima*), tree tobacco (*Nicotiana glauca*), giant reed (*Arundo donax*) and pampas grass (*Cortaderia sp.*), but as these have been mostly eliminated the focus is shifting to maintenance retreatments and treatment of non-native grasses and more herbaceous species. See Chapter III for more detail on nonnative, invasive plant species.

Goals

1. Conserve the riparian and wetland communities as essential features of the watershed ecosystem.
2. Maintain and enhance riparian vegetation communities in order to help sustain populations of special-status species that rely on the habitat for foraging, breeding, and roosting. Such activities will also benefit the non-listed, wildlife species that also use these riparian areas.
3. Maintain and enhance native riparian vegetation along Boden Canyon and Santa Ysabel Creek and tributaries for continued use as wildlife movement corridors.
4. Control or reduce cover and distribution extent of invasive plants (as well as future weed populations) identified as management concerns.
5. Minimize the introduction of new invasive plant, animal or pest infestations.

Tasks

1. Map and maintain a list of invasive plants.
2. Map and maintain a list of invasive plants of management concern that threaten the integrity and persistence of riparian and wetland habitats.
3. Every five years or following a disturbance event (e.g., wildfire), map areas of high risk for degradation and/or conversion.

4. Continue to implement nonnative plant control on an annual basis and target nuisance species, such as tamarisk and nonnative herbaceous and grass species in riparian and wetland habitats.
5. Target new infestations of invasive plants, animals or pests, including Invasive Shot Hole Borer that can be eradicated before they become fully established throughout the Reserve.
6. Assess the beds and banks of the riparian channels after 10-year (or greater) storm events to determine whether erosion and undercutting are degrading riparian habitat, causing excess sedimentation downstream, or threatening the existing infrastructure needed to maintain the Reserve. If needed, appropriate erosion control measures should be considered to stabilize and prevent further damage.
7. Conduct a tracking study of wildlife within Boden Canyon and along Santa Ysabel Creek to determine whether the drainage is maintaining functionality as a wildlife movement corridor. Results of the study would inform future management and monitoring of the Reserve, as well as broader scale MSCP and regional corridor issues. The study would be initiated and then updated as needed, based on available staffing and funding. Under the WCB Grant to the SDNHM, a Wildlife Corridor Study has been funded and began in 2020. Results should be available in 2021.
8. Utilize BMPs to minimize the introduction and spread of invasive plant species. The focus will be on weed corridors, trails and ROWs. (CNPS, Cal-IPC. 1999. BMPs).

Oak Woodland Communities

Oak Woodlands. CDFW File Photo

Although oak woodlands are considered terrestrial plant communities, much of this habitat on the Reserve is associated with drainages and functions like the riparian communities discussed

above, especially the oak woodlands adjacent to the Boden Canyon tributaries and Santa Ysabel Creek and its tributaries. Approximately 82 acres of oak woodland occur and includes a combination of coast live oak (76.5 acres) and Engelmann oak (5.2 acres). Engelmann oaks are rare, with a limited distribution throughout California and the County. The Reserve's oak woodlands support a broad range of wildlife species. A statewide management concern regarding oak woodland is that certain species (e.g., Engelmann oak) are not regenerating adequately to sustain populations (University of California, 2014). Additionally, the recent influx of Gold Spotted Oak Borer is a high risk to oak woodlands. Locally, other potential management concerns are heightened fire risk due to the prevalence of nonnative grasses in the understory and the proximity of oak woodland to chaparral and scrub habitats with high fuel loads.

Goals

1. Conserve oak woodland habitat as an important component of the unique mosaic of habitat types in the Reserve.
2. Protect and manage oak woodlands for species abundance and richness.
3. Maintain and enhance the quality and features of the woodlands that will benefit special status and all wildlife species.
4. Ensure that Engelmann oak woodlands persist on the Reserve.
5. Eliminate, control or reduce cover and distribution of invasive plants and pests of management concern.

Tasks

1. Map and maintain a list of invasive plants of management concern which threaten the integrity and persistence of oak woodlands.
2. Continue to implement nonnative plant control on an annual basis and target nuisance species such as nonnative herbaceous and grass species affecting oak woodland habitats.
3. Target new invasive plant infestations before they become established.
   Complete a comprehensive assessment survey of the condition of the oak woodlands on the Reserve and update the assessment information, as needed. The assessment survey would identify seral stage, canopy cover, dominant tree species, understory species, dead or dying trees, presence of pest infestations or diseases, occurrence and density of nonnative plants, opportunities for habitat enhancement and restoration, as well as problems that require treatment, monitoring or remediation
4 Conduct an initial assessment of oaks for potential pests (e.g., gold spotted oak borer), map and initiate measures to treat and prevent the spread of harmful insects that could damage/destroy the trees. Monitor annually. Under the WCB Grant to the SDNHM, a Diseased Tree Survey has been funded and began in 2020. Results should be available in 2021.
5. Compile an inventory of the individual Engelmann oaks on the Reserve (i.e., locations, DBH, canopy, seedling/sapling counts, and health of individual trees) as part of the oak woodland assessment. If needed, initiate an Engelmann oak planting program to enhance/augment the on-site population.

6. Utilize BMPs to minimize the introduction and spread of invasive plant species.

Chaparral, Scrub, and Grasslands

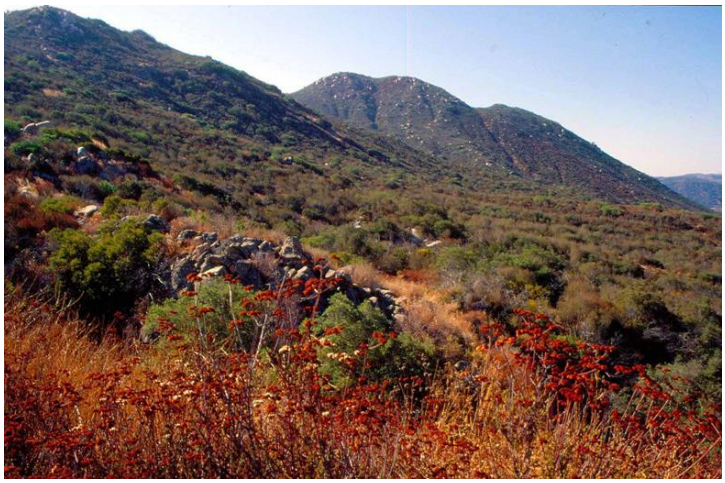
Chaparral, scrub, and grasslands are the predominant vegetation communities on the Reserve totaling approximately 1,079 acres. Over half of the special-status species that are present on the Reserve occur in these communities. Management concerns regarding chaparral, scrub and grasslands include the occurrence and spread of invasive nonnative species in areas that have repeatedly burned over the years.

Goals

1. Conserve the terrestrial upland vegetation communities as foraging, breeding, and sheltering habitat for the wildlife that occur within them.
2. Manage and control the spread of nonnative grasses into native upland habitat types to reduce the potential for flashy wildfire fuels and type conversion.
3. Prevent expansion or reduce cover and distribution extent of invasive plants of management concern. Eradicate new infestations of invasive plants before they become established.

Tasks

1. Map and maintain a list of invasive plants of management concern that threaten the integrity and persistence of terrestrial habitats native to the upland communities.
2. Update the Classification and Assessment with Landsat of Visible Ecological Groupings (CalVEG) assessment every 10 years and after a major disaster, (such as wildfire); thus allowing for determination that native plant communities' persistence, species composition, and species diversity are being retained.
3. Continue to implement nonnative plant control on an annual basis and target nuisance species, such as nonnative herbaceous and grass species.
4. Promote the recovery of stand structure, species composition, and wildlife habitat functions of the chaparral and scrub habitats burned in the numerous wildfires and in any future wildfires.
5. Manage the natural succession of species composition and structure of the communities to maintain and enhance conditions that will benefit wildlife species. Management may include, but would not be limited to grazing, mechanical methods, herbicides, or prescribed fire.
6. Utilize BMPs to minimize the introduction and spread of invasive plant species.



Typical scrub-covered hillside at Boden Canyon, CDFW file photo

MSP Roadmap for Management of Vegetation Communities

The San Diego Management and Monitoring Strategic Plan (MSP) Roadmap (MSP Volume 1.Chapter 1) is a proactive and dynamic document with a data portal that was prepared for the San Diego Association of Governments (SANDAG) by the SDMMP in conjunction with The Nature Conservancy and federal, state and local agencies involved in the conservation, protection and management of the plant and wildlife species and their habitats found in San Diego County. The MSP is a roadmap that unites the MSCP with other regional planning efforts (ie, MHCP, proposed NCP), various Subarea Plans and even those large efforts outside of San Diego County (Riverside MSCHP, Orange County NCCP). The MSP document incorporates three distinct, recently completed, strategic plans: 1) connectivity, 2) invasive plant management, and 3) threats and stressors to species and vegetation communities. The MSP geographic area (MSPA) covers the MSCP, the Multiple Habitat Conservation Plan (MHCP) and the proposed North County Plan (NCP). It includes approximately 628,648 acres of conserved lands within a 1,765,147-acre area. There are 11 Management Units, and the MSP addresses 111 plant and animal species. See Figure 3 that shows the Regional Planning Efforts and the MSPA.

The MSP was intended "to fulfill the need for a strategic approach to implement management and monitoring objectives in a cost-effective manner" relating specifically to the various Regional Planning efforts occurring throughout San Diego County. CDFW, through this LMP, has identified the priority species and habitats in the various regional plans and in the MSP, and has identified potential management and monitoring goals and tasks that can be implemented on the Reserve by CDFW staff to contribute to the overall regional preserve system.

It is important to note that implementation of any tasks will be further based on high priority within CDFW, and according to staffing and funding availability.

The Boden Canyon Ecological Reserve is located within Management Unit 5 of the MSP. Twenty-six species (2 plants and 24 wildlife species) that are both documented in the Reserve and addressed in the MSP are listed in Table 6 below. The various MSP species were categorized by risk level and vegetation management needs (MSP Volume 2, chapter 2, 2017).

Table 6. Focus Management Group Categories for MSP Species Documented within Boden Canyon Ecological Reserve

PLANTS

Species	Vegetation Management	Species Management
Palmer's Goldenbush	VF (CSS, CH)	
Engelmann Oak	VF (CH, GR, OW)	

INVERTEBRATES

Species	Vegetation Management	Species Management
Harbison's dun skipper		SL (OW)

AMPHIBIANS

Species	Vegetation Management	Species Management
Arroyo toad		SO (RIP)
Western Spadefoot toad	VF (CSS)	

REPTILES

Species	Vegetation Management	Species Management
Coast horned lizard	VF (CSS, CH)	
Orange-throated whiptail	VG (CSS, CH)	
Red diamond rattlesnake	VG (CSS, CH)	
Two-striped garter snake	VG (RIP)	

BIRDS

Species	Vegetation Management	Species Management
Osprey	VG (OW)	
Northern harrier		SO (GR)
Cooper's hawk	VG (CSS, CH, RIP, OW)	
Ferruginous hawk	VG (GR)	
Least Bell's vireo		SO (RIP)
Western bluebird	VG (OW)	
Grasshopper sparrow	VF (GR)	
Bell's sage sparrow	VF (CH)	
Rufous-crowned sparrow	VG (CSS)	
Yellow-breasted chat	VF (RIP)	
Tri-colored blackbird		SL (GR)
Golden eagle		SO (CH, GR, OW)

MAMMALS

Species	Vegetation Management	Species Management
Pallid bat		SL (CSS, GR, OW)
Townsend's big eared bat		SO (CH, RIP, OW)
San Diego pocket mouse	VG (CH)	

Species	Vegetation Management	Species Management
Southern mule deer		SS (CH, OW)
Mountain lion		SL (CSS, CH, OW, RIP)

CSS: Coastal Sage Scrub; CH: Chaparral; GR: Grassland; OW: Oak Woodland; RIP: Riparian

In summary, the following definitions describe each management category in the above table:

MSP VF: Vegetation Management Focus Group where the species in this group have limited distribution in the MSPA and/or they *DO* have specific vegetation characteristics that need to be managed for persistence in the MSPA.

MSP VG: Vegetation Management Focus Group where species in this group have a wider distribution in the MSPA or that *do not have* specific vegetation characteristics that need to be managed.

MSP SL: Species Management Focus Group SL species are species whose persistence in the MSPA is at high risk of loss without immediate management action above and beyond that of daily maintenance activities.

MSP SO: Species Management Focus Group SO are species whose persistence of 1 or more significant occurrences in the MSPA is at high risk of loss without immediate management action above and beyond that of daily maintenance activities.

MSP SS: Species Management Focus Group SS are species with occurrences considered more stable and their persistence is at lower risk of loss compared to SL and SO species; however, these species still require species-specific management actions.

In the Vegetation Management Focus Groups there are five vegetation communities on the Reserve that are included in the MSP, including coastal sage scrub, chaparral, grassland, riparian and oak woodland.

MSP Goals and Tasks for coastal sage scrub habitats:

There are 36 MSP species that utilize coastal sage scrub habitats. Of these, 9 are present on the Reserve, including 3 VF and 4 VG species. The coastal sage scrub community also contains two Species Management Focus Group SL species that have been detected on the Reserve. These are discussed below in the Species Management Section, Chapter IV, C.2.

Goals 1 and 2

1. Establish and implement a long-term monitoring plan for coastal sage scrub habitats, including areas burned and unburned in wildfire events.
2. Test and develop Best Management Practices (BMPs) to control non-native plants at a landscape scale, particularly annual grasses that pose a risk of type converting coastal sage scrub into nonnative grassland.

Task

1. Conduct large-scale management experiments to test effectiveness of different plant control methods including, grazing, prescribed fire, herbicide, and mechanical methods.

Goal 3

1. Determine the distribution, status, habitat associations, threats and management needs of the VF species on the Reserve.

Task

1. Palmer's goldenbush: Inspect and manage. Results will inform a region-wide coastal sage scrub management plan planned for the 2022-2026 MSP planning cycle.
2. Coast horned lizard: Continue participation in the region-wide next generation DNA sequencing study that began in 2015. Consider contributing the Reserve as a research sampling site.
3. Western spadefoot toad: Protect, enhance and restore habitats; participate in regional efforts to conduct focused surveys throughout the MSPA.

Goal 4

1. Monitor the detected VG species on a routine basis when conducting coastal sage scrub surveys, focused guild surveys in coastal sage scrub (herp arrays, bird surveys) or implementing habitat improvements in coastal sage scrub. These VG species include:
    - Orange-throated whiptail
    - Red-diamond rattlesnake
    - Southern California rufous-crowned sparrow
    - Cooper's hawk

MSP Goals and Tasks for chaparral habitats:

There are 50 MSP species that utilize chaparral habitats. Of these 50, 12 are present on the Reserve, including 4 VF and 4 VG species. The chaparral community also contains four Species Management Focus Group species: one SL species, two SO and one SS species that have been detected on the Reserve. These four are discussed below in the Species Management Section, Section C.2.

Goals 1 and 2

1. Maintain, enhance and restore chaparral on conserved lands, such as the Reserve, that support or have the potential to support VF species so they persist within the MSPA over the long term.

2. Establish and implement a long-term monitoring plan for chaparrals, including areas burned and unburned in wildfire events.

Task

1. Collect information from present through 2021 to inform the long-term management and vegetation monitoring program scheduled for the 2022-2026 MSP planning cycle.

Goal 3

1. Monitor chaparral VF species during the 2022-2026 MSP Planning cycle.

Task

- Bell's sage sparrow: conduct focused surveys 2022-2026
- Palmer's goldenbush: conduct focused surveys 2022-2026
- Engelmann oak: conduct focused surveys 2022-2026
- Coast horned lizard: conduct focused surveys 2022-2026

Goal 4

1. Monitor the detected chaparral VG species on a routine basis when conducting chaparral-based surveys, focused guild surveys (herp arrays, bird surveys or small mammal trapping) or implementing habitat improvements in chaparral habitat. These VG species include:

    - Orange-throated whiptail
    - Red-diamond rattlesnake
    - Cooper's hawk
    - Northwestern (San Diego) pocket mouse

MSP Goals and Tasks for grassland habitats:

There are 29 MSP species that utilize grassland habitats. Of these 29, seven are present on the Reserve, including 2 VF and 1 VG species. The grassland community also contains two Species Management Focus Group SL species and two SO species that have been detected on the Reserve. These are discussed below in the Species Management Section, Section C.2.

Goals 1 and 2

1. Maintain, enhance and restore grassland habitat on conserved lands, such as the Reserve, that support or have the potential to support VF species so they persist within the MSPA over the long term.

2. Test and develop BMPs to control non-native grasses and forbs at a landscape scale, particularly those annual grasses that pose a risk of type converting native grasslands into nonnative grassland.

Task

1. Conduct large-scale management experiments to test effectiveness of different plant control methods including, grazing, prescribed fire, herbicide, and mechanical methods.

Goal 3

1. Determine the distribution, status, habitat associations, threats and management needs of the grassland VF species on the Reserve. This information will inform the development and implementation of a grasslands management strategy that includes a monitoring component for the 2022-2026 MSP planning cycle.

    - Grasshopper sparrow
    - Engelmann oak

Goal 4

1. Monitor the detected grassland VG species on a routine basis when conducting chaparral-based surveys, focused guild surveys (bird surveys) or implementing habitat improvements in chaparral habitat. The VG species include:

    - Ferruginous hawk

Goal 5

1. Support in-house seed bulking propagations of native grass and forb species for restoration projects.

MSP Goals and Tasks for riparian habitats:

There are fourteen MSP species that utilize riparian forest and scrub habitats. Of these fourteen, eight are present on the Reserve, including one VF and two VG species. The riparian communities also contain one Species Management Focus Group SL species and three SO species that have been detected on the Reserve. The SL and SO species are discussed below in the Species Management Section, Section C.2.

Goal 1

1. Maintain, enhance and restore riparian habitat on conserved lands, such as the Reserve, that support or have the potential to support VF species so they persist within the MSPA over the long term.

Task

1. Collect information on habitat and species associated with riparian habitats, including current extent of tree mortality as a result of drought, pests and fungal pathogens, especially Polyphagous shot hole borer/*Fusarium* complex and the fungal pathogen, *Neofuscicoccum parvum*.

Goal 2

1. Using information collected above, establish and implement a long-term monitoring plan for riparian habitats for the 2022-2026 planning cycle.

Goal 3

1. Participate in the regional monitoring program for riparian bird communities, including focused monitoring for the one VF species (yellow-breasted chat) in the riparian habitat within the Reserve.

Goal 4

1. Monitor the detected VG species on a routine basis when conducting riparian habitat surveys, focused guild surveys in riparian (herp arrays, bird surveys) or implementing habitat improvements in riparian habitats. These VG species include:
    - Two-striped gartersnake
    - Cooper's hawk

MSP Goals and Tasks for oak woodland habitats:

There are sixteen MSP species associated with oak woodland habitat. Of these 16 species, nine are present on the Reserve, including one VF and two VG species. The oak woodland community also contains a total of six in the Species Management Focus Group, three SL species, two SO species and one SS species, that have been detected on the Reserve. These are discussed below in the Species Management Section, Section C.2.

Goal 1

1. Maintain, enhance and restore oak woodland habitat on conserved lands, such as the Reserve, that support or have the potential to support VF species so they persist within the MSPA over the long term, including the VF species Engelmann oak.

Task

1. Collect information on habitat and species associated with oak woodland habitats, including current extent of tree mortality as a result of drought, pests and fungal

pathogens, especially golden spotted oak borer and Polyphagous shot hole borer/*Fusarium* complex.

Goal 2

1. Using information collected above, establish and implement a long-term monitoring plan for riparian habitats for the 2022-2026 planning cycle.

Goal 3

1. Participate in regional efforts to update the 2014 aerial imagery to map current extent of dead oaks across the MSPA.

Goal 4

1. Conduct focused surveys for Engelmann oak during planning cycle 2022-2026

Goal 5

1. Monitor the detected VG species on a routine basis when conducting oak woodland habitat surveys, focused guild surveys in oak woodland (herp arrays, small mammal trapping, bird surveys) or implementing habitat improvements in oak woodland. These VG species include:
    - Cooper's hawk
    - Western bluebird

Wildlife Corridors

As discussed in Section III. F. above, Boden Canyon Ecological Reserve is situated in the landscape such that it provides both Regional and Local wildlife corridors. One of CDFW's main purposes for the acquisition of this property was to conserve the known linkages important to all wildlife in and through the Reserve while at the same time contributing to the broader, regional conservation efforts of the MSCP (State of California, WCB minutes, 1998).

Goals

1. Facilitate the movement/dispersal of plants and animals within the Reserve to conserve the natural ecosystem dynamics and regional biodiversity.
2. Continue to work towards the conservation, protection, enhancement, and identification of regional landscape linkages that connect the Reserve to other wildland areas.

Tasks

1. Continue to coordinate with local communities, county, state, and federal agencies, research institutions, and relevant organizations to develop an ecologically sound regional biological corridor system. In addition, CDFW will discourage urban, suburban, and infrastructure planning that does not prevent, through avoidance or mitigation, the degradation and fragmentation of habitat.
2. Actively encourage and coordinate with other entities to acquire or secure land acquisitions to ensure key biological corridors are conserved or enhanced.
3. Interpret for visitors the ecological significance of biological corridors, with emphasis on the Reserve and the surrounding region.
4. Install cameras at various locations within the Reserve to monitor wildlife movement. This task has begun through the WCB Grant to the SDNHM; results should be available in 2021.
5. Participate in regional and statewide efforts to band, collar or otherwise track wildlife to increase overall knowledge of wildlife use, movement and dispersal.

Buffers

Buffers, such as dedicated municipal open space (City and County of San Diego properties), are relatively low-use areas between the Reserve and larger adjacent Cleveland National Forest (to the north and east) and private properties (to the west). Buffers can serve to protect adjacent natural habitats from potentially destructive impacts like potential development or increased roads or infrastructure. Some types of land use outside of the Reserve's boundaries cause significantly negative impacts to the Reserve. Impacts may include exotic species invasion; the spread of wildfire; air, soil, and water pollution; noise pollution; predation and competition for resources by domestic pets; habitat fragmentation and the loss of habitat for plants and animals that would otherwise occur outside the boundaries of the Reserve.

Goal

1. As regional development pressures increase, establish, maintain, and protect buffers adjacent to the Reserve.

Tasks

1. Obtain, as necessary, and review regional conservation plans, management and monitoring plans or fee title documents pertaining to land use in the vicinity of the Reserve. Collaboration with the agencies and groups responsible for implementing these plans will help optimize the value of CDFW land acquisitions, management of critical habitat, and restoration activities.
2. Plan with neighboring land and business owners, communities, and governmental agencies to develop and maintain a buffer system along the outer edge of the Reserve boundaries.

2. Species Management

Many sensitive plant and wildlife species occur on Reserve including species with federal and state designations such as the least Bell's vireo and arroyo toad, as well as species that are covered by local conservation planning efforts. Since the passing of the NCCP Act in 1991, State and local conservation efforts have focused on ecosystem and multi-species protection. This has led to the conservation of large, intact areas of sensitive habitats, such as Boden Canyon. Management actions have also begun to focus more on habitats and less on individual species, based on the theory that healthy habitats will support and sustain healthy populations of plant and animal species. If we extrapolate this theory to the Reserve, then the tasks undertaken to improve the quality of the onsite habitats will also benefit the sensitive species these habitats support.

The following sensitive plants and wildlife, which occur on Reserve, are currently covered under an existing conservation plan, covered in the MSP Roadmap and/or are addressed in the above Habitat Management section, therefore, with the exception of Palmer's goldenbush, they will not be addressed in the Species Management section:

- Palmer's goldenbush
- Engelmann oak
- Western spadefoot toad
- Coast horned lizard
- Orange-throated whiptail
- Red-diamond rattlesnake
- Cooper's hawk
- Southern California rufous-crowned sparrow
- Bell's sage sparrow
- Northwestern pocket mouse
- Grasshopper sparrow
- Ferruginous hawk
- Yellow-breasted chat
- Two-striped gartersnake
- Western bluebird

Federal and State status species

There are three categories of special status species discussed in this LMP:

- federal or state Endangered or Threatened species
- state Fully Protected species, and
- state Species of Special Concern

These species include those that are either legally protected under the federal and/or state Endangered Species Acts (ESA or CESA) or other regulations. This includes species that are listed

or are candidates for listing as endangered or threatened under the federal ESA or the California ESA. The listing process for both United States Fish and Wildlife Service (USFWS) and the CDFW is lengthy, very detailed and incorporates timelines for completion of various actions. Each requires submittal of biological information through a petition or agency process, notifications to the public and affected/interested entities, a thorough review and analysis of all submitted information, and finally, a decision on whether or not listing is appropriate and warranted. The state procedure is a collaborative process involving both CDFW and its decision-making body, the California Fish and Game Commission (FGC).

Other state status species include species of importance to CDFW as Fully Protected species or as Species of Special Concern.

The classification of Fully Protected was the State's initial effort back in 1957 to identify and provide additional protection to those animals that were rare or faced possible extinction. Lists were created for fish, amphibians and reptiles, birds, and mammals. Most of the species on these lists have subsequently been listed under the California and/or Federal Endangered Species Acts; the exceptions are white-tailed kite, golden eagle, trumpeter swan, northern elephant seal, and ring-tailed cat. The white-tailed kite and the golden eagle are tracked in the CNDDB; the trumpeter swan, northern elephant seal, and ring-tailed cat are not. The Fish and Game Code sections dealing with Fully Protected species state that these species "...may not be taken or possessed at any time and no provision of this code or any other law shall be construed to authorize the issuance of permits or licenses to take any fully protected" species, although take may be authorized for necessary scientific research. This language arguably makes the "Fully Protected" designation the strongest and most restrictive regarding the "take" of these species. In 2003, the code sections dealing with Fully Protected species were amended to allow the Department to authorize take resulting from recovery activities for state-listed species. More information on Fully Protected species and the take provisions can be found in the Fish and Game Code, (birds at §3511, mammals at §4700, reptiles and amphibians at §5050, and fish at §5515). Additional information on Fully Protected fish can be found in the California Code of Regulations, Title 14, Division 1, Subdivision 1, Chapter 2, Article 4, §5.93. The category of Protected Amphibians and Reptiles in Title 14 has been repealed. The Fish and Game Code and Title 14 of the California Code of Regulations are available online. (CDFW Special Animals List, Listing and Status Information, April 2018).

California Species of Special Concern are determined through another very thorough process. It is the goal and responsibility of the Department of Fish and Wildlife to maintain viable populations of all native species. To this end, the Department has designated certain vertebrate species as Species of Special Concern because declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction. The goal of designating species as “Species of Special Concern” is to halt or reverse their decline by calling attention to their plight and addressing the issues of concern early enough to secure their long-term viability. Not all “Species of Special Concern” have declined equally; some species may be just starting to decline, while others may have already reached the point where they meet the criteria for listing as a “Threatened” or “Endangered” species under the State and/or Federal Endangered Species Acts. More information is available at: https://www.wildlife.ca.gov/Conservation/SSC. (CDFW Special Animals List, Listing and Status Information, April 2018).

The special status species, and their goals and tasks, are listed below:

***Endangered, threatened species*:**

Least Bell's vireo, USFWS file photo

There are two Endangered species on the Reserve, one bird and one amphibian. One is the state and federally listed endangered lease Bell's vireo (*Vireo bellii pusillus*), and the other is the federally listed endangered arroyo toad (*Anaxyrus californicus*). A third species in this category, a bird, detected on the Reserve was listed in 2019 as a state Threatened species, the tricolored blackbird (*Agelaius tricolor*). All three species are also covered in the MSCP and are addressed in the MSP Roadmap document (see Chapter IV, Section 2.2 on MSCP/MSP below)

- Least Bell's vireo
- Arroyo toad
- Tricolored Blackbird

Fully Protected species:

There are three Fully Protected species on the Reserve, two birds and one mammal, the golden eagle (Aquila chrysaetos), the white-tailed kite (Elanus leucurus) and the ringtail (Bassariscus astutus). Of these three, only the golden eagle is covered in the MSCP and addressed in the MSP Roadmap (see MSCP/MSP Section 2.2 below).

- Golden eagle (see MSCP/MSP Section 2.2 below)
- White-tailed kite

Goals

1. Ensure the continued existence of the white-tailed kite on the Reserve.
2. Maintain breeding and foraging habitat on the Reserve.
3. Manage open grassland areas to increase prey for the white-tailed kite and other foraging raptors.
4. Conserve woodland habitats and large expanses of chaparral, scrub and grassland habitats for the white-tailed kite.
5. Explore specific recommendations for restoring or enhancing nest sites or providing artificial nesting platforms for those raptors that would benefit from a platform.

Tasks

1. Coordinate with and participate in raptor monitoring efforts throughout the County, including those being conducted through the MSP.
2. Continue to implement nonnative plant control on an annual basis and target nuisance species, such as tamarisk and nonnative herbaceous and grass species in riparian and oak woodland habitats.

Ringtail

Goals

1. Ensure the continued existence of the ringtail on the Reserve.
2. Maintain breeding and foraging habitat on the Reserve.
3. Manage chaparral, oak woodlands, riparian areas, rock outcrops, hollow trees and snags (this would also benefit kites).
4. Coordinate with any regional management or monitoring plans developed for the ringtail.

Tasks

1. Conduct evaluation of existing ringtail burrows, dens, or other breeding areas, and determine potential enhancements for breeding habitats.
2. Following a fire event, conduct focused surveys for ringtails, including their tracks and nesting areas.
3. Provide any information on ringtail distribution to CNDDB and the MSP database.

Species of Special Concern

A Species of Special Concern (SSC) is a species, subspecies, or distinct population of an animal native to California that currently satisfies one or more of the following (not necessarily mutually exclusive) criteria:

- Is extirpated from the State or, in the case of birds, is extirpated in its primary season or breeding role;
- Is listed as Federally-, but not State-, threatened or endangered; meets the State definition of threatened or endangered but has not formally been listed;
- Is 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;
- Has naturally small populations exhibiting high susceptibility to risk from any factor(s), that if realized, could lead to declines that would qualify it for State threatened or endangered status.

There are 20 Species of Special Concern that have been detected on the Reserve, including two amphibians, five reptiles, seven birds, and six mammals, four of which are bats.

Seven SSC are addressed in the MSP under Vegetation (VG or VF) categories and were addressed in the Habitat Management Section above (see Chapter IV. C.1.b.).

- Western spadefoot toad
- Northern red-diamond rattlesnake
- Coast horned lizard
- Two-striped gartersnake
- Grasshopper sparrow
- Yellow-breasted chat
- San Diego pocket mouse

Five SSC either are covered in the MSCP or are in MSP species focus groups (SL, SO, SS). They are listed here; however, their goals and tasks are included in the MSCP/MSP Section below (See IV. C. 2.b.).

- Arroyo toad (also a federally endangered species)
- Tricolored blackbird (also state threatened)
- Northern harrier
- Pallid bat
- Townsend's big-eared bat

The following 9 SSC are not covered in the MSCP nor are they addressed in the MSP; their goals and tasks are listed below:

Coastal whiptail

Goals

1. Ensure the continued existence of the coastal whiptail on the Reserve.
2. Manage coastal sage scrub, chaparral, riparian, oak woodland habitat, and rocky areas.
3. Maintain existing large blocks of habitat within the Reserve by avoiding new or reducing any current degraded habitat barriers.
4. Expand large blocks of habitat by acquiring and conserving land adjacent to the Reserve.

Tasks

5. Conduct herptile trapping (herp arrays and/or pitfall traps) in the next two years and every five years thereafter.
6. Provide any information on coastal whiptail distribution to CNDDB and the MSP database.
7. As funding and staffing allow, conduct research on the effect of moderate habitat fragmentation, and determine connectivity between existing occupied patches of habitat.

Coast Patch-nosed snake

Goals

1. Ensure the continued existence of the coast patch-nosed snake on the Reserve.
2. Manage brushy areas including coastal sage scrub and chaparral habitat riparian, oak woodland habitat, and rocky areas.
3. Manage for coastal whiptail and orange-throated whiptail (*Aspidoscelis* lizards) as these are considered prey for the coast patch-nosed snake.
4. Expand large blocks of habitat by acquiring and conserving land adjacent to the Reserve.

Tasks

1. Conduct herptile trapping (herp arrays and/or pitfall traps) as funding and staffing allow, strive for conducting surveys every five years.
2. Remove degraded habitat that act as barriers and restore native habitats.
3. Provide any information on coast patch-nosed snake distribution to CNDDB and the MSP database.
4. As funding and staffing allow, conduct research on the effect of moderate habitat fragmentation, and determine connectivity between existing occupied patches of habitat.

Vaux's swift

Goals

1. Ensure the existence of Vaux's swift as a migrant bird species within the Reserve.
2. Maintain existing tall trees and woodland areas within the Reserve that provide seasonal habitat for Vaux's swift.

Tasks

1. Conduct seasonal monitoring in woodland areas and provide any information on the Vaux's swift to CNDDB.
2. Evaluate wintering/migratory habitat usage when this species is observed at the Reserve.

Olive-sided flycatcher

Goals

1. Ensure the continued existence of olive-sided flycatcher within the Reserve.
2. Maintain existing habitat including habitat edges and suitable snags of varying heights.
3. In the future, retain tall perching trees or snags within the Reserve when the opportunity occurs.

Tasks

1. Conduct breeding bird surveys for special status species as staffing and funding allow; strive for conducting surveys every five years. to determine whether sensitive species, including the olive-sided flycatcher breeds within the Reserve or is present on a migratory basis.
2. Conduct post-fire surveys to determine if olive-sided flycatcher use the post-burn edge as habitat.
3. Report results of any and all occurrences of olive-sided flycatcher to CNDDB.

Yellow warbler

Goals

1. Ensure the continued existence of yellow warbler within the Reserve.
2. Maintain and restore existing riparian habitat.

Tasks

1. Conduct breeding bird surveys for special status species as staffing and funding allow; strive for conducting every five years to determine whether sensitive species, including the yellow warbler breeds within the Reserve.
2. Participate in region-wide riparian bird surveys when they occur.
3. Conduct brown-headed cowbird trapping/removal.
4. Depending on funding and staffing, perform riparian habitat improvement projects including increasing the amount of riparian habitat and enhancing existing habitat such that various structural and successional stages within the riparian habitat is available for use by the yellow warbler.
5. Report results of all surveys to CNDDB and the MSP riparian bird database.

Loggerhead shrike

Goals

1. Maintain the existence of loggerhead shrike within the Reserve.
2. Manage riparian, shrub and grassland habitats within the Reserve used for breeding and wintering and including habitat microfeatures or structures (fences) that. enable the shrike's practice of impaling of prey.

Tasks

1. Conduct breeding bird surveys for special status species as staffing and funding allow; strive for conducting every five years to determine whether the loggerhead shrike breeds within the Reserve and/or whether it uses the Reserve on a migratory or year-round basis.
2. Participate in multi-state surveys through Partners in Flight (PIF) for the loggerhead shrike.

3. Report survey results to CNDDB and the PIF state coordinator.

Bryant's woodrat

Goals

1. Ensure the continued existence of the Bryant's woodrat on the Reserve.
2. Manage coastal sage scrub and chaparral habitat, rock outcrops, and cactus patches that provide sufficient materials for woodrat house construction.

Tasks

1. Conduct small mammal trapping as staffing and funding allow; strive for conducting every five years. This task occurred in 2020 under the WCB Grant to the SDNHM. Bryant's woodrat was detected at the Reserve in 2020.
2. Provide any information on Bryant's woodrat distribution to CNDDB and the MSP database.

Western red bat

Goals

1. Ensure the continued existence of the western red bat on the Reserve.
2. Manage for open water areas (creeks or pond) to provide necessary drinking water.
3. Manage wooded areas including riparian and oak woodland habitats, especially cottonwoods, sycamores and oaks.

Tasks

1. Conduct bat detection surveys as staffing and funding allow; strive for conducting every five years.
2. Consider western red bats in any drought-related monitoring, and potentially utilize drought funding for conducting any habitat enhancements or monitoring for western red bats.
3. Provide any information on western mastiff bat distribution to CNDDB and the MSP database.

Pocketed free-tailed bat

Goals

1. Ensure the continued existence of the pocketed free-tailed bat on the Reserve.
2. Manage preferred roosting sites such as high vertical cliffs, rock outcrops and boulders.
3. Manage coastal sage scrub, riparian and oak woodland habitats for roosting sites and foraging.
4. Manage any open water habitat on the Reserve, including providing a long unobstructed approach to allow for necessary drinking.
5. Coordinate with other regional entities in any telemetry or bat detection projects.

Tasks

1. Conduct bat detection surveys as staffing and funding allow; strive for conducting every five years.
2. Consider installing artificial bat boxes.
3. Provide any information on the pocketed free-tailed bat distribution to CNDDB and the MSP database.

MSCP-covered Species and MSP Roadmap species

Management of listed and MSCP-covered species has continued to change since 1996, based upon on-going research efforts in San Diego County. Under the original biological monitoring plan for the MSCP, monitoring of focal wildlife populations was prioritized towards "indicator" species with a goal of being able to detect significant long-term declines in populations (Ogden 1996). More recently, the *Management and Monitoring Strategic Plan for Conserved Lands in Western San Diego County, Vol. 1* (MSP, Strategic Plan, SDMMP 2013) was prepared for SanDAG, focusing on a comprehensive approach for managing multiple plant and animal species within San Diego County. For more on the MSP see the introductory paragraphs in the Habitat Management Element above (IV. C. 1.b.). CDFW, through its use of the MSP, will strive to identify the threats and stressors to a species or vegetation community and then adaptively manage as best as possible against them within the Reserve. This will be done by implementing invasive species mapping and treatment plan(s), a fire management plan, recreation plan, etc. The Reserve-based goals and tasks below tier off the regional, MSPA-wide goals and tasks and are meant to contribute to the full implementation of MSP goals and tasks.

There are three categories in the MSP's Species Management Focus Groups (SL, SO and SS). In summary, the following definitions describe each vegetation management category:

MSP SL: Species Management Focus Group SL species are species whose persistence in the MSPA is at high risk of loss without immediate management action above and beyond that of daily maintenance activities.

MSP SO: Species Management Focus Group SO are species whose persistence of 1 or more significant occurrences in the MSPA is at high risk of loss without immediate management action above and beyond that of daily maintenance activities.

MSP SS: Species Management Focus Group SS are species with occurrences considered more stable and their persistence is at lower risk of loss compared to SL and SO species; however, these species still require species-specific management actions.

Within the Reserve are four species in the SL group, five in the SO group and one species in the SS category that are addressed by the MSP Roadmap. The goals and tasks within the Reserve for each are addressed below:

SL species

Harbison's Dun Skipper

Goals

1. Protect, enhance and restore suitable habitat for the Harbison's dun skipper within the Reserve.

Tasks

1. As funding and staffing are available, conduct a habitat assessment for Harbison's dun skipper within the Reserve.
2. As funding and staffing are available, conduct host plant (San Diego sedge), adult, larval and hibernaculum surveys within the Reserve to determine the extent of the butterfly's range, population size, and to better understand habitat relationships within the Reserve. Use standardized protocols.
3. Submit survey results to CNDDB and to the MSP Database.
4. Participate in any regional or MSP-based efforts or studies regarding the Harbison's dun skipper (i.e. marking study, genomic sequencing programs, and associated genetic movement pattern studies).
5. As staffing and funding allow, implement pertinent tasks of the MSP-based Harbison's dun skipper Management Plan and high priority actions when it is completed.
6. Following a fire event, monitor for Harbison's dun skipper for at least three years, utilizing standardized MSP monitoring protocol.
7. Conduct post-fire habitat restoration as needed for host plants destroyed by the fire.
8. Potentially propagate host plant to increase its population within the Reserve.

Tricolored Blackbird

Goals

1. Protect, enhance and restore tricolored blackbird occupied and historically occupied habitat to create resilient, self-sustaining populations that provide persistence within the Reserve.
2. Determine the potential for maintaining the pond as a perennial source of water and conduct actions to meet this goal.

Tasks

1. Support statewide survey efforts for the tricolored blackbird by surveying within the Reserve every three years.
2. As funding and staffing allow, conduct a habitat assessment to determine suitable habitat for tricolored blackbirds within the Reserve.
3. Based on this habitat assessment, conduct annual presence/absence surveys, per protocol.
4. Based on the habitat assessment, annually inspect suitable nesting habitat at current and/or historically occupied sites within the Reserve to determine management needs.
5. Implement pertinent tasks and high priority actions of the MSP-based Management Plan (and/or any Recovery Plan) for tricolored blackbirds once it is completed.

6. When tricolored blackbirds are present, manage Reserve visitors and activities through education and signage to reduce threats to the tricolored nesting colony.

Mountain Lion

Goals

1. Enhance and expand areas occupied by mountain lion in San Diego County, including the Reserve, in large interconnected blocks of suitable natural vegetation surrounded by a limited number of high use roads.
2. Through CDFW involvement in land acquisitions, increase connectivity between the Reserve and suitable habitat areas to allow expansion and movement of mountain lion occurrences within San Diego County and adjacent counties to increase effective population size to sustainable levels.

Tasks

1. Participate in statewide and regional telemetry studies and modelling efforts to identify and prioritize potential mountain lion crossing locations.
2. Be actively involved with efforts to install wildlife crossing infrastructure improvements in areas identified through telemetry and including SR 76, SR 78, SR 79, I-15 and other high priority roads.
3. Actively participate with CDFW wildlife staff, UC Davis and other entities to utilize the Reserve as a location for mountain lion monitoring and tracking studies.
4. Provide relevant information on mountain lion observations within the Reserve to CDFW wildlife staff.
5. Implement pertinent tasks and high priority actions of any CDFW or CDFW-approved MSP-based future Management Plan for mountain lions.

Pallid Bat

Goals

1. Within the Reserve, protect pallid bat diurnal, nocturnal, and maternity roosts from destruction and human disturbance and enhance foraging habitat.

Tasks

1. As staffing and funding allow, conduct bat surveys to identify and locate pallid bats and any roosts within the Reserve.
2. As staffing and funding allow, conduct habitat assessment and collect habitat covariates for pallid bats within the Reserve using MSP standards.
3. Submit results of habitat assessment and surveys to CNDDB and the MSP database.
4. Review and, where feasible, implement the priority management actions proposed by the MSP (IMG) and the Pallid Bat Management Plan upon its completion.

SO species

Arroyo Toad

Goals

1. Protect and enhance existing arroyo toad populations and historic arroyo toad habitat within the Reserve.

Tasks

1. As funding and staffing allow, and after habitat changing events like a large fire, conduct a habitat assessment for the arroyo toad, and depending on results, conduct focused surveys using USGS survey protocols or other appropriate survey techniques for arroyo toads within the Reserve.
2. Continue to control non-native invasive plant species and restore areas with a potential for becoming suitable habitat.
3. Continue to control non-native, invasive and predatory aquatic animal species in areas where the arroyo toad is or where potential habitat exists.
4. Submit survey results to CNDDB and the MSP Database.
5. Contribute to the regional genetic study by providing samples collected within the Reserve.
6. Implement pertinent tasks and high priority actions of the MSP-based Management Plan for the arroyo toad.
7. During an environmental event (fire or flood) in or upstream of the Reserve, consider the potential need to rescue any known arroyo toads and conduct post-fire/flood event monitoring within the Reserve to document damage and recovery of arroyo toads and their habitat.

Northern Harrier

Goals

1. Protect and enhance northern harrier occupied and historically occupied habitat within the Reserve.

Tasks

1. As staffing and funding allows, conduct focused surveys for the northern harrier and other raptors within the Reserve to document current distribution and abundance, nesting sites and to assess habitat. Prepare site-specific management recommendations based on survey results and habitat assessments.
2. Submit results to CNDDB and the MSP database.

3. Implement pertinent tasks and high priority actions of the MSP-based Management Plan for the northern harrier once it is completed (expected by 2021).

Least Bell's Vireo

Goals

1. Protect, enhance and restore least Bell's vireo occupied and/or historically occupied habitat on the Reserve to ensure persistence or re-occupation by the species over the long-term.
2. Reduce threats and stressors to the species such as predation, parasitism by brown-headed cowbird and edge effects associated with trails or other allowed public uses.

Tasks

1. As staffing and funding allow, conduct focused surveys and habitat assessments within the Reserve for least Bell's vireo and other riparian birds.
2. As funding and staffing allow, conduct an assessment of known or potential infestations in riparian areas, including Shot Hole Borer/Fusarium Complex, and based upon this assessment; conduct control and treatment as needed.
3. Submit survey data to CNDDB and the MSP database.
4. Implement pertinent tasks and high priority actions of any state or federal Recovery Plan, and any MSP-based Management Plan for the least Bell's vireo upon its completion (expected 2021).
5. Map and treat invasive species, active restoration, and ensure the habitat is exposed to flood events to keep the habitat structure required for nesting.
6. Survey for cowbirds as part of other bird surveys, ensure appropriate habitat structure and limit trail use near riparian vegetation important to the species.

Golden Eagle

Goals

1. Protect and maintain golden eagles and their nesting and/or foraging habitat within the Reserve.

Tasks

1. Conduct golden eagle and raptor surveys within the Reserve as staffing and funding allow to determine distribution and abundance, wintering and nesting areas, and habitat usage.
2. If golden eagles are observed, provide information to regional and MSP contacts so that the Reserve may be included in any territory, eagle movement, or genetic research program.
3. Implement pertinent tasks and high priority actions of the MSP-based comprehensive Golden Eagle Management Plan upon its completion (expected by 2022).

Townsend's big-eared bat

Goals

1. Within the Reserve, protect Townsend's big-eared bat diurnal, nocturnal, and maternity roosts from destruction and human disturbance and enhance foraging habitat.

Tasks

1. As staffing and funding allow, conduct bat surveys to identify and locate Townsend's big-eared bats and any roosts within the Reserve.
2. As staffing and funding allow, conduct habitat assessment and collect habitat covariates for Townsend's big-eared bats within the Reserve using MSP standards.
3. When detected, annually inspect the vicinity of Townsend's big-eared bat roosts taking care to not disturb bats and use a regional monitoring protocol to collect covariate data on human activities and other threats to determine management needs.
4. Submit results of habitat assessment and surveys to CNDDB and the MSP database.
5. Review and, where feasible, implement the priority management actions proposed by the MSP (Important Management Gal - IMG) and the Townsend's big-eared bat Management Plan.

SS species

Southern Mule Deer

Goals

1. Through CDFW involvement in land acquisition programs, increase connectivity between the Reserve and suitable habitat areas to allow expansion and movement of southern mule deer occurrences within San Diego County and adjacent counties to increase effective population size to sustainable levels.
2. Maintain southern mule deer and suitable habitat within the Reserve.

Mule deer, CDFW file photo

Tasks

1. Through CDFW involvement in regional multi-species plans and in conjunction with other linkage assessments and implementation plans (e.g. mountain lion), integrate wildlife infrastructure recommendations to enhance deer movement based on these assessments and/or results of deer genetic studies.
2. Conduct a habitat assessment for southern mule deer within the Reserve and based on this assessment, identify and implement, as funding is available, habitat improvement projects for southern mule deer within the Reserve.
3. Include the Reserve in the bi-annual ground and/or aerial surveys as they are conducted by CDFW staff for Deer Management Unit (DMU) 510.

CNPS List 1B species

Plants with a California Native Plant Society (CNPS) California Rare Plant Rank of 1B are rare throughout their range with the majority of them endemic to California. Most of the plants that are ranked 1B have declined significantly over the last century. All of the plants constituting California Rare Plant Rank 1B meet the definitions of the California Endangered Species Act of the Fish and Game Code and are eligible for state listing. Within the Reserve there are three Rank 1B plants. Their goals and tasks are below:

Delicate Clarkia (CNPS List1B.2)

Goals

1. Ensure known occurrences of delicate clarkia persist and that suitable habitat is maintained within the Reserve.
2. Minimize the potential threats to this species including competition with nonnative species.

Tasks

1. Conduct rare plant surveys as staffing and funding allow, strive for conducting surveys every 3-5 years to determine the extent of delicate clarkia on the Reserve.
2. Inspect populations of known occurrences of delicate clarkia within the Reserve using standard protocols.
3. Submit survey results to CNDDB and the MSP database.
4. Based on survey results, determine management and enhancement needs and develop an implementation schedule.
5. Conduct routine monitoring to ensure species persistence and to identify potential threats and appropriate actions to remediate eliminate the threat.
6. Support research related to delicate clarkia and its habitat that would assist CDFW in the management and recovery of this species.

Palmer's Goldenbush (CNPS List 1B.1, MSCP covered species, MSP VF species).

For additional goals and tasks see above Habitat Management Section on coastal sage scrub and VF species.

Goals

1. Ensure known occurrences of Palmer's goldenbush persist and that suitable habitat is maintained within the Reserve.
2. Minimize the potential threats to this species including competition with nonnative species.

Tasks

1. Conduct rare plant surveys as staffing and funding allow and strive to conduct surveys every 3-5 years to determine extent of Palmer's goldenbush on the Reserve.
2. Inspect populations of known occurrences of Palmer's goldenbush within the Reserve using standard MSP and regional IMG protocols.
3. Submit survey results to CNDDB and the MSP database.
4. Based on survey results, determine management and enhancement needs and develop an implementation schedule.
5. Conduct routine monitoring to ensure species persistence and to identify potential threats and appropriate actions to remediate eliminate the threat.
6. Support research related to delicate clarkia and its habitat that would assist CDFW in the management and recovery of this species.

Robinson's Peppergrass (CNPS List 1B)

Goals

1. Ensure known occurrences of Robinson's peppergrass persist and that suitable habitat is maintained within the Reserve.

2. Minimize the potential threats to this species including competition with nonnative species.

Tasks

1. Conduct rare plant surveys as staffing and funding allow and strive to conduct surveys every 3-5 years to determine the extent of Robinson's peppergrass on the Reserve.
2. Inspect populations of known occurrences of Robinson's peppergrass within the Reserve using standard protocols.
3. Submit survey results to CNDDB and the MSP database.
4. Based on survey results, determine management and enhancement needs and develop an implementation schedule.
5. Conduct routine monitoring to ensure species persistence and to identify potential threats and appropriate actions to remediate eliminate the threat.
6. Support research related to Robinson's peppergrass and its habitat that would assist CDFW in the management and recovery of this species.

Goals for the following non-listed species of local importance:

- ***Chorizanthe leptotheca*,** Ramona Spineflower (CNPS List 4)
- ***Juglans californica***, Southern Black Walnut (CNPS List 4)
- ***Machaeranthera juncea*,** Rush Bristleweed (CNPS List 4)
- ***Polygala cornuta var. fishiae*,** Fish's Milkwort (CNPS List 4)
- ***Quercus engelmannii*,** Engelmann Oak (MSP VF species, CNPS List 4). For additional details on Engelmann oaks see above Habitat Management Section on oak woodland habitat and VF species.
- ***Scirpus acutus*, (**previously ***Juncus acutus*****)** Southwestern spiny rush (CNPS List 4)
- ***Viguiera laciniata*,** San Diego County Sunflower (CNPS List 4)

Goals

1. Ensure and maintain persistence of non-listed, but locally important plant species in the Reserve.
2. Minimize potential threats to these species.

Tasks

1. As staffing and funding allow, conduct broad scale sensitive plant surveys every five years or as appropriate based on the biology of the plant species known from the area and local environmental conditions to document the presence/absence of sensitive plant species. Surveys may be appropriate between five-year intervals when extraordinary events occur (e.g., exceptional weather patterns, fire).
2. Update occurrence information every five years.

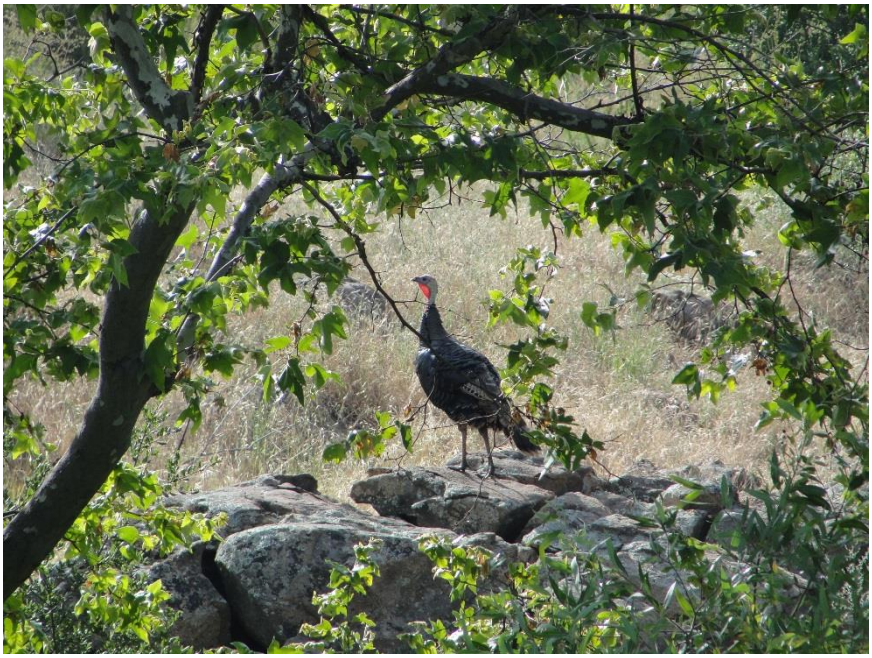
3. Implement nonnative plant control on an annual basis and target nuisance species, such as nonnative herbaceous and grass species in areas where the sensitive plant species have been observed on the Reserve.

Resident Game Bird and Game Mammal Species

Game species are generally defined as land mammals and birds not normally considered domestic animals. Game groupings in California include big game, upland game birds, resident small game and migratory game birds, including doves and waterfowl. The game species that are found in the Reserve include mule deer, California quail, mountain quail, wild turkey, mourning dove, Eurasian collared doves (recent detection), Audubon's cottontail rabbit, brush rabbit, and when the pond has water there can be a variety of waterfowl species (ducks and geese). At this time, CDFW regulations state that only upland game species may be hunted within the Reserve. For details on public use and the rules and regulations in the Reserve, see Chapter IV. D below.

Wild Turkey, *Meleagris gallopavo*

The wild turkey is a resident species native to North America but introduced to California. The wild turkey is thought to have been introduced into California during the second half of the nineteenth century. The wild turkey occurs throughout the Reserve and on adjacent private and public lands with regular movement between these areas.



Wild Hen Turkey. CDFW File Photo

Suitable habitat for this species is a combination of trees and open grasslands. Trees provide food, escape cover, and most important, nighttime roost sites where turkeys can avoid predators and adverse weather conditions (CDFG, Strategic Plan for Wild Turkey Management, 2004). Except for roosting, the turkey is largely a ground dwelling and feeding bird. Open

grasslands are the other key component to suitable wild turkey habitats, providing food for adults, insects for poults (young turkeys) and open areas where turkeys can forage while avoiding predation. The quality and interspersion of forested and open grassland habitats is thought to be more important than the ratio of one to the other (CDFG 2004). Turkeys can be expected to utilize all habitats on-site but is most often associated with grassland and oak woodland habitat. Foraging habits of wild turkeys are complex and dependent on multiple habitat-based variables. Turkeys are wide-ranging opportunistic and generalist feeders that consume both vegetative matter and to a lesser extent animal matter.

Goals

1. Maintain habitat for wild turkey to provide quality public hunting opportunities.

Tasks

1. Conduct surveys as staffing and funding allow; strive for conducting surveys every 3-5 years to assess habitat condition and abundance. The information will be used to guide public use management and enforcement needs.

California Quail, *Callipepla californica*

California Quail. Photo courtesy of Flickr

The California quail is a native resident species that occupies upland habitats throughout San Diego County. It is a common, permanent resident of low and middle elevations throughout California, being replaced by Gambel's quail in southeastern deserts. It is found in shrub, scrub and brush, open stages of conifer and deciduous habitats and along the margins of grasslands and croplands (Zeiner, et al. 1990b). The California quail is numerous throughout the Reserve in coastal sage scrub, open chaparral, and open woodland (Unitt, 2004). The California quail feeds

on legume and other seeds, on green vegetation, arthropods, grains and fruits. It forages on the ground, gleans, grazes and browses; jumps to pick seeds, blossoms and fruits. It searches and pounces on arthropods; rarely fly-catches. California quail are ground nesters with nests hidden in brush. Peak nesting period is May-June, clutches average 14 eggs with hatching generally in June. Broods remain together through the winter or joins others (Zeiner, et al. 1990b).

Goals

1. Maintain habitat for California quail populations so they persist within the Reserve.

Tasks

1. As staffing and funding allow, conduct a habitat assessment every 3-5 years to determine habitat management needs (i.e. brush piles, habitat restoration).
2. As staffing and funding allow, conduct a water source assessment and determine possibility of developing alternate water sources such as springs, or guzzlers.

Mountain Quail, *Oreotyx pictus*

The mountain quail is a native resident species that occupies the mountainous regions of San Diego County, occasionally occurring down to the base of the mountains, probably to drink at springs (Unitt 2004). Generally, it is found seasonally in open, brushy stands of conifer and deciduous forest and woodland, and in chaparral. Mountain quail eat green foliage, buds, acorns, flowers, fruits, seeds of forbs, shrubs and trees; also some arthropods. It gleans, scratches, plucks, grazes and browses on the ground and in foliage. It nests on the ground in herbage, at the base of tree, in rocks or near shrubs, log or stump. It breeds late March to late August with peak in May-July. One clutch a year is average, with an average of 10 eggs. Broods remain together through the winter (Zeiner, et al. 1990b). The species has been heard once in the Reserve by CDFW staff during an avian point-count survey in 2003 (Comrack pers. comm.). The mountain quail is considered uncommon throughout the Reserve due to lack of preferred topography and habitat.

Goals

1. Maintain habitat for mountain quail populations within the Reserve.

Tasks

1. As staffing and funding allow, conduct a habitat assessment; strive for conducting this assessment every 3-5 years to determine habitat management needs (i.e. brush piles, habitat restoration, water sources) for mountain, and other quail species.

Mourning Dove, *Zenaida macroura*

The mourning dove is a native year-round resident species within San Diego County. It is common throughout the county in all habitat types including croplands, pastures, other grasslands, open chaparral, desert habitats, open hardwood, hard-wood conifer, riparian and low elevation conifer habitat. The mourning dove is common throughout the Reserve. It feeds almost entirely on seeds of cereal grains, forbs and grasses, occasionally on snails and less often on insects. It obtains food from the ground by pecking. Doves require a water source to be nearby to drink once or twice a day. Mourning doves can breed year-round in California, with the peak in May to June. It can raise 2-6 broods a year. (Zeiner, et al. 1990b).

Goals

1. Maintain habitat for mourning doves within the Reserve.

Tasks

1. As staffing and funding allow, conduct a habitat assessment; strive for conducting this assessment every 3-5 years to determine habitat management needs (i.e. brush piles, habitat restoration). The information will also be used to guide public use management and enforcement needs.
2. Conduct a water source assessment and determine possibility of developing alternate water sources such as springs, or guzzlers.

Eurasian Collared Dove, *Streptopelia decaocto*

The Eurasian collared dove is a relatively recent species to occupy the Reserve and is a non-native species that can be hunted year-round with no bag limit (see public use section for more details). This dove is from subtropical Asia was introduced into North America in the 1980's and has continued to spread throughout the U.S. and California in the last two decades. It is both widespread and common from Southeast Asia to Western Europe. It has been documented on the Reserve by CDFW staff (J. Price pers. comm. 2018). The Eurasian collared dove is a medium sized bird, about the size of a rock pigeon with a distinct black "collar" around a portion of its neck, with a buff-pink-grey colored body, noticeable red legs and a black bill.

Its call is distinctly different than the mourning dove, a *coo-COO-coo* but sounding more Like a loud screeching *hah-hah*, particularly in flight just before landing. Its feeding behaviors are similar to other doves, eating grains, seeds, shoots and insects. Flocks are common up to fifty; however, flocks can number in the thousands. It breeds throughout the year, having two clutches, and frequents urban areas, farms, and trees. The population is still growing exponentially and the potential of disease transmission to native doves exists. Eurasian collared doves are known carriers of the parasite *Trichomonas gallinae* as well as Pigeon Paramyxovirus. Both *Trichomonas gallinae* and Pigeon Paramyxovirus can spread to native birds via commingling at feeders and by consumption of doves by predators. Pigeon Paramyxovirus is an emergent disease and has the potential to affect domestic poultry, making the Eurasian collared dove a threat to not only native biodiversity, but a possible economic threat as well (Wikipedia,

2018). Because the Reserve does not have domestic poultry or bird feeders, it is unknown whether the population of these non-native doves will increase within the Reserve in the coming years.

Goals

1. Monitor the abundance and distribution of Eurasian collared dove in the Reserve.
2. Determine whether the Eurasian collared dove is having a negative impact on the Reserve or on other wildlife species within the Reserve, and if yes, develop and implement a targeted removal strategy.

Tasks

1. As staffing and funding allow, conduct surveys every 3-5 years to determine abundance and distribution of Eurasian collared doves, and to determine population change over time.
2. Monitor habitats utilized by Eurasian collared doves within the Reserve to determine if any habitat degradation, environmental conditions or species changes occur due to this invasive species.
3. Coordinate with other local public or private landowners and CDFW programs statewide to determine potential or actual impacts associated with disease transmission to native doves or other species.
4. Based on observations and assessments, target removal of the species through increased hunter opportunity or through CDFW management.

Four other resident game birds, the Gambel's quail, spotted dove, ringed-turtle dove, and the band-tailed pigeon, while not observed on the Reserve have some potential to occur within the Reserve. Band-tailed pigeons generally occur at higher elevations than the elevations of the Reserve.

Two resident small game mammals are present in the Reserve, the brush rabbit and the Audubon's cottontail.

Brush Rabbit, *Sylvilagus bachmani*

Abundant, yearlong resident of dense, brushy areas, and of early successional stages of oak and conifer habitats throughout California west of the Sierra Nevada, except for dry Central Valley and arid desert regions. Brush rabbits are herbivorous, grazing on a variety of grasses and forbs in grasslands, meadows, and riparian areas. They are most active during crepuscular periods or during cloudy days. They nest in cavities 3-6 inches into the ground under cover of brush, breeding January-August with most activity March-June. Females produce 2-4 litters per year of 1-6 young. Brush rabbits occupy all upland habitats and are expected to be common throughout the Reserve (Zeiner, et al. 1990c). This species was detected in the Reserve in 2020 by SDNHM.

Goals

1. Maintain habitats within the Reserve so that brush rabbits persist over the long-term.

Tasks

1. Include brush rabbits as a target species in future mammal survey efforts, as staffing and funding allow, to determine abundance and distribution within the Reserve.

Audubon's cottontail, *Sylvilagus audubonii*

Audubon's cottontail (desert cottontail) inhabits most of the southern two-thirds of the state, excluding the higher elevations. They are abundant to common in grasslands, open forests, and desert shrub habitats. They are found in more open habitats than brush rabbits. Cottontails are herbivorous, grazing and browsing on grasses, forbs, tree and shrub leaves, twigs, fallen fruit, acorns, and tender bark. They construct fur-lined nests on the ground or in burrows, usually within dense shrub stands. They generally breed from December – June, with peak activity March-May. Females produce 2-4 litters each year of 1-6 young. The Audubon's cottontail occupies all upland habitats and are expected to be common throughout the Reserve. This species was detected in the Reserve in 2020 by SDNHM.

Goals

1. Maintain habitats within the Reserve so that Audubon's cottontail persists over the long-term.

Tasks

1. Include Audubon's cottontail as a target species in future mammal survey efforts, as staffing and funding allow, to determine abundance and distribution within the Reserve.

The black-tailed jackrabbit has not been detected within the Reserve and is unlikely to occur due to lack of preferred habitat. While the southern mule deer is a game species found on the Reserve, it is also categorized as an MSP SS Species. See Chapter IV, 2.b (MSP species - Goals and Tasks) above for discussion on goals and tasks for southern mule deer.

Invasive Plant or Animal Species of Management Concern

Invasive species are those that can be generally defined as non-native, exotic, or having recently expanded their known distribution range to the degree that they have become, or have the potential to become, a negative impact on the native ecosystem and the species endemic to the local area. Those invasive species of management concern are those that are 1) difficult to

control, 2) spread quickly, 3) do the most damage to natural resources, 4) or have highly negative effect(s) on listed, sensitive or declining species. Invasive species can outcompete native species, can consume resources needed by native species, and some can degrade native vegetation communities and habitats such that they type convert to a less productive habitat.

Bullfrog at Boden Canyon, photo by Tim Hovey

Some invasive species do more damage than others, and it is these species that CDFW desires to stop the spread, treat, and if possible, eradicate. Examples of invasive plants to be managed (controlled or removed) include Arundo (giant reed), tamarisk, Eucalyptus, pampas grass, and numerous grasses, such as rip gut brome. Examples of invasive wildlife species include wild pig, bullfrog, Eurasian collared dove, brown headed cowbird, and pests such as gold-spotted oak borer. In some cases, the potential damage a given invasive species can do is unknown or not visible until years, or decades, later. In the example of wild pig, damage can occur rapidly and efforts to eradicate are time consuming, expensive and difficult. A recent multi-agency eradication effort in San Diego County was largely successful, however, not all the pigs could be removed. This may lead to more habitat degradation in the future; dedicated monitoring and quick removal efforts will need to occur. No wild pigs have been observed within the Reserve.

A significant, and successful, effort by CDFW staff over the last 10-20 years has been the removal of non-native and invasive bullfrogs from the central pond area and other wetland and stream locations within the Reserve. The many years of drought and low water has naturally reduced the bullfrog problem within the Reserve. Bullfrog reduction benefits native amphibians, including the endangered arroyo toad.

Significant efforts by CDFW staff, contractors and others have been successful in removing many non-native plants (primarily tamarisk and pampas grass) and conducting annual monitoring is now sufficient to keep these plants in check.

Goals

1. Maintain a healthy, native ecosystem to the maximum extent practicable.
2. Remove invasive species of management concern as soon as possible.
3. Coordinate target removals with agency and private landowners upstream and adjacent to the Reserve to increase likelihood of success.

Tasks

1. Conduct annual monitoring of invasive plant species, and when found, develop treatment plan and removal schedule as soon as can occur based on staffing and funding. Strive for conducting full Reserve weed surveys every seven years.
2. Conduct focused monitoring efforts in conjunction with MSP Invasive Strategic Plan or other agency efforts.
3. Report monitoring findings to CDFW lands program and MSP invasive species contact.
4. Conduct trapping efforts for brown headed cowbirds when detected in the Reserve or within adjacent habitats, to alleviate any parasitism to nests of the endangered least Bell's vireo or other sensitive bird nests.
5. Continue removal efforts for bullfrogs within the Reserve; this species was detected in the Reserve in 2020 by SDNHM.
6. Monitor trends in Eurasian collared dove population, behaviors, and note any impacts.
7. Frequently look for sign of wild pig within the Reserve and remove as soon as possible.

Note: Additional goals and tasks for invasive species can be found in the various habitat sections above.

Impact Guidelines for Habitat and Species Management

In planning and implementing the habitat and species portion of the Biological Elements, CDFW will give priority to management activities that avoid direct impacts to protected resources including, native vegetation communities and the associated species they support. If direct impacts cannot be avoided, then site-specific plans will be prepared for management activities subject to CEQA review and must comply with all applicable regulations. Impact avoidance measures for management activities will include but not be limited to:

- Seasonal closure, signage, fencing, and/or informational kiosks to prevent public use of sensitive areas used for roosting and/or breeding by sensitive species. All structures would be installed outside of the applicable breeding seasons, and arroyo toad active season.
- No land disturbance within the stream channels without the requisite authorizations from CDFW, United States Army Corps of Engineers (ACOE), and Regional Water Quality Control Board (RWQCB). Also, any surface-disturbing activities (including vegetation removal) that could potentially impact federally listed species will be coordinated with the USFWS and formal/ informal consultation completed, as necessary.
- Restricted use of pesticides and herbicides in riparian habitat and wetlands. Allowed uses will be determined as identified on herbicide label and subsequent 679 recommendations from and overseen by CDFW personnel possessing a valid Qualified

Applicator License/Qualified Applicator Certificate [QAL/QAC] for herbicide application on the Reserve.

- Non-native plant species will be controlled using an integrated approach that relies on both non-chemical and chemical (i.e. herbicide) use strategies. The risk that herbicides pose to non-target organisms is dependent on both exposure and toxicity. This relationship between risk, exposure and toxicity can be assessed using the Hazard Quotient (HQ) method employed by numerous public agencies including the United States Environmental Protection Agency and the USFS. http://www.u.s.fed.us/foresthealth/pesticide/pdfs/PrepEnvironmentalDoc_11-2014. pdf. With this method, no significant risk to non-target species would be expected when the calculated HQ is below a pre-determined Level of Concern (LOC). To reduce the risk posed to wildlife species at the Reserve, no herbicide will be used unless its calculated HQ value is below the LOC for the appropriate exposure scenario.
- Additionally, the risk to non-target wildlife and special-status plant species will be reduced by making low-volume, spot-treatments using hand-held equipment targeted specifically at non-native plants. Broadcast applications will be uncommon. Other risk-reduction strategies that may be used include using buffer zones, shields, tarps or other physical barriers to protect non-target plants, using selective rather than non-selective herbicides, and timing herbicide applications so that they are made when non-target species are in less-susceptible life stages (i.e. dormancy).
- No fence removal during the bird breeding season unless pre-activity surveys have documented the absence of nesting birds in the project area.

3. Biological Monitoring Element

In an effort to remain consistent in monitoring within the South Coast Region of CDFW, much of the biological monitoring element below has been taken from the Cañada de San Vicente LMP that was approved in 2016. It was then modified to suit the Boden Canyon Ecological Reserve. This approach also increases efficiency in personnel time and provides opportunities for consolidation of funding for like projects.

Monitoring habitats and species responses to management tasks and natural disturbances is an integral part of an adaptive management program. Multispecies conservation monitoring programs include three main components: implementation (compliance) monitoring, effectiveness monitoring, and targeted studies (Atkinson et al. 2004).

- Implementation (compliance) monitoring tracks the status of plan implementation, ensuring that planned actions are executed.
- Effectiveness monitoring evaluates the success of the plan in meeting its stated biological objectives (Noss and Cooperrider, 1994). It includes determining the status and trends of resources (e.g., quantitative data on covered species), the status and trends of known pressures (e.g., invasive species), and the effects of management

actions on resources and known pressures (e.g., density of invasive plants measured before and then one to five years after herbicide treatment).

- Targeted studies increase the effectiveness of monitoring and management by improving knowledge about the ecological system and management techniques. Targeted studies may occur for only a short period of time rather than as long-term monitoring and typically are undertaken to resolve critical uncertainties and improving knowledge of natural systems under management (e.g., plant succession and weed dynamics in response to fire).

Monitoring is necessary for an effective adaptive management program; and can indicate whether a management action is having the intended benefit. The primary purpose of the Monitoring Program is to identify ways to conserve, enhance, and restore the native vegetation communities found on the Reserve; conserve and enhance the capacity of these communities to support populations of native species; and conserve the wildlife movement functions of the Boden Canyon drainages and Santa Ysabel Creek. CDFW will continue to strive to conduct the various types and components of monitoring to maintain and continually improve environmental conditions at the Reserve.

As stated previously, the Reserve is in the planning area of the MSCP, and in the multiple plan effort of the MSP Roadmap. Both programs require monitoring to determine whether specific conservation goals are being met. In an effort to meet the goals of both the MSCP and the MSP, CDFW has incorporated the goals of these plans, where appropriate, into the Monitoring Program for the Reserve. Monitoring will occur in a prioritized fashion and as staffing and funding is available.

Monitoring vegetation communities is key in the adaptive Monitoring Program. Approximately 80 acres of riparian/wetland vegetation (two alliances) occur within the Reserve representing approximately 6.5 percent of the total area (See Figure 12 and Table 3 – Note that vegetation mapping and acreages are approximate and not precise). Riparian corridors are generally more productive and have higher plant species richness than surrounding upland ecosystems. However, generally speaking, riparian systems are more linear in nature with higher edge to area ratios and can be more susceptible to invasion by non-native plants. Parameters for monitoring patterns in riparian vegetation include woody and herbaceous plant cover, species richness or composition (including relative importance of non-native and upland species), size/age structure of dominant riparian trees, and total vegetation volume.

Annual grasslands represent approximately 5.7 percent of the total area of the Reserve (approximately 70 acres). Grassland habitats at the Reserve are artifacts of previous land use regimes, including cultivated crops and grazing, and have become dominated by nonnative annual grasses and forbs. In the absence of grazing and fire, annual grasslands require active management to maintain their ecological integrity and structural diversity. Grassland habitat management activities may include prescriptive burning, grazing, mechanical treatments, and/or selective herbicide use. There is an opportunity to establish ecological baseline conditions, develop management scenarios that address long-term biological goals, and monitor the effectiveness of these strategies.

Oak woodlands are among the most biologically diverse habitats, providing nesting habitat, forage, and shelter for a wide variety of wildlife species. Approximately 83 acres of oak dominated vegetation (two alliances) occur within the Reserve representing approximately 6.8 percent of the Reserve.

The dominate vegetation types within the Reserve are the chaparral and scrub communities. Approximately 975 acres of eight different scrub alliances consisting of chamise chaparral, chamise-mission manzanita chaparral, sage brush-, sage scrub-, Diegan- and buckwheat-scrub mixes, deerweed scrub and laurel sumac scrub occurs within the Reserve. This represents approximately 80 percent of all vegetation within the Reserve. These habitats are found on xeric substrates and are fire adapted, able to re-sprout after fire events and through seeding (either producing seeds at an early age or germinating seeds caused by heat of the fire).

Establishing an Adaptive Management Approach

Land managers are frequently confronted with the quandary of how to manage resources with limited funding and incomplete information. One approach to this challenge is to simply begin, then adapt practices as knowledge increases. This approach starts by basing the LMP on the broadest ecological level (habitat), then working towards a comprehensive ecological inventory of the site, integrating data as it becomes available, measuring data against indicators of success, and modifying management strategies as new information is learned. This is the backbone of a comprehensive and adaptive land management plan.

Measuring conditions and responses of the ecosystem to both intentional (e.g., management actions) and natural changes (e.g., flooding) is a critical piece of the adaptive management feedback loop. Over time, monitoring indicates trends in species and habitats (e.g., increasing, decreasing, and static) that may be correlated to specific conservation and management activities.

While some management activities are straight forward (trash removal, sign posting), other management activities produce much greater uncertainty (habitat restoration). Due to the complex variables and uncertainty involved in managing and monitoring ecosystems and special-status species, the development of a biological monitoring and implementation program typically proceeds in the three phases (Atkinson et al. 2004).

Adaptive Management at the Reserve

Conducting Focused Surveys for Special-Status Species

A primary concern of the CDFW is the protection of special-status species and their habitats. Monitoring the presence of special-status species within and adjacent to the Reserve will contribute the scientific understanding of regional population trends for these species and will provide valuable information about the overall health of ecosystems at a larger landscape level.

Since birds occupy a wide variety of ecological niches and are relatively easy to monitor in comparison to other taxa, they are often used as focal species for monitoring. Monitoring their

status is key to understanding trends in the health of ecosystems within the Reserve and the region.

Collecting Useful Scientific Data

Data management begins with proper collection and recordkeeping in the field. Inventories and sampling protocols must be established so that different people can gather comparable datasets over time. Protocols should not be overly reliant on technology that is likely to change or become obsolete so that datasets are no longer replicable. Data must also be reported consistently to serve an adaptive management purpose.

Use of volunteers, student assistants and citizen scientists for data collection can take time and effort to organize and train, however using these groups can be beneficial to them and to CDFW. Collaboration with academic institutions and other agencies is key to collecting useful information especially when CDFW staffing resources are low.

Providing Quality Control

CDFW will guide the setup and implementation of the biological monitoring program, including development of the quality assurance program and specific protocols for data sampling. Reserve personnel should also coordinate with larger, regional resource planning to improve the long-term viability of habitats and species while providing access to additional data and technical expertise.

Biological Monitoring Goals and Tasks

Goal 1

Develop a Reserve-wide Monitoring Plan that incorporates priority needs for habitats and species based on existing information and needs to fill gaps in that information.

Tasks

1. Review current biological information for the Reserve (see Chapter III).
2. Determine which data sets need to be collected; prioritize if not previously collected or information is old.
3. Schedule staffing and funding to complete baseline surveys over the entire 1,221-acre Reserve.

Goal 2

Complete a resources inventory for the major vegetation communities (riparian/wetlands, oak woodlands, and chaparral, scrub/shrub and grasslands).

Tasks

1. Set up permanent plots for vegetation monitoring. Permanent vegetation monitoring plots provide consistent reference points from which to measure and monitor changes in species distribution, plant density, and canopy cover within a given habitat. These data are especially valuable when undertaking habitat restoration. Permanent vegetation monitoring plots should be established in each of the four major vegetation communities at the Reserve.
2. Set up permanent photo monitoring stations for annual documentation of habitat conditions. Photographs are by far the easiest monitoring tool available to a manager. They are an inexpensive visual record of the site over time. Establishing permanent photo points in each of the major vegetation communities at the Reserve will provide another method of documenting changes and compliment other monitoring programs.
3. Inventory and map distributions of invasive non-native plant populations and integrate data into the GIS database for the Reserve. Mapping invasive plant populations is the first step in prioritizing management activities directed towards controlling their spread.

Goal 3

Conduct updated presence/absence or focused surveys for special-status species (flora and fauna) to augment baseline surveys; use results for adaptive management actions.

Tasks

1. Schedule staffing and funding, as available, to conduct surveys based on underlying questions, concerns or environmental changes.
2. Schedule staffing and funding to survey for rare plants, focused small mammals, sensitive birds, sensitive mammals (including bats), sensitive amphibians and sensitive reptiles.
3. Schedule staffing and funding to conduct biological corridor usage studies in conjunction with the mammal surveys. Results will assist in region-wide corridor evaluations.
4. Submit occurrence data to CNDDB and the MSP MOM database.

Goal 4

Evaluate long-term monitoring strategies and resolve critical management uncertainties.

Tasks

1. Establish cooperative agreements with local and regional groups, academic institutions, and resource agencies to enhance special-status species habitats and monitor regional special-status species populations (including above tasks in Goals 1-3 when CDFW staff or funding are unavailable). Monitoring populations of special status species should be conducted periodically to assess overall habitat integrity, detect changes in distribution

and abundance, and detect positive and adverse effects of management activities, human use, and/or nonnative species.

2. Evaluate monitoring strategies periodically to identify and report changes that are warranted to maintain consistency with Reserve goals. This evaluation could include a review of the scientific literature and consultation with species and habitat experts. Implementation and Effectiveness monitoring will be conducted using a simple management action tracking system such as a spreadsheet.
3. Coordinate distribution of Reserve annual management reports and any proposed work plans.
4. To the extent practicable, this LMP will complement and utilize existing and developing approaches from the MSCP and MSP efforts.

The monitoring elements are summarized below in Tables 7-10, grouped by habitats, plants, invertebrate, and vertebrates (and further by wildlife guilds) found in the Reserve.

Detailed goals and tasks for habitat management and individual species management, including various monitoring elements, are found above in Chapter IV, Sections C.1 and C.2. The tasks will be utilized during work planning efforts and in scheduling personnel (see Chapter V.) The protocols/methodologies used in below tables are only suggestions and will likely be more refined during study design and/or data collection. Monitoring will depend on priorities, available staffing levels and funding.

Table 7. Biological Monitoring Element: Habitats

RIPARIAN AND OTHER WETLAND HABITATS

Task	Timing/Seasonal Restrictions	Protocols/Methodologies
Map and maintain list of invasive plants that threaten persistence of riparian & wetland habitats	Map and update every 5 years / when annual nonnative species begin to germinate, typically Mar-May	Conduct annual, visual inspections in areas previously treated or suspected to have nonnative species (e.g., areas with recent disturbance)
Nonnative plant control	Annually / prior to seed set for annual species	CDFW 679 permit (Internal Request to use Herbicide)
Boden Canyon tributaries and Santa Ysabel Creek bed and bank assessments	After major storm and wildfire events. Installation of erosion control measures in jurisdictional areas may require permits from CDFW and ACOE/Outside arroyo toad and bird breeding seasons	Visual inspections Installation of appropriate erosion control measures
Riparian tree mortality assessment to determine extent of mortality due to drought, pests and fungal pathogens (Polyphagus shot hole borer and Fusarium complex pathogens)	As funding and staffing allow/Outside of breeding season. A Diseased Tree Survey was funded in 2019 and surveys are scheduled for 2021 through the WCB Grant to SDNHM.	Conduct visual inspections of riparian trees per MSP guidelines

Task	Timing/Seasonal Restrictions	Protocols/Methodologies
Monitor MSP VF species (Riparian birds, including yellow-breasted chat) and VG species (two-striped garter snake and Cooper's hawk)	As funding and staffing allow or in conjunction with other monitoring efforts	Per MSP guidelines (bird surveys, herp arrays)

OAK WOODLAND HABITAT

Task	Timing/Seasonal Restrictions	Protocols/Methodologies
Map and maintain list of invasive plants that threaten persistence of oak woodlands	Update map every 5 years / when annual nonnative species begin to germinate, typically Mar-May	Conduct annual, visual inspections in areas previously treated or suspected to have nonnative species (e.g., areas with recent disturbance)
Nonnative plant control	Annually / prior to seed set for annual species	CDFW 679 permit (Internal Request to use Herbicide)
Oak woodlands assessment, include assessment for pests and diseased and dead oaks	As funding and staffing allow/ A Diseased Tree Survey was funded in 2019 and surveys are scheduled for 2021 through the WCB Grant to SDNHM.	Point intercept transects, belt transects, or quadrant sampling.
Engelmann oak inventory include assessment for pests and diseased and dead oaks	As funding and staffing allow/	Area searches / patch mapping
Conduct surveys for VF and VG species	As funding and staffing allow	Per MSP guidelines

CHAPARRAL, SCRUB/SHRUB AND GRASSLAND HABITAT

Task	Timing/Seasonal Restrictions	Protocols/Methodologies
Map and maintain list of invasive plants that threaten persistence of scrub and chaparral habitats	Update map every 5 years / when annual nonnative species begin to germinate, typically Mar-May	Conduct annual, visual inspections in areas previously treated or suspected to have nonnative species (e.g., areas with recent disturbance)
Nonnative plant control	Annually / prior to seed set for annual species	CDFW 679 permit (Internal Request to use Herbicide)
Update CalVEG assessment	As funding and staffing allow or in conjunction with other CDFW or local monitoring efforts or after major disaster	Per CDFW CalVeg program
Conduct surveys for VF and VG species (Cooper's hawk, western bluebird)	As funding and staffing allow or in conjunction with other monitoring efforts	Per MSP guidelines (bird surveys)

Table 8. Biological Monitoring Element: Sensitive Plants (Palmer's goldenbush, Delicate clarkia, Robinson's peppergrass and Englemann Oak)

SENSITVE PLANTS

Task	Timing/Seasonal Restrictions	Protocols/Methodologies
Conduct rare plant surveys	As funding and staffing allow and as needed / when annual species are present	Point or belt transect; visual inspections in areas known to have sensitive annual plant species
Map and maintain list of invasive plants that threaten persistence of sensitive plants and their habitats	Update map every 5 years/when annual nonnative species begin to germinate; typically, Mar-May	Conduct annual, visual inspections in areas previously treated or areas suspected to have nonnative species (e.g., areas with recent disturbance)
Nonnative plant control	Annually / prior to seed set for annual species	CDFW 679 permit (Internal Request to use Herbicide)

Table 9. Biological Monitoring Element: Sensitive Invertebrate (Harbison's dun skipper, MSP SL species)

SENSITIVE INVERTEBRATES

Task	Timing/Seasonal Restrictions	Protocols/Methodologies
Monitoring Program	Annual / Determined by MSP	MSP protocol
Map and maintain list of host plant (San Diego sedge) and conduct adult, larval and hibernaculum surveys	As funding and staffing allow/ following fire events and/or determined by MSP	Standard / MSP protocol
Map and maintain list of invasive plants that threaten persistence of Harbison's dun skipper habitat	Update map every 5 years / prior to seed set for annual species	Conduct visual inspections in areas previously treated or areas suspected to have nonnative species (e.g., areas with recent disturbance)
Nonnative plant control	Annually / prior to seed set for annual species	CDFW 679 permit (Internal Request to use Herbicide)
Habitat enhancement	As needed / during the rainy season	Accepted methodology

SENSITIVE REPTILES AND AMPHIBIANS

Task	Timing/Seasonal Restrictions	Protocols/Methodologies
Monitoring program for arroyo toad, western spadefoot toad and western pond turtle	As funding and staffing allow in spring and summer toad breeding season	USFWS - CDFW protocols/ USGS methodologies

Task	Timing/Seasonal Restrictions	Protocols/Methodologies
Monitoring program for other sensitive reptiles	As funding and staffing allow/breeding season	USGS or CDFW accepted protocols
Map and maintain list of invasive plants that threaten persistence of arroyo toad and western spadefoot toad	Update map every 5 years / when annual nonnative species begin to germinate; typically Mar-May	Conduct visual inspections in areas previously treated or areas suspected to have nonnative species (e.g., areas with recent disturbance)
Nonnative plant control	Annually / prior to seed set for annual species	CDFW 679 permit (Internal Request to use Herbicide)
Remove dense vegetation that impedes movement	As funding and staffing allow, as needed / after toads have moved to wintering areas	Visual inspection in areas that support toad dispersal
Eradicate nonnative animal species	As needed	Accepted protocols for the various species
Rescue as necessary in the event of fire or flood in or upstream of ER	As needed	Accepted CDFW and USFWS protocols

Table 10. Biological Monitoring Element: Sensitive vertebrates (State/Federal status and MSP species)

SENSITIVE BIRDS

Task	Timing/Seasonal Restrictions	Protocols/Methodologies
Targeted (breeding) surveys for riparian/wetland sensitive birds (tricolored blackbird, yellow warbler, yellow-breasted chat, least Bell's vireo)	As funding and staffing allow or in conjunction with MSP or other efforts/breeding season	USFWS or CDFW / per MSP guidelines
Targeted surveys for sensitive birds in upland habitats (chaparral, shrub/scrub, grassland and oak woodlands)	As funding and staffing allow or in conjunction with MSP or other efforts	USFWS or CDFW / per MSP guidelines
Map and maintain list of invasive plants that threaten persistence of sensitive bird habitat	Update map every 5 years / when annual nonnative species begin to germinate; typically, Mar-May	Conduct annual, visual inspections in areas previously treated or areas suspected to have nonnative species (e.g., areas with recent disturbance)
Nonnative plant control	Annually / prior to seed set for annual species	CDFW 679 permit (Internal Request to use Herbicide)
Restrict public use	As needed/Breeding season	Seasonal closure, signage, symbolic fencing, and/or informational kiosks
Conduct survey for and targeted removal of brown-headed cowbirds	As funding and staffing allow and as needed	CDFW protocol and methodologies

Task	Timing/Seasonal Restrictions	Protocols/Methodologies
Participate in MSCP riparian bird monitoring efforts	As determined by MSP Management Plan or CDFW, as funding and staffing allow	Accepted survey protocol

SENSITVE BIRDS - RAPTORS

Task	Timing/Seasonal Restrictions	Protocols/Methodologies
Conduct focused surveys for northern harrier, golden eagle, white-tailed kite, Cooper's hawk, ferruginous hawk, prairie falcon, osprey	As funding and staffing allow/per MSP	Accepted MSP or other raptor protocol
Map and maintain list of invasive plants of management concern that threaten persistence of raptor breeding of foraging habitat	Update map every 5 years / when annual nonnative species begin to germinate; typically, Mar-May	Conduct annual, visual inspections in areas previously treated or areas suspected to have nonnative species (e.g., areas with recent disturbance)
Nonnative plant control	Annually / prior to seed set for annual species	CDFW 679 permit (Internal Request to use Herbicide)
Restrict public use	As needed/Breeding season	Seasonal closure, signage, symbolic fencing, and/or informational kiosks
Participate in MSCP or MSP raptor monitoring efforts	As determined by MSP Management Plan(s) or CDFW, as funding and staffing allow	CDFW or MSP accepted protocol

SENSITIVE MAMMALS

Task	Timing/Seasonal Restrictions	Protocols/Methodologies
Conduct small mammal surveys	As funding and staffing allow / overnight surveys in spring-summer, breeding season. A small mammal survey was funded by WCB and conducted by SDNHM; results were available in early 2021.and incorporated herein.	CDFW or USGS/ Sherman live box traps and transects, visual observations, tracking plates
Conduct medium (ringtail, badger) and large mammal (mountain lion, deer) surveys	As funding and staffing allow/breeding season. A Wildlife Corridor Study was funded by WCB and conducted by SDNHM; results will be available in 2021.	CDFW accepted protocols / Telemetry, tracking stations, trail cameras, deer herd composition counts
Conduct habitat suitability assessment for small and medium sized mammals (burrows, dens)	As funding and staffing allow, in conjunction with surveys	Accepted protocols

SENSITIVE MAMMALS- BATS

Task	Timing/Seasonal Restrictions	Protocols/Methodologies
Inspect roost / breeding sites	As funding and staffing allow / during breeding season	Visual inspections in areas where bats may occur: cliffs, outcrops, caves, old structures
Restrict public use	As needed/Breeding season	Seasonal closure, signage, fencing, and/or informational kiosks
Participate in MSCP or MSP bat monitoring efforts	As determined by MSP, Management Plan(s) or CDFW, as funding and staffing allow	Anabat; accepted protocols

GAME SPECIES

Task	Timing/Seasonal Restrictions	Protocols/Methodologies
Game species inventory / census	As funding and staffing allow and as needed	Point counts, scat identification, photo points, trail cameras, tracking stations
Creation of brush piles	As funding and staffing allow/Outside breeding season of arroyo toad and sensitive bird species	N/A
Enhancement and repair of existing water sources; evaluation of need for additional artificial water sources	As funding and staffing allow, and as needed /fall-winter	N/A

Impact Guidelines for Biological Monitoring Element

In planning and implementing the biological monitoring portion of the Biological Elements, CDFW will give priority to monitoring efforts that use the most practicable and non-invasive methods available. This will ensure avoidance of direct impacts to protected resources. Impact avoidance measures for monitoring activities will include but not be limited to:

- Individuals conducting monitoring will be CDFW employees or otherwise authorized under Federal permit(s) or State MOU(s) applicable to the species being monitored.
- Species-specific protocols will be followed and care will be taken especially during breeding season surveys.
- All employees and individuals conducting monitoring will be aware of all species issues and potential for encounters while on the Reserve (i.e. potential for encountering arroyo toads on the Boden Canyon dirt road). Precautions will be taken to ensure no impact to listed species.

- No vegetation clearing or land disturbance will occur for monitoring efforts. In the event (i.e. installing herptile arrays) that vegetation might be modified, it will occur outside of the breeding season and accepted Best Management Practices (BMP) will be used as well as impact avoidance/reduction measures. Any surface-disturbing activities (including vegetation removal) that could potentially impact state or federally-listed species will be coordinated within CDFW and with the USFWS. Formal/ informal consultation will be completed as necessary.
- Non-native plant removal and use of pesticides and herbicides will not occur while breeding is occurring in the treatment area. The timing of herbicide applications will occur so that the treatments are most effective for the target species while avoiding any direct or indirect impacts to sensitive resources.

D. Public Use Elements: Goals, Tasks and Impact Guidelines

As mentioned earlier in this LMP, CDFW acquires lands for a variety of purposes. Generally, those lands that are open to public use include Wildlife Areas and Ecological Reserves. All lands administered by CDFW are subject to regulations adopted by the California Fish and Game Commission (Commission) pursuant to the California Code of Regulations (CCR) Sections 550, 550.5, 551, 552, 630 and 702. Ecological Reserves are also subject to the statutes adopted by the state Legislature in Sections 1580-85 of the Fish and Game Code https://www.wildlife.ca.gov/Lands.

The Commission determines whether designations and uses in proposed regulations are consistent with the relevant statutes as well as the purposes for which each land was acquired. Each proposed

Typical kiosk at the Reserve used for posting public information, CDFW file photo

designation and use is subject to review pursuant to state and federal regulatory requirements prior to being authorized. Boden Canyon was designated as an Ecological Reserve in 2000. Its authorized uses, also adopted in 2000, include the general uses and regulations applicable to all CDFW lands, and the area specific regulation of "upland game hunting allowed but only at such times and in the specific areas designated by the department" (14 CCR § 630 (d)(5)).

The general lands regulations and definitions in Sections 550, 550.5 and 630 are found at the CDFW Lands website and the section in the Fish and Game Code regarding Ecological Reserves

California Code of Regulations, Title 14, Section 630 regarding the current rules and regulations for Ecological Reserves.

California Code of Regulations, Title 14, Section 550 regarding the current rules and regulations for all CDFW lands

A summary of those regulations applicable to Boden Canyon Ecological Reserve in 2019-2020 is included below:

Section 550:

- Visitors are responsible for knowing and complying with all regulations pertaining to hunting and use of department lands
- Visitor entry is authorized only from sunrise to sunset except during department-authorized hunting when access at other times may be permitted
- It is unlawful for a visitor to enter without a valid entry permit or pass (see section 550.5)
- Special Use Permits, Environmental Education activities, and Environmental Research activities shall be conducted only under written authorization from the regional manager
- No visitor shall mine or disturb geologic formations, archaeological, cultural or anthropological artifacts, structures or resources; no visitor shall take or disturb any bird nest or eggs thereof; no visitor shall cut, saw, trim remove or disturb any form of animal or plant life, except that non-woody vegetation may be cut and used for temporary hunting blinds; and no visitor may construct or build any type of structure
- Wildlife viewing, hiking and photography are allowed except in areas specifically closed
- Visitors are prohibited from releasing, introducing or transplanting any animal or plant species
- Visitors are prohibited from feeding fish or wildlife
- Visitors are prohibited from bring in pets except on a leash of 10 feet or less, and except when using dogs pursuant to authorized hunting
- No camping allowed
- No horses allowed
- No bicycles or bike riding allowed
- No fires allowed
- No visitor shall tamper with, deface, damage or destroy or remove any property that is not their own, including signs, markers, sign-posts, flagging or marking of any kind
- It is unlawful to litter, leave, deposit, drop, dump, bury or scatter any debris, trash, or refuse
- No visitor shall possess, use or be under the influence of alcohol, marijuana or controlled substances

- Visitors are prohibited from using motor vehicles, including motorcycles, OHVs, ATVs and UTVs
- For specific hunting regulations with regard to species, methods of take, seasons, bag limits and other details, see specific language in Hunting in California for annually approved hunting regulations
- No falconry is allowed on Ecological Reserves

Section 550.5:

Entry Permits, Fees and Passes: Where the department has determined that entry permits are required and/or that fees are necessary to offset the department's costs of providing public recreational opportunities, an appropriate pass must first be purchased.

As background, the lands pass program was created by the State Legislature in 1988 with the adoption of the Native Species Conservation and Enhancement Act. There was recognition that CDFW needed additional funds to manage its lands, most of the existing funding was provided by hunters, and the lands were used by many people who were not hunters. The lands pass was developed as a means for all users to contribute to the conservation of the lands they enjoy (Fish and Game Code Sections 1764 and 1765) and they cost far less than what hunters pay in required fees and the federal excise taxes on hunting equipment that goes to state wildlife agencies.

Since 1988, the Lands Pass has only been required at six CDFW properties. In 2012, the Legislature adopted Fish and Game Code Section 1745 which required including additional properties in the lands pass program for the same reasons as the earlier legislation. Properties are added to the lands pass program through the adoption of regulations. Boden Canyon, along with other properties, was added to the lands pass program in 2016 (California Code of Regulations, Title 14, Section 630(c)).

A lands pass is required for each visitor who is 16 or older unless they are carrying a valid hunting, trapping, or fishing license (including reduced fee or free licenses described under "General Licensing Information"). In 2020, a one-day lands pass costs $4.58 and an annual lands pass costs $26.48. For more information about lands passes and how to purchase them online, by phone at (800) 5651458, or in-person; go to the CDFW Lands Pass website.

School and organized youth groups, including accompanying adults, are exempt from the lands pass requirement, but need to contact the area manager in advance to schedule a field trip. Multiple lands passes can be purchased by entities that obtain a Special Use Permit for a group activity or event, or they can instruct their participants to obtain their own passes. Each participant should carry their own pass.

Section 630:

In addition to the general regulations for all lands found in Section 550, those Ecological Reserves with area-specific regulations are listed in Section 630 (see Table 11 below):

- Boden Canyon is designated in Section 630(b)(16) as an Ecological Reserve
- Boden Canyon is listed in Section 630(c)(2) as having the requirement for a visitor to carry a Daily or Annual Lands Pass, or a valid hunting, or fishing license on their person while in the Reserve
- Boden Canyon is listed in Section 630(d)(5) as allowing hunting as a designated public use: "Upland game allowed but only at such times and in the specific areas designated by the department." For specifics on species, methods of take, seasons and bag limits see Hunting in California.

Table 11. Area Specific Regulations for Boden Canyon Ecological Reserve

Facility	Type	County	Code	Description
Boden Canyon	Ecological Reserve	San Diego	630(d)(5)	(d) Ecological Reserves with Hunting as a Designated Public Use: Unless listed and specified as allowed…below, hunting is prohibited on ecological reserves. Where hunting is allowed, it shall be subject to all applicable general hunting regulations and the area-specific regulations set forth in this subsection. (5) Upland game allowed but only at such times and in the specific areas designated by the department.
Boden Canyon	Ecological Reserve	San Diego	630(c)(2)	Ecological Reserves That Require a Daily or Annual Lands Pass for Authorized Uses other than Hunting: Pursuant to subsection 550(c) and 550.5(c) of these regulations, it shall be unlawful for a visitor to enter any ecological reserve or portion thereof listed in this section without carrying a valid Lands Pass or a valid hunting, fishing, or trapping license on their person. A Lands Pass must be purchased in advance. Information on how to purchase a Lands Pass and exceptions to this requirement are provided in subsection 550.5(c). (2) Boden Canyon Ecological Reserve: Required.

It is the policy of the Fish and Game Commission that:

Lands under the administration of the Department be made available to the public for fishing, hunting or other forms of compatible wildlife dependent recreational use, and for scientific studies whenever such use or uses will not unduly interfere with the primary purpose for which such lands were acquired.

For the purpose of this policy, undue interference shall not mean that hunter and angler access to properties that would otherwise be available for access for passive recreational activities (i.e. bird watching, interpretive tour, etc.) is deemed to be necessarily incompatible. Further, hunting and fishing shall not be banned simply because a Department administered land was acquired primarily for the protection of various threatened and endangered species unless it can be clearly demonstrated that such activities would be likely to have a detrimental effect on listed species on the property in question.

In keeping with this policy, the overall public use goal for the Reserve is to protect biological resources, while providing opportunities for recreational activities and scientific studies. Compatible activities are those that are wildlife-dependent and that have low potential to negatively impact wildlife and other uses of the Reserve.

Other forms of public recreation, including camping, dog training and field trials, mountain biking, and off-highway vehicle use, are prohibited because of the potential negative impacts at this Reserve to wildlife, wildlife habitats, conflicts with other uses, and management demands (CCR, Title 14, § 550 and 630). Since the Reserve was acquired and designated, CDFW staff have been patrolling and monitoring public uses, and when prohibited uses occurred, those visitors have been cited by CDFW law enforcement. Recent monitoring has provided the following public use information:

- Roughly 22 mountain bikes per month illegally enter the Reserve
- Roughly 5 motorcycles per month illegally enter the Reserve
- Roughly 40 hikers per month utilize the Reserve

Additional public use information was incidentally collected in 2020 during the Wildlife Corridor Study. That information is consistent with past data that hikers, hunters, bicyclists and motorcyclists continue to be active in the Reserve. Horse use was not observed during that study.

However, there have been illegal equestrian users in the past. This use has subsided over the last few years. Additionally, low-flying aircraft routinely enter the air space over the Reserve (helicopters landed once on the pond spillway), and marijuana grows have been reported, investigated and remediated. Vandalism of gates and locks has occurred, as well as the illegal creation of new trails around gates enabling the prohibited entry of bikes and/or motorcycles into the Reserve. Creating unauthorized trails around gates and through habitats is not only illegal, but it is both a safety and environmental concern. Creation of illegal trails is occurring within the Reserve and can have deleterious effects on wildlife not only through habitat loss but by users encroaching into their habitat. Specifically, at the Reserve, erosion has been exacerbated by such actions and in some areas slope failures have occurred and culverts are washed out. Soil has been moved into piles and bike jumps have been created, and side trails off the main road have been built.

Above and below: Erosion and bike jump in Boden Canyon. Photos taken Oct. 2020. T Stewart

Vegetation has been trampled and/or removed and soil compaction has occurred to such a degree that the runoff does not seep in, but rather, the flows increase in velocity and erosion happens. Again, erosion issues are present within Boden Canyon on lands owned by CDFW, the City and the County. Illegal users are exacerbating the problem and causing increased safety hazards.

The soils in the Reserve are of a highly erodible type (see Chapter II. B. 2. above) and when heavy rains come or squirrels actively burrow holes near culverts, the unstable areas are affected. Pedestrians have better control of where they are walking and can see potential hazards; however, bicyclists or motorcyclists can reach speeds that may cause them to veer to an unstable area. This can be a danger to themselves and other Reserve visitors. An important goal for CDFW is to provide

a safe and enjoyable experience to all its visitors; this is accomplished by visitors respecting the rules and regulations of the Reserve and understanding the purpose for which the property was acquired.

As such, the Public Use Elements in this LMP address the appropriate and compatible wildlife dependent public uses, which include:

- Hunting
- Educational/Interpretive
- Scientific Research
- Trails

1. Hunting Element

The dominant vegetation within the Reserve is chaparral with coastal sage scrub, other scrub/shrub habitats, and oak woodland. As such, quail, dove and turkey are found in good numbers throughout the Reserve. Rabbits are also found throughout the Reserve but tend to be nocturnal and may not be readily available for hunting opportunities.

Turkeys tend to inhabit the Reserve during the winter and spring months when water is available, however, are mostly absent in the summer and fall. During the summer and fall months, it is believed the turkeys move from the Reserve to adjacent lands that have available water.

Deer are found throughout the Reserve, however current regulations do not allow for deer hunting at this time. Formal surveys for deer are not conducted within individual reserves but are done throughout the state. CDFW estimates deer abundance statewide by deer management unit (DMU) or deer herd. Aerial and ground-based survey methods are used to obtain ratio and abundance information for multiple survey polygons covering the range of deer locally. The Reserve falls within DMU 510 where deer are known to exhibit significant seasonal variations in movement and use within a home range. Thus, survey polygons have been established that allow meaningful population data to be collected.

Though site-specific deer surveys have not been conducted in the Reserve it is included in a DMU 510 survey polygon. Survey of this polygon has provided information needed to support deer hunting and management activities in the DMU. A hunting program for deer may be proposed in the future at the Reserve.

Hunting at the Reserve has been occurring since 2000. Hunters are required to have a valid license and stamps, and the appropriate/authorized equipment. The regulations for hunting within the Boden Canyon Ecological Reserve currently state:

"*Upland game allowed but only at such times and in the specific areas designated by the Department*."

In addition to possessing a California hunting license, hunters are required to possess a California Upland Game Validation (FGC 3682.1). Hunters also need to complete a Harvest Information Program (HIP) survey and possess a free HIP validation. There are additional

regulations that hunters will need to know before hunting at the Reserve or any location, including seasons, shooting hours, bag limits, and methods of take. Area specific regulations can be found at Property-specific Regulations for the Use of CDFW Lands.

Under current hunting regulations, big game and waterfowl hunting are not allowed. Take of non-game and furbearer species is also not currently allowed at the Reserve. The species that are permitted to be taken when hunting is allowed by CDFW include five upland game birds: wild turkey, California quail, mountain quail, mourning dove and Eurasian collared dove; and two small game mammals: brush rabbit, and Audubon's cottontail (see Table 12 below).

The CDFW webpage for "upland game birds" includes the statewide rules for all of the above-mentioned species. Likewise, for the webpage for "small game mammals. These hunting regulations were established when CDFW first acquired the Reserve. They were written in a conservative manner until biological, management, and other pertinent data could be obtained. Additional hunting opportunities such as big game, non-game or opening the Reserve to other hunted species under Title 14 may be explored.

In past years, two small game guzzlers (artificial water sources) were installed on the Reserve to enhance quail and smaller wildlife populations by increasing the availability of water. CDFW has been active throughout the state since the 1940's in the installation and maintenance of guzzlers and other water enhancements, especially in arid areas (Simpson, Stewart and Bleich, Fish and Game Journal, 2011).

Table 12. Upland Game Species detected and existing opportunities for hunting

Scientific Name	Common Name	Authorized Hunting Method*
Meleagris gallopavo	Wild Turkey	Shotgun or Archery
Callipepla californica	California quail	Shotgun or Archery
Oreortyx pictus	Mountain quail	Shotgun or Archery
Zenaida macroura	Mourning dove	Shotgun or Archery
Streptopelia decaocto	Eurasian collared dove	Shotgun or Archery
Sylvilagus bachmani	Brush rabbit	Shotgun or Archery
Sylvilagus audubonii	Audubon's cottontail	Shotgun or Archery

*See current regulations for method of take, season and bag limits

Routine monitoring and patrol will ensure that hunting and other public uses do not interfere with overall Reserve management or stewardship goals. This includes the conservation of sensitive habitat (e.g. that which is occupied by state and federal listed species), as well as the conservation of sensitive plants and animals.

The adjacent Cleveland National Forest (CNF) provides hunting opportunities in accordance with state laws and regulations for any allowable species as specified in the regulations, and according to seasons, bag limits and methods of take as outlined in the regulations. It may be appropriate and even easier for the public because CNF is immediately adjacent for the Reserve

to also adopt such regulations, but to-date CDFW has not proposed these more open hunting opportunities. The Reserve boundaries are posted, and It is always important to remember that every hunter has the responsibility to know where they are hunting at all times.

Goals 1-2

1. Provide a safe and high-quality upland game bird hunting experience to the public
2. Provide upland game bird hunting opportunities to the public by initiating the use of the Upland Game Bird Special Hunt Program or other programs.

Tasks

1. Conduct upland game bird surveys throughout the Reserve to ensure populations are sustainable and adjust hunting area according to survey findings.
2. Develop and promote youth-oriented, family, mobility-impaired, and promote general public hunting opportunities as access allows.
3. Promote hunter training and ethics through information, hunter education classes, and enforcement.
4. Explore and where feasible, provide additional hunts through the Upland Game Bird Heritage Program or other programs.
5. Enhance water availability for game and other wildlife species, while minimizing impacts to listed/ sensitive species.
6. Maintain relationships among CDFW staff, hunters, volunteer organizations, and when appropriate, implement the use of Memorandum of Understanding (MOU)s or Memorandum of Agreement (MOA)s for enhancement projects, education or outreach efforts.

Goal 3

Conduct surveys for non-game (crow, coyote) and small game species to assess the potential for small and non-game hunting opportunities and /or management activities.

Tasks

1. Based on surveys, determine if non-game and small game hunting opportunities and/or management activities are appropriate.
   Evaluate hunting activities periodically to identify and report changes that are warranted to maintain consistency with Reserve goals.

Goal 4

Evaluate the potential for implementing a deer hunting program within the Reserve.

Tasks

1. Boden Canyon is included in an existing deer survey polygon (DMU 510) which has been designed to provide CDFW with the data needed to support deer hunting locally. Assess the survey information and other management issues to determine the feasibility of deer hunting in the Reserve.
2. Determine desired specific regulations for a deer hunting program (youth hunt, method of take, etc) for the Reserve.
3. Develop and submit regulation change proposals through Regional, Branch and Fish and Game Commission processes.
4. Incorporate the Reserve, as necessary and required, into applicable documents for deer hunting programs. CDFW produces statewide environmental documents for all hunted species. The document for deer hunting addresses population data collection, data collection methods, and hunting tag quota for each DMU.

Impact Guidelines

1. Adhere to the tasks and Impact Guidelines noted in the Biological Elements section.
2. Provide appropriate signage and barriers to keep hunters outside of sensitive habitats and within the boundaries of designated hunting boundaries.
3. By following the above-mentioned impact guidelines and other measures within the LMP meant to eliminate or minimize impacts to resources; hunting as described above will have no significant or detrimental impacts.

2. Education/Interpretation Element

Environmental research and education are integral components of resource management and are allowable uses on the Reserve. Educational/interpretive programing that may benefit the understanding of the mission of CDFW and the various wildlife species and habitats at the Reserve should be encouraged. Organized educational/interpretive events must be conducted in a manner that is compatible with other current uses, management, and acquisition purposes of the Reserve.

Goals

1. Provide safe and enjoyable educational and interpretive opportunities within the Reserve. All events must follow the applicable regulations in Title 14 CCR § 550(d), (e) and 550.5(F)(c)(11).

Tasks

1. Inform the public of Reserve access, use designations, use restrictions and who to contact in an emergency (through outreach), signage, and CDFW Web site.
2. Coordinate CDFW staff and volunteers for organized educational events, nature walks, and wildlife-viewing within the Reserve.
3. Develop interpretive information about the natural and cultural history of the Reserve.

4. Continually evaluate recreation activities to identify and report changes that are warranted to maintain consistency with Reserve goals.

Impact Guidelines

1. Adhere to the Impact Guidelines noted in the Biological Elements section.
2. Provide appropriate signage and barriers to keep visitors outside of sensitive habitats.

3. Environmental Research Element

Environmental research is an integral part of resource management and is allowed on the Reserve. Environmental research on Department land shall be conducted according to California Code of Regulations [CCR § 550(f)].

Goals

1. Encourage environmental research that will enhance CDFW's adaptive management program.
2. Encourage environmental research that will add to the overall knowledge of plant and animal species found on the Reserve.
3. Encourage environmental research that will benefit/be applicable to other reserve areas within the MSCP.
4. Encourage participation in MSP and multi-agency research efforts.

Tasks

1. Support on-going scientific research in the Reserve, and in the MSPA that is relevant to CDFW's research or lands program needs. Facilitate and coordinate scientific research required to implement the LMP.
2. Focus environmental research on topics that will help CDFW achieve the goals and objectives outlined in the LMP and thereby enhance adaptive management of the Reserve.
3. Identify research projects that are consistent with LMP goals for environmental research on the Reserve and develop guidelines for submitting proposals for such.
4. Require submission of field data and final reports to CDFW of all authorized research conducted on the Reserve.
5. Where appropriate, utilize cooperative agreements/contracts with the University of California, San Diego State University, and other institutions and agencies such as the San Diego Natural History Museum Biodiversity Research Center to conduct research when needed data is not available through other means.

Impact Guidelines

1. Adhere to the Impact Guidelines noted in the Biological Elements section.
2. Researchers should be vetted and authorized for the applicable research being conducted.

3. Any research that may adversely impact sensitive species, nontargeted species, and/or habitats (e.g., redundant studies, lack of responsible researchers, or excessive access from ongoing studies), shall not be allowed.

4. Trails

Typical trail on the Reserve, photo by T. Stewart

Prior to CDFW's ownership of the Reserve, the land was privately owned. As such, no public trails existed on the Reserve. Authorized access was only as an invited guest of the previous land owner(s). There is only one main dirt road that runs up (south-north) Boden Canyon, which is currently used by CDFW staff for maintenance, management and research, and that is also open for authorized pedestrian public use (See Chapter II. D.2. above regarding City and County properties relative to easements for ingress and egress). There is also one connecting trail that runs east-west on an old dirt road/trail adjacent to the Santa Ysabel Creek drainage. This trail is currently not maintained or authorized for other than pedestrian use where it crosses CDFW land. It connects City land on the west to the Cleveland National Forest on the east.

There is a proposed section of the Coast To Crest Trail in this area that could be implemented, pending environmental and local jurisdiction approvals, by the City, the County, and/or the San Dieguito River Park (SDRP) JPA. The proposed trail is in the planning stages at this segment; however, it is being considered for pedestrian, equestrian and bicycle use. Current trail proposals can be found at the San Dieguito River Park JPA website.

Current CDFW regulations prohibit equestrian and bicycle use in the Reserve. (See Chapter I. E. above that discusses the SDRP and its focused planning area (FPA)). CDFW is open to discussions with other entities regarding the potential for a land transaction that could allow for a multi-use trail in this area. CDFW would be heavily involved in ensuring that access for current, allowed Reserve users is not altered, and that CDFW access for Reserve management, maintenance and patrol would be maintained or enhanced. No direct or indirect impacts to sensitive species, habitat or to cultural resources could occur because of a trail.

Trail literature was researched during the preparation of this Final LMP and there is a wealth of information that is available from around the world and from the 1970's to the present. The information spans topics such as documented impacts from trails and trail users, trail designs, methods to reduce potential erosion issues, suggestions on types of users for various situations and conditions, and ways to direct and monitor trail usage. CDFW encourages any entity planning trails in the vicinity of the Reserve to be sure to research such literature themselves.

Goal

1. Provide a safe and enjoyable experience to visitors utilizing the authorized trail(s) in an authorized manner within the Reserve.
2. Work with CNF, City, County and/or SDRP representatives on a potential Coast to Crest connector trail in the southern part of the Reserve.

Tasks

1. Routinely inspect and maintain authorized trails used by visitors.
2. Explore mutual land transactions for CDFW parcels R, S and T or other possible options with associated agencies or trail entities that may benefit the Coast to Crest Trail.
3. Upon request, provide access into the Reserve to the agencies planning the Coast to Crest Trail for trail planning purposes (environmental, engineering studies).
4. Upon request, provide data on known resources in CDFW parcels R, S and T for trail planning purposes.

Impact Guideline

1. Adhere to the Impact Guidelines noted in the Biological Elements section.
2. This LMP will be a reference for future environmental documents that will provide more detailed information and analysis for site-specific projects/developments related to trails.

E. Facility Maintenance Elements: Goals, Tasks and Impact Guidelines

Current facility maintenance includes the repair and maintenance of structures present on the Reserve, including the pond and spillway, culverts, gates and fences. It also includes the maintenance of roads, trails, and fuel modification zones and preservation of historic resources. Certain maintenance activities are a higher priority and must be done on a regular basis, such as inspecting fences and gates, clearing culverts of debris, and maintaining fuel modification zones. Other activities typically occur over a longer period, annually or on an as-needed basis, such as maintaining access roads, and structure maintenance.

At this time, and into the near future, CDFW is not considering planning or building any new structures in the Reserve. If any are proposed, such structures will avoid or minimize environmental impacts and any new facilities will be evaluated for the appropriate level of environmental documentation on a project-by-project basis.

1. Existing Facilities

There are no buildings on the Reserve, except for the degraded remains of two former structures from the Johann Boden family in the 1890's. As identified in the Historic Period Resources section in this LMP (Chapter II. C 1. b), these pieces of concrete and wooden foundations, remnants of tin roofs or a shack and two non-functioning wells is all that exists today from the Boden family and other more recent settlers. Wildfires and general decay have taken their toll on these historic structures.

Goal

1. Preserve the historical context of foundations and evidence of early home sites within the Reserve to the maximum extent practicable.

Tasks

1. Preserve historical resources on the Reserve through fencing or signage.
2. Annually evaluate and document the condition of the historical structure remnants, increasing protective measures as needed.
3. Evaluate whether to provide interpretive signage or leave in a protected state off- trail.

2. Wells, Springs and Guzzlers

Two historic wells occur on the Reserve, and one developed spring, likely associated with the homesteads of the 1890's. The wells have never been tested by CDFW due to their poor condition and currently nonfunctional state. It is unknown how deep they are/were or what the rate of flow was when they were functioning. Limited farming and livestock grazing were part of the historical use of the Reserve so these wells were presumably installed at that time. Modern wells have not been developed in recent time.

One known natural spring that has been modified with a pipe to enhance flow, exists in the central portion of the Reserve near the eucalyptus grove. In addition to the spring there are two areas where above-ground water tends to remain year-round within the creek. These year-round wet areas are located below the pond and in the northern most part of the Reserve.

Two artificial water sources, known as guzzlers, exist on the Reserve. They are located in the central and eastern areas of the Reserve.

Goal

1. Retain the current wells, springs and guzzlers on the Reserve.
2. Determine the need or desire to repair wells to a functioning condition.
3. Determine if additional water sources on the Reserve would benefit wildlife.

Tasks

1. Conduct an evaluation of existing water sources on the Reserve, both natural and manmade. Map and mark them for management purposes using GPS.

2. Assess water needs to support wildlife management within the Reserve and install additional wells or guzzlers as needed. Review and determine potential impacts to existing resources prior to construction of any new water supply structure.
3. When installing guzzlers, only install those that have been designed to prevent incidental mortality of wildlife.

3. The Pond and Spillway

The pond and spillway in the central portion of Boden Canyon, in Parcel H of the Reserve, is thought to have been constructed around 1979. This is based, for the most part, on aerial imagery. While the pond has been both full and dry over the years, it has been in a no-water or low-water state for the majority of time since the Reserve was acquired.

Boden Pond, dry (left 2018) and full (2008) photo by Tim Hovey

The pond presents both benefits and concerns; on one hand it is a unique aquatic feature within the canyon that provides a habitat resource for local wildlife, and supports a high diversity of waterfowl, wading marsh birds, and other open water and wetland-associated wildlife when it holds water. The pond also generates a broad alluvial fan with high groundwater at the upstream end of the pond, which enhances the suitability of the drainage to support willow and mulefat riparian woodland habitats and the wildlife associated with those habitats (Merkel and Assoc. 2001). Sensitive species that have benefitted or would benefit from a full pond and associated healthy wetland/riparian habitats include the tri-colored blackbird, southwestern pond turtle, the least Bell's vireo and other birds, bats and mammals whose life cycles depend on these habitats. Over the years the pond and its wetland habitat has expanded or retracted based on the amount of rainfall and the pond's ability to store water. In years with little or no water, the vegetation dries up and species diversity and wildlife use are limited.

While the benefits to the pond are many, the downsides are fewer but possibly more serious. With large amounts of water came predatory non-native fish and crayfish (presumably from upstream). These are known predators on young pond turtles and arroyo toads. The most significant negative aspect of the pond is the dam and spillway. The dam is small, holding likely 20-30 acre feet at the most. Its structural integrity is unknown, however, and a potential for failure exists. Rodent burrowing activity in the vicinity can weaken the existing concrete structure, and if a failure were to occur, accumulated soft mud and a tremendous amount of water (depending on how much was in the pond) could be released downstream in a flow that

might cause significant damage. Hydrologic scouring, flooding and modifications to the bed and banks of the Boden drainage and Santa Ysabel Creek could occur. One positive result may be an improvement in pools or shallow ponds that would resemble a more natural system, but any effect or result of a spillway collapse is really unknown.

Several scenarios have been pondered over the years, including 1) do nothing and let the pond area evolve naturally, 2) purposefully breach the dam and allow the pond to drain and the

Boden Pond from west, 2017, photo by T. Stewart

natural system to recover to a riparian habitat, or 3) retain, maintain and strengthen the dam and restore the pond to a viable open water/wetland habitat feature.

Under the WCB Grant to the SDNHM, a hydrology and hydraulic study was done in 2020 that provided more information, insight and recommendations to CDFW regarding the above-stated issues with the dam and spillway. CValdo Corporation provided the Boden Canyon Hydrology and Hydraulics Report in December of 2020 based on local data, on-the-ground information and researching of soils, precipitation, terrain and topography, and other factors. This enabled them to calculate flows from various scenarios, including a 100-year storm event, and potential impacts from them. They looked at the potential for erosion relative to the various culverts at stream crossings in the canyon, and they assessed likely impacts to the dam and spillway. They provided recommendations on both to CDFW.

Their main points were that erosion will always need to be monitored and managed at the Reserve. The combined factors of soil type, steepness, and natural drainage patterns lay the foundation for natural erosive conditions within the Reserve. “The canyon is by its very nature

an erosive landform" (pers comm. M. Cairns, CValdo, 1-19-21). The report provided specific information for CDFW to utilize in future engineering and construction contracts for repair or replacement of culverts, and areas where riprap may benefit and lessen the current head cutting problems.

The CValdo report also provided information stating that breaching the dam during dry weather conditions would take it out of service and provide a greater level of safety by lessening the risk/potential for downstream flooding. CDFW is currently evaluating its course of action for both the culverts and the dam/spillway. Any future task that meets the definition of a project under CEQA would be thoroughly analyzed and conform to laws, regulations and the applicable CEQA document would be completed. All necessary permits would be obtained.

Goals

1. Determine how the recent CValdo Report recommendations can be used to maintain a safe environment in the pond area for wildlife and the public.
2. Maximize high quality habitat to the extent practicable under current conditions.

Tasks

1. Submit CValdo report to CDFW managers and headquarters for incorporation into the annual budget and deferred maintenance processes.
2. Twice annually, once before the rainy season and once following the rainy season, visually inspect the dam and spillway for any changes, monitor potential weakened conditions.
3. Mark hazards or weakened areas of the dam and spillway as off-limits to the public.
4. Monitor the vegetation changes through photo points or vegetation transects.
5. Conduct habitat suitability assessments, and accordingly conduct focused sensitive species surveys in the pond area.
6. Focus improvements on non-native plant and animal control in the pond area.
7. Explore the potential for habitat restoration.
8. Every five years revisit the current approach to managing the pond area in its naturally evolving condition, and if warranted, begin studies to determine needs and desires for the Reserve relative to the pond and potential next steps, if any, for pond/dam modifications.

4. Roads and Culverts

Culvert washout spring 2017, photo by T. Stewart

There is one main dirt road up the canyon, and a few spur roads that lead to Forest Service, City or interior areas of the Reserve. The main road eventually leads to a gate and private property on the northern end of the Reserve. This road is not generally maintained, but sections have been graded by CalFire to act as both a fuel break and an access road for fire suppression actions. Additionally, CDFW has been working on a few badly eroded areas of the road in an effort to maintain vehicle access for management purposes.

There are many culverts of varying size and condition throughout the Reserve, and on both City and County property within Boden Canyon. Most of these occur along or under the main dirt road. CDFW installed a new culvert within the Clevenger Canyon drainage section of the Reserve in 2001. The culvert size was increased at that location to better handle flow needs. The CValdo Report mentioned above has assessed the current culvert problems in the Reserve and provided recommendations for future actions for CDFW to consider. The undersized, degraded or totally damaged culverts will need repairs or replacements and potentially rip rap in some areas.

Goals

1. Determine how the recent CValdo Report recommendations can be used to ensure a safe route of travel for pedestrian visitors and authorized management vehicles on the

single dirt road within Boden Canyon, both on the Reserve and over ingress and egress easements.
2. Ensure culverts are maintained in a safe condition through routine inspection and repairs as needed.

Tasks

1. Submit CValdo report to CDFW managers and headquarters for incorporation into the annual budget and deferred maintenance processes.
2. Continue to partner with CalFire for road maintenance work, which also serves as a training and practice ground for CalFire's heavy equipment operators.
3. Maintain existing dirt roads as necessary by use of herbicide on non-native vegetation, mowing, graveling, grading, or by other means.
4. Conduct an assessment of existing culverts, mapping them using GPS/GIS and then ranking them according to priority for repair or replacement. Some of this task was completed in 2020.
5. Annually clear debris from culverts in the fall to prepare for winter storms and re-inspect after large storm events.
6. Partner with the City of San Diego in seeking funds for repair of the main road, culverts, and the Santa Ysabel Creek crossing on City property, which because of its location, is one of the first damaged areas that halts management and emergency vehicles from continuing up the rest of the canyon.
7. Seek funds through the CDFW Engineering, Lands and Deferred Maintenance Programs to repair or replace culverts and repair the road in a prioritized and systematic approach.

5. Signage, Fencing and Gates

Signs, fencing and gates are an important aspect of visitor use management, and hence wildlife management. When signs, fences and gates are placed in appropriate locations, visitors and wildlife can coexist. Signs used at the Reserve serve multiple purposes. They delineate boundaries, regulations and can present educational or interpretive information. Sometimes larger signs or kiosks are placed where a greater amount of information is available for public viewing. Fencing is primarily for boundary purposes at the Reserve, however there are times when interior fencing is erected to direct visitors away from hazards or to keep sensitive resources protected. Gates are also a means to identify a boundary where it intersects with a road. This enables management or emergency vehicles to safely and efficiently enter the Reserve. Gates generally have multiple lock slots that are available for the landowners, easement owners, emergency agencies or authorized individuals.

Gate at Boden Canyon and Highway 78, CDFW file photo

Goals

1. Utilize signs, fencing and gates for necessary legal, boundary or resource protection needs without detracting from the natural beauty of the Reserve.
2. Maintain all signs, fencing and gates in a safe and functional condition.

Tasks

Erosion at gate caused by vehicular trespass, 2017.
Photo by T. Stewart

1. Conduct an assessment of the current condition and location of signs, fences and gates. Map them using GPS/GIS.
2. Create a schedule for routine inspection and repairs/replacement of signs, fences and gates.

3. Inform the public of the laws and regulations applicable to the Reserve, update as necessary, include maps when and where appropriate.
4. Educate the public about the value of the natural and cultural resources within the Reserve.
5. Install temporary signage during the arroyo toad breeding season to alert visitors and authorized individuals to the sensitivity of the drainages or high use areas of toads.
6. Seek funding for new or replacement signs, fencing and gates.

Impact Guidelines for Facility Maintenance Elements

1. Adhere to the Impact Guidelines noted in the Biological Elements section.
2. Ensure that regular maintenance actions do not affect the arroyo toad, including but not limited to, avoiding maintenance activities at night and working in Santa Ysabel Creek or the Boden drainage when it is likely toads may be present (unless conducting surveys). Where appropriate, survey sites prior to the start of work to ensure no toads are present within the limits of the work area. If toads are present, work will be conducted at a later date.
3. Repairs to or replacement of existing facilities will stay within the footprint of the existing structure and will be conducted during the time of day and season least impactive to or with no impact to sensitive resources. These temporary disturbances will be less than significant.
4. No maintenance work will occur in habitat areas during the bird nesting season (March 1-September 1) unless a qualified biologist conducts a preconstruction survey within one week prior to scheduled work and determines there will be no impact to nesting birds.
5. This LMP will be a reference for future environmental documents that will provide more detailed information and analysis for site-specific projects/developments related to any future facilities within the Reserve.

F. Fire Management Elements: Goals, Tasks and Impact Guidelines

Fire is a natural process in the southern California, Mediterranean ecosystem with fire tolerant or fire dependent adaptations characteristic of many species in the ecosystem. Vegetation plays an important role in the fire regime of the Reserve and plant species and vegetation have evolved to survive repeated fires. Some of these communities, such as chaparral and coastal scrub rely on occasional fires as part of their regeneration process even though the short-term impacts of fire in these communities can appear to be severe (Cañada de San Vicente LMP, 2016).

Fire regime refers to the patterns of fire that occur over long periods of time, and the immediate effects of fire in the ecosystem in which it occurs. Fire regime is a function of the frequency of fire occurrence, fire intensity and the amount of fuel consumed. The frequency is determined largely by ecosystem characteristics, weather, and ignition sources while the intensity is influenced by the quantity of fuel available and the fuel's combustion rates. Interactions between frequency and intensity are influenced by wind, topography, and fire history.

Wildfires at the Reserve can be fanned by 'Santa Anas' - the hot, dry winds that move through the region during fall and winter. These winds begin when masses of cold air form over the great basin (high desert plateaus in Utah and Nevada). The winds that spin off these high-pressure systems grow warmer, dryer and stronger as they spill south and west, down through the steep mountain canyons towards the ocean. Due to local topography, fires can spread rapidly and extensively when Santa Ana winds are present.

1. Wildfire and Fire Management

Wildfire management is essential for human safety and minimization of catastrophic fire damage to infrastructure, vegetation, wildlife, and cultural resources of the Reserve. Historic fire suppression, methods of wildfire control, and the use of prescribed fire as a management tool are important Reserve management issues.

There are opposing views of the usefulness of fuel modification to protect either homes or sensitive wildlife and habitat. One view holds that the majority of biological impacts occur during extreme weather events (Keeley and Zedler 2009, Moritz et. al 2004, Keeley et. al 1999 as cited in Cañada de San Vicente LMP, 2016) and fuel treatments do little to prevent the spread of fire under these extreme weather conditions and are only useful when fire crews use them for access. On the other side, fuel treatment zones have protected numerous communities and saved lives, as well as protected habitat for wildlife. Two recent examples include Laguna skipper habitat protected due to fuels management actions between the South and East Grade on Palomar Mountain and a recent fire in Cuyamaca Rancho State Park, where a fuel treatment zone served its purpose during a recent fire (Rochester and Fisher 2014).

Post-burn scene at Boden Canyon, CDFW file photo

Until Europeans settled the area, fires ignited by lightning and/or Native Americans were a major force that shaped and maintained the health of plant communities. Before suppression, fire cycles promoted habitat regeneration by opening the shrub canopy and reducing plant competition, burning off duff and litter to expose soil for seed germination, triggering seed

release, reducing insect pests and disease that kills woody plants, and aiding in nutrient recycling. In general, some believed that fire suppression had caused the development of dense vegetation, heavy loads of fuel, and in some situations the unchecked invasion of exotic weeds. However, recent research has indicated that age-class mosaics have only a limited ability to prevent the spread of wind-driven fires and that large fires in southern California have historically and naturally occurred.

Coordination with the California Department of Forestry and Fire Protection (CalFire) is an important element in the Reserve's fire management strategy. CDFW will continue cooperation with this agency during fire events and share expertise, incorporating the fire data of CDFW and other agencies into CDFW's GIS database. Additionally, CDFW will work cooperatively with other agencies and strive to assist with fire management goals that provide a level of protection for both Reserve lands and neighboring properties through the placement of adequate buffers located outside of the Reserve boundaries.

Prescribed burning is a planned application of fire implemented under safe weather conditions to restore a healthy ecosystem and reduce the risk of catastrophic wildfires. Prescribed fires are used as a management tool to eliminate exotic weeds from native habitats, promote the growth of native plant species, and enhance wildlife habitat. By reintroducing fire cycles to the ecosystem, healthy landscape-level ecological dynamics can be restored. Methods other than prescribed fires are also used to mimic fire and create habitat mosaics.

When there is a fire suppression conflict between protecting human life and other values, human life receives top priority. Protection of the Reserve, habitat of sensitive, threatened, and endangered species, and watershed values should receive careful consideration when choosing suppression tactics. CDFW and CalFire will continue to work together to implement the most appropriate fire suppression methods (for more on CDFW and CalFire coordination see Chapter II. B. 4 Fire Cycles).

2. Fire Management Within the Reserve

This element addresses all aspects of fire management within the Reserve, including vegetation management regimes, fire suppression activities, post-fire cleanup and remediation activities, and fire recovery regimes. The primary purpose of this element in the LMP is to:

- Identify the public safety, wildlife, and protected resource concerns that must be factored into fire management activities within the Reserve;
- Provide guidelines for planning vegetation management, fire suppression, post-fire clean-up and remediation, and fire recovery regimes for parts within the Reserve;
- Coordinate vegetation management for fuel reduction purposes with habitat enhancement, age class mosaics and management, and exotic weed control plans, with a focus on ROW and exotic annual grass control; and
- Continue the coordinated planning and implementation of fire management activities with CalFire under existing policies, plans, and agreements.

For purposes of this LMP, the fire management program for the Reserve is divided into

components that mirror the Fish and Game Commission (FGC)-Board of Forestry (BOF) Joint Policy for Pre-, During-, and Post-fire issues, and then includes one additional component, Fire Recovery/Monitoring (See Appendix E for the FGC/BOF Joint Fire Policy).
Each component has its own goals and tasks:

- Pre-Fire: Vegetation Management Regime
- During-Fire: Fire Suppression and Suppression Damage Remediation
- Post-Fire: Assessment and Wildfire Remediation
- Fire Recovery: Regime and Monitoring

Pre-Fire - Vegetation Management Regime

This component addresses pre-fire planning, coordination and vegetation clearing for both fuel reduction purposes and as part of the management of fire-dependent habitats within the Reserve. Locations in the Reserve where vegetation management may be required for fuel reduction and safety purposes include but are not limited to: all facilities within the Reserve, the Reserve entrance, and vital access infrastructure. Habitats targeted for vegetation management (for fuel reduction and/or for habitat management purposes) include dense chaparral, oak woodland and annual grasslands. Management regimes could include a combination of techniques to remove or thin vegetation, including hand-cutting, mechanical mowing, prescribed burns and herbicide treatments. Because of the mosaic of habitat types in the Reserve, occurrence of sensitive species and protected resources, and recent burn history, the Reserve does not lend itself to easily definable treatment areas or zones.

Goals

1. Manage for fire cycles and fire management actions, including fuels reduction, that promote healthy ecological systems supportive of native biota;
2. Establish pre-fire regimes that will reduce the potential for devastating wildfire impacts to facilities and resources within and adjacent to the Reserve;
3. Enhance certain habitats in the Reserve by using vegetation management to replicate natural succession processes.
4. Coordinate with CalFire on pre-fire planning per the multiple policies and agreements previously discussed.
5. Support wildland/urban interface policies to protect structures through various ember and fuel reduction action and fire-proofing methods.

Tasks

1. Form cooperative partnerships with state and federal agencies, and research institutions/organizations to develop scientifically sound objectives and methodology for fuel reduction, including prescribed burning.
2. Pursue a greater understanding of the relationship between wildfire, prescribed fire, fire suppression, fire control, and the ecological systems of the region. Recognize the role of

fire in maintaining ecological balance, processes, and biodiversity in all fire management policies.

3. Work in cooperation with CalFire to assess, develop and implement a fuel load reduction regime, if needed, and a working schedule for the Reserve. Include an evaluation to limit/reduce new ignition probabilities. Management techniques will be determined on a site-specific basis and may include a combination of cutting, mowing, prescribed burns, and herbicide treatments. General guidelines for the techniques that can be used are provided in Table 13.
4. Pursue fire management techniques that promote sound ecological principles or "buffer zones" between the Reserve and the neighboring communities. In cases where the adjacent land is currently developed or is planned for improvement, the footprint of the buffer zones should be implemented outside of the Reserve on land associated with the development.
5. Identify areas within the Reserve to achieve maximum benefit from hazardous fuels reduction projects. Ideal locations would be along roadways (particularly where the vegetation is primarily flashy fuels, such as annual grasses or weeds), or areas with a high density of exotic species. Acceptable resources to identify potential areas include vegetation maps, fire history maps, cultural resource maps/records, and other tools.
6. Work in cooperation with CalFire to evaluate need, then develop and implement vegetation management regimes for oak woodland and grassland habitats in the Reserve. Treatment areas will be identified based on an analysis of habitat conditions, fuel loads, and occurrence of protected resources. Management techniques will be determined on a site-specific basis and will include a combination of cutting, mowing, prescribed burns, and herbicide treatments. General guidelines for the techniques to be used are provided in Table 13.
7. Designate staging areas for fuel reduction activities in each treatment area. Staging areas are locations where hand crews and equipment may be concentrated and/or where vehicles may be parked. Staging areas will be placed at locations where minimal damage to natural habitats would occur. This could include existing roads or previously disturbed sites. Caution should be taken in locating staging areas in weedy areas. Dispersal of weed seeds into the treatment areas by foot or vehicular traffic should be avoided.
8. Identify chipping areas for each treatment area where chipping will occur. Generally, these locations need to be accessible by vehicle in order to transport and operate the chipper. Where chipping occurs, the chips shall not be placed in areas supporting native herbaceous habitats. Chips will be spread thinly where feasible and placed in the most disturbed locations. If no feasible location can be found to receive chips, they will be disposed of off-site.
9. Limit foot and vehicle traffic through the treatment areas in order to prevent weed seeds from dispersal beyond treatment limits.
10. Communicate prescribed fire methodology and intention to conduct burns to the public if and when a prescribed burn is determined to be necessary and beneficial. In addition, interpret for the Reserve's visitors, the role of fire in maintaining a healthy ecosystem via prescribed burns.

11. Set coordination meetings annually with CalFire prior to the declaration of Fire Season (pursuant to FGC and BOF policy). This would accomplish the following: updates on boundaries, access issues, natural and cultural resources, and notification processes, including updating contact information for dispatchers, CDFW and CalFire. This will ensure appropriate personnel are notified when a wildfire incident occurs. Additionally, coordination meetings will identify training opportunities to ensure CDFW personnel are safely able to participate in certain aspects of fire management.

Table 13. Fuel Treatment General Technique Guidelines

Treatment Technique	Description and Guidelines
Clearing of dead or decadent shrubs	Hand-cutting based on site-specific prescriptions. Focus on species such as chamise and ceanothus.
Fuel reduction in locations dominated by annual herbaceous vegetation	Mechanical mowing using equipment dictated by site-specific conditions. No disking allowed (disturbs soil and increases weed production). Timing should take into consideration the nesting season of grassland birds and the growth patterns of that year so that mowing need only occur once. Equipment maintenance is essential to prevent sparks that could ignite fires and the spread of invasive weed seeds. Herbicide treatments and other methods may also be implemented.
Prescribed burns	Requires site-specific plan and must comply with air quality, ESA/ CESA, and CEQA requirements. Within the Reserve, also must take into account rare habitats, special status species, and breeding seasons. Entails igniting fires in specified location when weather, winds, and other conditions allow control of the burn. Will be planned in cooperation with and conducted by CalFire.
Removal of flammable invasive plants	Requires site-specific prescriptions. Treatments could include hand-cutting, herbicide application of cut individuals, removal of seed heads to prevent dispersal, or other methods to prevent regrowth.
Roadside reduction of herbaceous biomass	Mechanical mowing along roadsides; treatment width is 10 ft. Intended to cut annual herbaceous biomass to reduce potential for roadside ignitions. Herbicide treatments may also be used in conjunction with or instead of moving including chemical trimming after roadside brushing.
Thinning or clearing of live shrubs	Hand-cutting and removal based on site-specific prescriptions to reduce fuel ladder effects and facilitate mowing where annual biomass is present near roadsides; treatment width is 10 ft. Should not remove more than one-third of the individual biomass of a given shrub, unless this shrub is largely dead and decadent. As many of the rarer shrubs and subshrubs as feasible should be retained. The range of native plant species in the treatment area should be maintained.

Impact Guideline

1. All activities are subject to the impact avoidance and other requirements that apply to fire management activities in general and activities in areas with protected resources (including cultural as well as natural resources).

During Fire - Fire Suppression and Suppression Damage Remediation

This component addresses responses to wildfires in the Reserve and the immediate remediation actions necessary to mitigate impacts caused by suppression activities. It is important to note that the actions taken to remediate suppression activities are different from post-fire activities. Remediation of suppression damage needs to occur while fire-fighting personnel, mop-up crews, and equipment are still on site, still assigned to the fire, and available to conduct the necessary actions. Once these personnel are gone, it is more difficult and less likely that remediation will occur. In order for remediation actions to occur, CDFW personnel should be actively participating in the Incident Command and be on-site for assessing, documenting and reporting necessary suppression remediation actions to the Incident Commander.

Goals

1. Ensure safety for public and staff and protect Reserve facilities during wildfires.
2. Establish fire response and suppression strategies to minimize impacts to the Reserve's facilities and protected resources.
3. Establish wildfire cleanup, and immediate remediation strategies to minimize impacts to the Reserves facilities and protected resources.

Tasks

1. Ensure a quick response to notifications from CalFire or CDFW Dispatcher (SURCOM) regarding a wildfire on CDFW property.
2. Follow prepared policies and guidelines for the Response to Wildfire (CDFW, 1995, and Appendix E).
3. During a wildfire event on the Reserve, work with CalFire to implement appropriate suppression methods suitable to the different vegetative communities and terrain. Firefighting crews, equipment, and chemicals can inadvertently damage natural and cultural resources during and following firefighting activities. Procedures should be adjusted to the maximum extent possible to minimize damage to sensitive natural and cultural resources while suppressing wildfires, including employing Minimum Impact Suppression Techniques, MIST (CDFW and CalFire Operating Plan 2012). When tactically feasible and safe to do so, techniques can include minimizing the construction of mechanical fire lines, using helicopter long lines instead of constructing heliports, use of cold trail or back fire techniques, limiting use of fire retardant especially in wetland or

riparian areas, and use of natural barriers and existing roads instead of dozer line construction.

4. Modify fire suppression tactics to support wildlife management such as allowing the Reserve to burn in certain areas where safe to do so and with no facilities at risk, with thick brush where benefits to wildlife would result, and defending from roadways rather than aggressive, heavy equipment suppression techniques in habitat areas.
5. Ensure that CDFW Environmental Scientists or other personnel provide input to the Regional Manager and work with interagency teams and Incident Command both as Land-owner Representatives and Resource Specialists during wildfire events concerning Reserve boundaries, access issues, and sensitive resource issues to assure consideration of appropriate methodologies during firefighting events.
6. Establish the following guidelines for fire suppression activities within the Reserve, when tactically safe and reasonable, including but not limited to:

    - Limit staging areas to wide areas on roads and already disturbed areas.
    - Prohibit bulldozer use within 100' of stream centers and in all riparian areas.
    - Avoid dropping retardant within 200' of any wetland or riparian areas.
    - Avoid bulldozer use within 100' of cultural resource sites and any known populations of listed plants, amphibians, reptiles, birds or mammals.
    - Assign a qualified archaeologist to oversee protection of significant archaeological, historical, and other types of cultural resources (where such protection can be accomplished in a safe manner without delaying or hindering emergency response operations).

7. As wildfires are contained, and prior to fire personnel or contractors leaving, establish the following guidelines for suppression damage remediation within the Reserve:

    - Ensure that fire suppression equipment, materials, and trash are removed from the Reserve;
    - Restore infrastructure and landscape contours to pre-fire conditions;
    - Remove all debris pushed into watercourses;
    - Remediate any damage from mechanical firefighting equipment, including restoring dozer lines, decompacting newly created fire roads, spreading cut vegetation, and installing water diversions where needed.
    - Repair culverts and stream crossings and restore drainage and road surfaces in areas damaged by fire suppression activities;
    - Repair damage to gates, fences, and other infrastructure caused by either fire or fire suppression activities.

Impact Guidelines

All activities are subject to the impact avoidance and other requirements that apply to fire management activities in general and activities in areas with protected resources (including cultural as well as natural resources).

Post-Fire - Assessment and Wildfire Remediation

This component addresses what takes place once the immediate response to, and suppression of, a wildfire on the Reserve are over. This assumes the fire was fully contained and declared fully out, suppression damage has been remediated and fire-fighting personnel and equipment have been released from the fire. Again, safety to the public and staff are always the first priority.

Boden Pond following recent wildfire, CDFW file photo

Goals

1. Ensure the safety of staff and the public.
2. Ensure the protection of cultural resources on the Reserve.
3. Establish post-fire regimes that will enhance the natural recovery of vegetation communities and species populations affected by the fire.
4. Manage the regrowth areas in ways to restore habitat quality to levels that equal or exceed pre-fire conditions.

Tasks

1. Consider closing the property to the public until a Post-fire assessment is done and it is safe to re-open.
2. Conduct an assessment of the burned area and where applicable use the State Office of Emergency Services (OES) framework established in 2007 to complete a Burned Area Emergency Response (BAER) Plan. Work in conjunction with other agencies (USFS, USFWS, USGS, CalFire, OES, SDMMP and MSP staff) and with internal CDFW experts to complete the Plan.
3. Where applicable complete emergency watershed work, as determined in the BAER Plan, as soon as possible and before the first heavy rainfall, including installation of straw waddles and other erosion protection devices.

4. Revegetate only in critical areas that are at risk for conversion to nonnative habitats, or to reduce invasion of non-native, exotic plant species;
5. Develop an assessment protocol for the burn areas to identify and prioritize treatment areas for recovery regimes, including guidelines for retaining damaged or dead trees for their wildlife values.
6. When trees near roads in a burn area are felled:

    - Dispose of the slash (limbs and tops) either by cutting and building of brush piles or by chipping and redistributing it on the site or through another approved method.
    - Position larger felled trees so they lay horizontal to the slope to assist with erosion control and provide future wildlife habitat.
    - Remove or secure loose logs on the uphill of a road to prevent them from rolling onto the roadway. Securing of logs can be done by placing large rocks or driving large wooden stakes into the ground on the downhill side of the log.

7. In areas with burned oaks, apply the following general guidelines to mark trees for removal. The guidelines reflect the fact that oaks have the ability to regenerate after fires. The success of the regeneration depends on the intensity of the burn that took place around the oak stems. The species of oak also plays an important role in the ability of the species to respond to a wildfire. Oaks will be marked for removal if:

    - They are dead, determined by not having sprouting leaves within one year of a fire.
    - They have the potential to fall on roadways (i.e., leaning toward the roadway and having the length to reach the road if they fell, large limbs overhanging the road, obvious defects such as large scars, or swelling in the main tree stem).

8. Incorporate the data collected above and the actions taken into a post-fire report for CDFW Managers. This will provide justification for adequate staffing and budgeting in the future for wildfire planning and implementation of the FGC-BOF Joint Policy on Pre-During, and Post-Fire activities.
9. Conduct a Wildfire Incident De-brief with CalFire Personnel. Discuss actions taken during this wildfire and where improvements can be made for future wildfire events. Request CalFire Incident Report (should include ignition cause and location, fire-fighting and support resources assigned to the fire, final acreage and boundaries, and any other fire-related details) and request the final Fire Map in GIS format for CDFW use in monitoring and reporting.

Impact Guidelines

All activities are subject to the impact avoidance and other requirements that apply to fire management activities in general and activities in areas with protected resources (including cultural as well as natural resources).

Fire Recovery Regime and Monitoring

This component focuses on the short- and long-term recovery of burned areas following post-fire cleanup and remediation, and after the initial post-fire actions have occurred. This component includes any necessary follow-up actions and monitoring of the remediation effort, as well as habitat and species recovery monitoring.

Goals

1. Ensure the recovery of habitats and species on the Reserve.
2. Coordinate post-fire monitoring with interested and knowledgeable agencies and academic institutions.

Tasks

1. Working in cooperation with agency and academic restoration experts and managers of adjacent public lands, develop habitat-specific recovery strategies. Each strategy will include criteria for determining appropriate methods for any site restoration, will contain guidelines for techniques and materials to be used, monitoring protocols, and success criteria. Opportunities for pilot projects within the existing burn areas should be identified to allow methods and approaches to be tested.
2. Identify and implement interim recovery and monitoring measures in burn areas following post-fire cleanup and remediation, including but not limited to the monitoring of:

    a. erosion and sedimentation;
    b. wildlife, especially breeding activities and wildlife movement;
    c. plant species composition and structure in regrowth areas;
    d. the invasion of weeds in areas disturbed by fire suppression activities or in the burn area and take corrective actions as needed; and,
    e. the effectiveness of installed erosion control measures; take corrective actions as needed.

3. Incorporate the data collected above, the results and post-fire actions taken into a report for CDFW Managers. This will provide justification for adequate staffing and budgeting in the future for wildfire planning and implementation of the FGC-BOF Joint Policy on Pre-During, and Post-Fire activities.

Impact Guidelines

All activities are subject to the impact avoidance and other requirements that apply to fire management activities in general and activities in areas with protected resources (including cultural as well as natural resources).

G. Cultural Resources Elements: Goals, Tasks, and Impact Guidelines

1. Archaeological Sites (Prehistoric and Historic)

The Reserve includes both prehistoric and historic archaeological sites based on past nearby surveys and the recent study conducted by PanGIS, Inc. under the WCB Grant to the SDNHM. CDFW had thought there had been no known studies or surveys within the Reserve, however, through the searches conducted by PanGIS they found one report from within the Reserve, and several just outside the Reserve that CDFW did not have knowledge of. Additionally, seven previously unrecorded archaeological resources were located by PanGIS in the Reserve during the surface survey (Cultural Resource Technical Report, PanGIS, Dec 2020).

Former historic tin shack on the Reserve, majority has burned in recent wildfires. CDFW file photo

In general, archaeological sites are considered sacred and/or contain culturally sensitive features such as burials, cremations, rock art, or ceremonial places. Although none of the known sites within this Reserve are currently listed on the California Native American Heritage Commission's sacred sites list, it is possible that some of the sites within the Reserve would qualify for such listing.

Changing conditions including effects from erosion, fire, animal disturbance, visitor disturbance, unauthorized activities, vandalism, etc., can affect cultural resource sites and either expose additional artifacts/features, or cause damage or destruction to them.

Some of the known archaeological sites within the Reserve are from the historic period and represent the presence of American settlers in this area. Historic archaeological sites include homestead dwellings and ranching sites.

Goals 1 and 2

1. Thoroughly assess the information provided by PanGIS in their Cultural Resource Technical Report and determine management actions and prioritize them based on funding and personnel availability.

2. As funding allows, implement recommendations for future work as outlined in the Cultural Resources Treatment and Protection Plan (PanGIS, 2021) to continue to identify, protect, stabilize, and preserve the archaeological resources within the Reserve.

Tasks

1. Implement the recommendations as delineated on the *Treatment and Inspection Matrix* (see Table 14 below).
2. Identify procedures for careful planning of all undertakings, including routine maintenance and any new facility development, to avoid or minimize significant impacts to cultural resources within the Reserve. Planning should include archaeological and historical research and consultation with Kumeyaay and/or other cultural groups as appropriate.
3. Develop procedures for soliciting and permitting scientific research and interpretation of archaeological sites in the Reserve. Utilize the research questions and recommendations provided in the Cultural Resources Treatment and Protection Plan (PanGIS Inc., 2021). Reach out to various institutions (academic and non-profit) and request assistance with future work on the Reserve. A permitting process can be developed based on the process in place at California State Parks (e.g., form DPR412A), another state agency, or it can be developed with assistance from a state agency or institution that has archaeologists on staff (e.g., CSP, California Office of Historic Preservation, California Dept. of Transportation, CalFire, etc.).
4. Develop measures to protect cultural resources during wildfire incidents, flash flood events, earthquakes, or other natural disasters. Outline procedures for assessing damages after a natural disaster event. Archaeological sites most vulnerable to damage, such as those located along drainages and gullies, those with dense surface artifact distributions, those with combustible materials, etc., will be identified for implementation of such protection measures. Even sites containing bedrock grinding features must be recognized as vulnerable to fire, based on damages and destruction identified as a result of the 2003 Cedar Fire.
5. Provide cultural resource training to CDFW staff and make locations of previously recorded cultural sites known to the Reserve manager and game wardens so that they can monitor site conditions and watch for deterioration and/or vandalism. Make sure they are aware of current cultural resource laws such as SB 1034, PRC 5097.5, H&HS 7050.5, Penal Code 6221/2, Government Code: PRC 6254 and 6254 and 6254.10, etc.
6. Assess the effects of visitor use, habitat management, and natural erosion on archaeological sites. Treatment measures should be implemented where appreciable damage to sites is identified. Such measures can include site-specific closures, restrictive buffers around sensitive cultural resources, moving roads/trails or other damaging activities away from archaeological sites, revegetation to hide or impede access and/or erosion control, sign placement, installation of fencing, site capping, security monitoring, public education, and other protection and/or avoidance measures. *Treatment and Inspection Matrix* (Table 14), for other details.

7. Establish a program for the continuation of professional archaeological inspection, assessment, and evaluation of cultural resources within the Reserve as shown in *Treatment and Inspection Matrix* (Table 14). Approximately 20% of the Reserve was surveyed in 2020 under the WCB Grant mentioned previously. Funding should be sought after to survey the remaining 80% of the Reserve. Some areas may not be fully accessible. Inspections should be conducted by a qualified archaeologist and should include documentation of sites and features through photographs, measurements, and Global Positioning System (GPS) recordation. Condition monitoring/assessment records and updated site forms should be regularly prepared and submitted to California Historical Resources Information System (CHRIS)'s South Coastal Information Center to document observed changes. Previously encountered but unrecorded resources should be further analyzed and properly recorded.

Impact Guidelines

1. The compilation and identification of site data does not entail any environmental impacts.
2. Any fieldwork portions including archaeological survey, testing, or other research on the Reserve would require pre-project environmental review and potentially, permitting, if work is being done by outside consultants or non-state entities.
3. All unlisted, eligible, or potentially eligible historical resources located on the Reserve will be mapped, recorded, and evaluated to determine their eligibility status for placement on the NRHP or CRHR.

Goal 3

Resolve potential conflicts between management goals for areas with cultural and other protected resources and facilitate the implementation of habitat and fire management, facility maintenance, and cultural resource protection.

Tasks

As funding allows, prepare an assessment of Category 1 through 3 sites (see Table 14 below) that identifies habitats, special status habitats, special status species, exotic invasive plants, roads, structures, and special use areas within a ½ mile or larger radius of known cultural resource sites and examine how prescribed treatment measures might affect other management activities in the area (and vice versa).

Impact Guidelines

1. Construction and/or maintenance of facilities, visitor-use activities, and habitat/ fire management work all have the potential to disturb, degrade, or damage surface and/or buried archaeological remains, historic structures, historic features, landscapes, or sacred sites.

2. Any new facilities including roads, trails, fence lines, structures, buildings, etc., will be designed and constructed to avoid archaeological resources to the extent possible. Projects should be designed and implemented to avoid significant impacts to recognized historic resources. As per professional standards for assessing and mitigating significant impacts to historical resources, treatment measures in compliance with the Secretary of the Interior Standards for the Treatment of Historic Properties will be implemented to reduce potential significant impacts to a level less than significant.
3. Prior to any actions that have the potential to disturb the area of known or possible archaeological sites, or in areas that have not been inspected for archaeological resources within the past five years, Environmental Review will be completed and additional research, archaeological survey, and/or testing will be carried out to determine if significant cultural resources exist.
4. If impacts to archaeological resources are unavoidable, then an archaeological data recovery plan will be developed and implemented. A qualified professional archaeologist will oversee and/or monitor those activities deemed to have the highest potential to disturb or damage buried archaeological resources to ensure that no historical or Native American resources are adversely impacted. Native American consultation will also be undertaken.
5. If unexpected cultural remains are uncovered during any project activities, work will be stopped in that area so that the resource can be recorded, the nature of the deposit can be determined, and an appropriate avoidance, protection, or recovery plan can be implemented.
6. All unlisted, eligible, or potentially eligible historical resources will be mapped, recorded, and evaluated to determine their eligibility status for placement on the NRHP or CRHR.
7. Vandalism and/or damage to cultural sites are a constant concern that is difficult to eliminate, but with proper steps, can be minimized.

Table 14. Proposed Treatment and Inspection Matrix for Cultural Resource Sites

Category*	Description	Treatment	Inspection
1	Resources that are eligible or potentially eligible for inclusion in either the National Register of Historic Places (NRHP)[1] or the California Register of Historical Resources (CRHR) or are significant under CEQA[2]. These resources have integrity and are at risk for damage and vandalism.	1. Preserve in place 2. Actively manage for preservation through measures[3] such as: Avoiding impacts Installing fencing Planting vegetation as a deterrent (e.g., thorny or poisonous plants) or for erosion control Installing signage specifying laws protecting archaeological sites on public lands Rerouting trails, road, paths of travel, etc. Stabilizing and repairing historic structures and features Capping 3. Avoid introduction of incompatible elements. Restoration and replacement of architectural features should be based on detailed and accurate representation of original features as substantiated by historical, physical, pictorial, or archaeological evidence. 4. Avoid introduction of plant species to the site area that would undermine, damage, or modify the resource (e.g., trees with spreading surface roots)	Every Year (or more frequently if site specific issues are identified)
2	Resources that may be significant under CEQA by have reduced potential for damage due to topographic isolation, inaccessibility, or limited surface manifestations (artifacts and/or features)	1. Preserve in place 2. Allow other uses nearby as long as there is no direct access to the site's resources. 3. Manage the site's resources by: Avoiding direct impacts Planting vegetation to hide and protect the site Stabilizing and repairing historic structures and features	Every two years (more frequently if site specific issues are identified)
3	Resources that do not meet NRHP or CRHR eligibility criteria or may not be significant under CEQA (includes resources used in interpretive programs and for research and study)	1. Preserve in place 2. Allow other uses and modern amenities nearby 3. Manage the site's resources by: Avoiding direct impacts Planting vegetation to hide and protect the site Restoring or reconstructing historic resources for interpretive use	Every five years

Category*	Description	Treatment	Inspection
4	Resources that do not require any additional consideration (includes some isolated artifacts, resources that have lost integrity, or those that have been damaged or destroyed). May include sites where a data recovery program has been completed.	1. Ensure proper documentation of the resource has been completed and submitted to the appropriate agencies and organizations. 2. If collections were conducted, ensure that funding is provided for curation at an appropriate facility in accordance with the State Historical Resources Commission's guidelines.	Not required

***These proposed categories will be based only on site inspections conducted during the resource inventory work for the Reserve and should not be assumed to infer any determination of significance or non-significance of the sites. In order to determine site significance, National Register of Historic Places/California Register of Historic Resources eligibility, and actual site categories a program of archaeological site testing should be undertaken. However, until such a time as the testing program occurs, these proposed categories should be used for treatments and inspections outlined in the Treatment and Inspection Matrix.**

NOTES for Table 14:

1 *Under the NRHP: the quality of significance in American history, architecture, archeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and: (a) are associated with events that have made a significant contribution to the broad patterns of our history; or (b) are associated with the lives of persons significant in our past; or (c) embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or (d) have yielded or may be likely to yield, information important in prehistory or history. Generally, the resource must be at least 50 years old to be eligible for consideration.*

2 *Under CEQA, a resource is "historically significant" if the resource meets the criteria for listing on the CRHR (Pub. Res. Code SS5024.1, Title 14, Section 4852) including the following: (a) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage; (b) Is associated with the lives of persons important in our past; (c) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or (d) Has yielded, or may be likely to yield, information important in prehistory or history.*

3 Any installation of protective measures within or adjacent to a known cultural resource should only be undertaken with the participation of a qualified archaeologist and Native American consultation. Archaeological and/or Native American monitoring is required for any protective work that involves ground disturbance within or adjacent to a known cultural resource.

Goal 4

Resolve potential conflicts between management goals for areas with cultural and other protected resources.

Impact Guideline

The management activities will be subject to the impact avoidance and other requirements that apply in areas with protected resources.

2. Historical Resources

As mentioned in Chapter II. C, the earliest recorded settlement in Boden Canyon dates back to the 1890's by the Johann Boden family. There are vestiges of two home sites located in the canyon, where the family grew crops and raised livestock. Other signs of occupation include Eucalyptus trees and an olive grove located east of the main pond. Remnants of a tin shack and two non-functioning aged wells are also present. Most of what had remained at the time of CDFW acquisition has burned in wildfires over the last 20 years.

In general, the LMP's Goals and Tasks should provide the basis for CDFW's ability to effectively protect these unique historic resources from adverse impacts caused by recreational use, vandalism, or other disruptive activities.

Goal 1

As funding allows, Identify, document, evaluate, and protect historical resources within the Reserve.

Tasks

1. Maintain a current, updated inventory, GIS mapping, and informational database for those historic resources within the Reserve that may be eligible for listing on the CRHR/or NRHP.
2. Locate individuals or their descendants who worked, lived, or visited the Reserve and conduct oral history interviews. The information gleaned from these individuals may be used to complement and expand upon existing historical data for planning and interpretive purposes.
3. Collect, store, preserve, and make available any original photographs, plans, documents, objects, transcribed oral histories, etc., associated with the Reserve's historic resources to qualified researchers and interpreters.
4. Actively designate eligible historic resources to the CRHR/or NRHP. Listing on the latter may qualify a historic resource for federal emergency post-disaster restoration and/or reconstruction funding sources.
5. As funding allows, initiate and complete Historic Structure Reports (HSR) and/or Cultural Landscape Reports (CLR) for extant historic buildings, structures, objects, sites, and other significant landscape features.
6. These reports will provide the following:

- Physical, graphic, and photographic information about a resource's history and existing conditions.
- Recommend appropriate preservation treatments, managerial actions, and appropriate uses.
- Outline recommendations for future work without compromising character-defining historic features.

Goal

1. Protect the valuable historic resources of the Reserve while still creating opportunities for visitor-related outdoor recreational experiences.
2. Interpret and conduct additional research on the historical resources on the Reserve utilizing the research questions contained in the Cultural Resources Treatment and Protection Plan (PanGIS Inc. 2021).

Tasks

1. Base historic resource managerial decisions in accordance with recommendations and guidelines set forth by the following state and federal historic preservation regulations and guidelines:
    - California Public Resources Code (PRC)
    - Executive Order W-26-92
    - CEQA
    - National Environmental Protection Act (NEPA)
    - The United States Secretary of the Interior's Standards and Guidelines for the Treatment of Historic Preservation Projects
    - The United States Secretary of the Interior's Standards for the Treatment of Historic Properties, with Guidelines for Cultural Landscapes.
    - The United States Department of the Interior Preservation Brief No. 36: Protecting Cultural Landscapes—Planning, Treatment and Management of Historic Landscapes.
2. Follow the Archaeological Goals and Tasks (as appropriate) for the treatment of historic archaeological resources. For example:
    - Provide historic resource training to CDFW staff and make locations of previously recorded cultural and historic sites known to Reserve manager and game wardens so that they can monitor site conditions and watch for deterioration and/or vandalism.
    - Develop measures to protect historic resources during wildfire incidents, flash floods, or other natural disasters.
    - Assess the effects of visitor use and natural erosion on historic archaeological sites.
    - Coordinate the management of historic resources with public agencies managing the same types of resources on adjacent lands.

- Determine what interpretive materials can be developed and provide applicable and non-confidential information on the Reserve website or at kiosks on the Reserve.

Impact Guidelines

By subjecting any prospective land use or land management activities to the above-listed historic resource treatment recommendations, any impacts to their historic integrity would be reduced to acceptable levels.

Land Management Plan Priority Tasks

Based on information included in this LMP, and noting where gaps in information occur, CDFW has identified and prioritized tasks across all elements (biological, public use, facility maintenance, fire management and cultural resources management). The below list includes those tasks in priority order:

1. Cultural Resources Technical Study and Treatment/Protection Plan. This includes a NAHC Sacred Lands File search, initial field inventory, and preparation of a cultural resources management plan and confidential map of resources in the Reserve;
2. Erosion Study that includes analysis necessary to prioritize the culvert, washout, and channel erosion repairs and or culvert replacements so that funding requests can be submitted through CDFW processes;
3. Small mammal trapping survey throughout the Reserve to update the 1994 survey and provide current data on small mammals (species present, habitat occupation), with a focus on sensitive mammals;
4. Diseased tree survey/initial assessment to determine presence of disease, fungus, parasites, and overall health of riparian and oaks within the Reserve. Based on the results conduct a more thorough assessment and determine treatment needs;
5. Wildlife corridor study, including seasonal camera monitoring to determine use of the Reserve by wildlife and contribute to regional data sets on the success of regional plans and acquisition strategies to ensure adequate wildlife corridors persist in and through the Reserve; and,
6. Tiering off of the erosion study above, assess the safety and stability of the dam and spillway in the center of the Reserve and develop options and needs for management of the pond, dam and spillway.

   All of the above priority tasks were funded through a WCB Grant in 2019, with their implementation in 2020 and 2021. Information and products received from this Grant were incorporated into the Final LMP as they became available, including recommendations and conclusions. Specifically, the products that were received and incorporated in detail in this LMP include: Cultural Resources Technical Report and Cultural Resources Treatment and Protection Plan (PanGIS Inc. 2021), a Hydrology and Hydraulics Study (CValdo Corp. 2021) and a Small Mammal Trapping Study (SDNHM, 2020). Information from and results of the Diseased Tree Surveys and the Wildlife Corridor Study will be incorporated into this LMP by SCR staff and/or retained in staff

files. The LMP will be updated as applicable projects, tasks, and monitoring results are available from this Grant and through other sources.

V. OPERATIONS AND MAINTENANCE SUMMARY

This chapter contains information in a summary format which will guide budget preparation and work plans for the Reserve. Operations and maintenance is broken down into two sections: funding and staffing, and equipment needs.

A. Funding and Staffing

When the Reserve was acquired beginning in 1998, the property came with no funding for operations, management or staffing. Decades later, CDFW began incorporating management of its lands (both Wildlife Areas and Ecological Reserves) into the existing Wildlife and Sports Fish Restoration Grant (WSFR) Federal Grant Program. While it is not enough funding to cover all the staffing and management needs on CDFW properties, it is enough to cover basic management and routine inspections during those years when funding is received. The federal grant cycle and renewal process is dynamic and not considered a permanent source of funds.

Currently Boden Canyon Ecological Reserve is one of 16 properties in the South Coast Region (SCR) that are covered under an existing WSFR grant. Boden Canyon Ecological Reserve is included in the more detailed budget identified as "Job 2", the "Southern Lands", which includes management of 10 properties. In the 2018-19 Fiscal Year (FY) the grant that includes the Reserve provided the base funding for 4 permanent staff, funds for temporary help, and a little over $100,000 for general expenses. To reiterate, this is for multiple properties; the Reserve does not receive any funding specific to it, rather tasks are outlined in the grant that are to be conducted under the grant timeline and budget.

In 2016, the State began requiring visitor use day passes at certain properties, and the Reserve is one of them (see Chapter IV. D above, Public Use Program). This funding source is currently minimal, providing approximately $250.00 per year for the Boden Canyon Ecological Reserve. In the future, this program may generate more income where it will be more beneficial to the SCR and the Reserve.

Currently, one Environmental Scientist/Reserve Manager is assigned to the Reserve and one-two Scientific or Seasonal Aids (temporary staff) are assigned to that Reserve Manager. The Reserve Manager oversees other CDFW properties in addition to Boden Canyon Ecological Reserve, so work time is allocated between these various properties and is not fully dedicated to any one property. Additionally, CDFW staff from the SCR or, on occasion, from within various Headquarters units, provide task-specific assistance to the Reserve Manager as needed. Current staffing is not adequate to fulfill all maintenance, management and monitoring needs of the Reserve.

Goal

To adequately support the Reserve and perform the tasks identified in this LMP, a combination of additional site management and maintenance staffing will be required. The staffing needs

proposed in this LMP incorporate permanent staffing, supplemented by seasonal labor and, where appropriate, use of volunteer help.

Tasks

1. Addition of one Permanent Yearly (PY) Environmental Scientist, with 50 percent of time assisting the Reserve Manager at the Reserve, primarily focusing on invasive species treatment and monitoring.
2. Addition of one PY Fish and Wildlife Technician, with 25 percent of time to assist with maintenance and management needs (fencing, signage, gates, kiosks) at the Reserve.
3. Addition of 25% PY Environmental Scientist, as needed, to assist with public use programs (including hunting, education and interpretation, and environmental research).
4. Secure additional funding to support and maintain the Reserve.
5. Secure additional funding through constituent groups, user fees, and grants from persons/groups that do not provide monies through traditional hunting/ fishing license fees.

B. Equipment

No vehicles, equipment, hand tools or materials have been specifically allocated to the Reserve. Vehicles, equipment and tools are either assigned to the Reserve Manager, to other personnel that assist in managing the site, or are considered "pool" vehicles, equipment, tools, etc. Materials and supplies are purchased as needed and as funding is available. The majority of equipment, tools and supplies are located at nearby CDFW properties or at the SCR office in Kearny Mesa.

Goal 1

1. Manage the Reserve to protect, maintain, and improve the biodiversity, habitat integrity, and environmental health of the Reserve. As well, ensure the safety of people working on and using the Reserve.

Tasks

1. Purchase equipment needed to maintain the Reserve. Equipment needed to implement LMP goals includes but is not limited to: a new herbicide spray rig for use on a utility vehicle (e.g., a 'Gator') and one small sprayer for use on an ATV.

Goal 2

1. Maintain all equipment, vehicles, and facilities in optimum working condition to maximize their useful lifespan and to promote efficient use of the Reserve's operating budget.

Tasks

1. Regularly inspect and service all equipment and vehicles.
2. Maintain the herbicide storage facility, in accordance with all applicable storage regulations.
3. When feasible, establish cooperative agreements with other state agencies such as CAL FIRE to provide and operate equipment needed to maintain the roads and facilities at the Reserve.

Constraints on Facility Maintenance Elements

The goals of the facilities maintenance elements are constrained by a range of natural and human induced factors. Effective management of the Reserve requires that these factors be identified and considered.

Environmental factors

Maintenance requirements will depend largely on the severity of winter weather conditions. In years of exceptional rainfall, flooding or erosion may damage roads, fences, and signage. The degree of damage will dictate maintenance priorities.

Financial factors

As with other elements, limited funding for staff and operations is a major constraint on facilities maintenance. To fully meet facilities maintenance goals, an increase in funding for the Reserve will be required.

Acknowledging that funding is limited, the implementation of all operations and maintenance tasks will be prioritized for funding and staffing based on: 1) critical safety need for staff and/or the public, 2) compliance with a legal requirement, 3) need for immediate resource protection, 4) need for necessary management or enforcement to achieve CDFW's mission, and 5) opportunity to maximize funding or partnership efforts to achieve a larger benefit for the Reserve and Region.

VI. CLIMATE CHANGE STRATEGIES

According to the Department's California's Wildlife Action Plan (CDFW, 2015), detrimental impacts to wildlife diversity have been categorized under four major threats: population growth and development, water management conflicts, invasive species and climate change. During the past several years, there has been tremendous effort to address climate change and to develop strategies either mandated by legislation or by various Executive Orders.

Please see: http://www.climatechange.ca.gov/state/legislation.html

The California Natural Resources Agency has undertaken a Climate Change Adaptation Strategy (CAS) to implement the Global Warming Solutions Act (AB 32) and to:

> *"Collect, synthesize, and communicate to the greatest extent possible, how sea level rise; temperature rise and duration; and precipitation changes due to climate change will exacerbate existing fire, flood, water quality, air quality, habitat loss, human health and drought risks will impact the state's economy, infrastructure, human populations, and environment. In concert with AB 32 objectives and ongoing climate science predictions, adaptation strategies shall focus on a 50 year climate impact timeline. This effort will rely heavily on research funded through the California Energy Commission's Public Interest Energy Research (PIER) program."*

The projected climate change threats include higher temperatures and amplified drought periods which

will lead to increased catastrophic wildland fires. Invasive weeds, invertebrates and other non-native species which rely on disturbance and stressed ecosystems may have an advantage over native communities. Earlier snowmelt and consequent flooding may impact vulnerable levee systems, water availability and management. In addition, sea level rise and fluctuating rainfall need to be considered within the Department's restoration programs and management of wildlife, vegetation and fisheries resources held in the public's trust. Engineering solutions to address subsequent erosion for public safety and infrastructure may have a detrimental effect on Department managed estuaries and coastal wetlands. Request for commercial use of Department lands including wind and solar energy projects will also likely increase and contribute to habitat fragmentation and species impacts.

So how does this relate to Department lands management goals and policies?

Wildlife area and ecological reserve managers are currently integrating climate change strategies in their proposed goals, operations and maintenance tasks on their sites. These include fuel reduction for habitat diversity or for adjacent residential and urban interface mandates; monitoring of leading populations and control of exotic weeds and other invasives; water quality and conservation measures, purchase of water rights, maintaining or enhancing in-stream flows; implementing best management practices for mosquito control in managed wetlands; acquisition and conservation planning to preserve wildlife corridors, creating larger buffer zones around wetlands and coordinating management goals with other public agencies and non-government organizations that have similar missions. Site planning has also emphasized management on an ecosystem landscape level. The Department incorporates other planning and international conservation efforts on its lands that include the North American Bird Conservation Initiative, Partners in Flight, North American Waterfowl Management Plan, U.S. Shorebird Conservation Plan and the Western Hemisphere Shorebird Reserve Network and future participation in Partners in Reptile and Amphibian Conservation. Department lands also contribute to Recovery Plans for listed species, NCCP's and multiple species HCP's.

Lands management is also actively involved in reducing "non climatic stressors" described as runoff from non-point pollution, appropriate disposal of trash and other hazardous materials. Public health and safety are considered in every program offered to the public and maintenance of infrastructure on Department lands (levees, roads, parking lots and interpretive centers, etc). There are also programs in place to reduce greenhouse gas emissions in facilities, residences and vehicles that are maintained and operated on the properties.

Critical to all these efforts is the continuing education of lands managers and their staff and providing them the best scientific information available. The science of climate change and its potential effects on natural resources has to be conveyed in a timely matter to anticipate their future needs.

The Department supports research that will determine the most appropriate survey protocols to identify new or troubling patterns and trends within a species or vegetation community. Future phenology changes in plants and wildlife together with potential range shifts and migration patterns will affect management decisions for seasons and harvest models for game species. Various regions have continued to implement specific actions outlined in California's Wildlife Action Plan, through baseline resource assessment and monitoring with State Wildlife Grant (SWG) funds.

The Department has completed a draft White Paper titled "Climate Change-related Research Considerations (July 2008) and a "Policy for Quality in Science and Key Elements of Scientific Work" (January 2008) that will assist research efforts on Department lands and benefit natural resource management in general.

Implementing the Natural Resources Agency Climate Change Strategies and emerging Department policies will present financial and staffing challenges to a Lands Program already beleaguered with chronic budget shortfalls. Focus should be maintained on planning for current climate change effects as well as projected impacts. Continued effective and efficient use of Department operational budgets is essential and outside funding opportunities should be maximized.

VII. FUTURE REVISIONS TO LAND MANAGEMENT PLANS

All planning documents eventually become dated and require revision so they can continue to provide practical direction for operational and maintenance activities associated with the property. A common and unfortunate situation is that the revision of planning documents is often neglected for budgetary or staff constraints, or other priorities. To address this challenge, this brief guide incorporates a suggested hierarchy of revision procedures in which the level of process and required involvement is proportionate to the level of change that is proposed. The LMP reflects the best information available during the planning process, but it is understood that new information or circumstances will arise over time and adjustments will be required to keep the LMP current. Such new information or circumstances may include:

- Feedback generated by adaptive management of the site
- Scientific research that directs improved techniques of habitat management
- Research that directs improved management of agricultural resources
- Documented threats to fish and wildlife species and their habitats
- New legislative or policy direction
- New acquisitions

When new information dictates a change to the LMP, it is important that there is an appropriate process established to facilitate this change. Public outreach and public input will be necessary in proportion to the proposed policy change established by the LMP. Unless a reasonable and clear revision process exists, the LMP could become outdated and irrelevant. If the appropriate procedure for a particular, proposed, revision is not apparent, the determination of which of the following procedures to use shall be made by the regional manager in consultation with the Lands Program/Wildlife Branch.

A. Minor Revisions

Minor revisions may include the addition of new property to an existing ecological reserve or wildlife area or the adoption of limited changes to the goals and tasks through adaptive management, based on other scientific information or policy direction. This procedure will be applicable to revisions that meet the following criteria:

- No change is proposed to the overall purposes of this LMP

- CEQA documentation (if required) is completed and approved
- Appropriate consultation occurs within the region and with other appropriate branches in the Department
- Appropriate consultation with other agencies occurs
- Adjoining neighbors are consulted regarding the revision when the revision is related to a specific location or the acquisition of additional area.

Minor revisions may be prepared by the staff members or with other CDFW resources, and require approval by the regional manager. If additional acquisitions require no changes in existing management, the parcels may be integrated within the current plan via a memo from the regional manager to the Director. The documentation is attached to the management plan and provided to the Lands Program/Wildlife Branch for their files.

B. Major Revisions

Major revisions or a new LMP, require a procedure comparable to the initial LMP planning process, but also proportionate to the level of policy change that is proposed. This procedure is applicable to revisions that meet the following criteria:

Substantial revision and/or new policy direction is proposed to the LMP, or the adoption of a completely new plan is proposed.

- Appropriate CEQA documentation is completed and approved.
- Appropriate consultation occurs throughout CDFW.
- Appropriate coordination and consultation with other agencies occurs.
- A public outreach program is conducted that is proportional to the level of the proposed revision.

Major revisions or a new plan may be prepared using available CDFW resources. Any major revisions or new plan development require prior approval by the regional manager. If the appropriate procedure for a particular, proposed revision is not apparent, the determination of which of these procedures to use shall be made by the region in consultation with the Lands Program. The revised plan may need additional CEQA analysis if the revisions present substantive changes. A new plan and or new CEQA analysis for a revised plan would require the review and approval of the Deputy Director.

C. Plan Status Reports

Periodic evaluation is important to help ensure that the purposes and goals of the LMP are being met. The chapter or section that includes, “Management Goals,” may contain many specific tasks that involve monitoring of the site and evaluation of the adequacy of management activities. Cumulatively, these efforts will provide feedback regarding the success of the overall management effort. Periodic and detailed analysis of this feedback data will be necessary to assess the status of this LMP.

A review of the achievement of the goals of the LMP should be prepared every 5-10 years following the date of adoption of the LMP or subsequent revisions. A status report documenting this review should, at minimum, include:

- An evaluation of the achievement of the purposes and goals of the LMP.
- An evaluation of the completion or annual completion, as appropriate, of each tack contained in this LMP.
- Monitoring required as a result of a mitigated negative declaration.
- A fiscal evaluation of the program.
- An evaluation of the effectiveness of CDFW's coordination efforts with local governments, and other property management and regulatory agencies involved with the site.
- A notation of important new scientific information that has bearing on management.
- A recommendation and schedule for revisions to the LMP to incorporate new information and improve its effectiveness.

The status report should be prepared or coordinated by the site manager or other regional representative. It should be reviewed by appropriate Regional functions, then submitted to the Regional Manager and forwarded to the Lands Program, Wildlife Branch to be submitted to the Deputy Director. This report should serve as a basis for revision of the LMP and appropriate adjustment to ongoing management practices. Approved copies of the report are included in the management plan files in the region and Lands Program.

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APPENDICES

A. Public Comments and CDFW Responses
B. Plant and Animal Species List
C. CNDDB Query Results
D. Proposition 12-13, and Proposition 117 Information
E. Wildfire-related Documents