Eastern Sierra Nevada Riparian Areas Assessment for Fuels Reduction

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List of Abbreviations

Board	California Board of Forestry and Fire Protection
CAAQS	California ambient air quality standards
CalVTP	California Vegetation Treatment Program
CEQA	California Environmental Quality Act
CNDDB	California Natural Diversity Database
CRHR	California Register of Historical Resources
ELZ	Equipment Limitation Zone
EPA	U.S. Environmental Protection Agency
ESNR	Eastside Sierra Nevada Riparian
HCP	habitat conservation plan

IPaC	USFWS Information for Planning and Consultation
MMRP	Mitigation Monitoring and Reporting Program
NAAQS	National Ambient Air Quality Standards
NAHC	Native American Heritage Commission
NCCP	Natural community conservation plan
NRHP	National Register of Historic Places
PEIR	Program Environmental Impact Report
PSA	Project-Specific Analysis
SPR	Standard project requirement
SS	Special Status Species
CA SWAP CFS	California State Wildlife Action Plan Conservation Focal Species
BCC	USFWS Bird of Conservation Concern

1. EXECUTIVE SUMMARY

This environmental assessment of riparian zones of the Eastern Sierra Nevada Region provides resource managers current information on existing condition for the preparation project-specific compliance documents. The document serves as a reference source for planners who seek a concise synthesis of the current science of riparian habitats and associated environments while considering such areas for fuels reduction treatments. The study provides information on biological resources along the southeastern Sierra slope below the elevation of forested habitats (<6,500 feet) and supports California Environmental Quality Act (CEQA) Public Resources Code [PRC] Section 21000 et seq.) requirements for the environmental setting section of an Environmental Impact Report (EIR) and the compliance requirements of National Environmental Protection Act (NEPA). Specific environmental factors and constraints associated with fuels treatments in these biologically sensitive areas are identified to inform agencies and project proponents of the potential issues and opportunities prior to a formal environmental review. As such, local, regional, state, and federal agencies with land ownership or land management responsibilities may use this synopsis of environmental impacts and mitigation measures to inform project design criteria and to employ best management practices. Baseline data provided herein were compiled utilizing those databases publicly available and offers planners accurate and updated project information and site conditions on the Area of Potential Effects (APE).

2. INTRODUCTION

For more than a century, fire exclusion across the Inyo National Forest and Mono and Inyo County has contributed to increased density in all woodland types (riparian and coniferous forests) with naturally frequent to moderate fire return intervals. These conditions are have become increasingly conducive to large wildfires, many of which occur when downslope winds move rapidly across the foothills of the Owens Valley. Historically, these fires have often followed the paths of creeks and adjacent riparian vegetation, as these areas offer the heaviest concentrations of fuels. On the eastern slope of the Sierra Nevada, riparian zones tend to be a particularly flammable part of the landscape due to greater vegetation density and continuity than the surrounding uplands. Under certain conditions, riparian corridors can act as prime conduits for rapid fire spread through an arid landscape that otherwise has insufficient fuel to propagate fire.

Many recent fires in Mono and Inyo County have not only burned severely in upland shrub and pinyon pine vegetation, but have been carried more rapidly through riparian vegetation. In the arid eastern Sierra, some of the highest fuel loads are concentrated in the riparian corridors with disturbance adapted species such as aspen (*Populus* spp), willow (*Salix* spp) and water birch (*Betula occidentalis*). High or extreme fire behavior in riparian vegetation has been observed in local wildfires in very similar vegetation types including the Inyo Complex (2007), Birch (2002), Piute (2002), and Laurel (1987) Fires. Current data on fire perimeters from CAL FIRE indicate that 51 small to medium sized fires (500 to 10,000 acres), and 9 large fires (>10,000 acres) occurred in the Mono and Inyo County area during the last 20 years (2001 to spring 2021).

Recent fire activity and risk assessments indicate an increased need for fuels reduction across the region, yet the complications associated with riparian area management frustrate planning efforts. The Sierra Nevada Ecosystem Project (SNEP 1996; Vol III, Ch 5, p 203) characterizes riparian areas as a focal point of many resource conflicts in the Sierra Nevada because they are a critical ecological link between

land and water. Roads and road crossings, urban development, channelization of streams and overgrazing are causing significant habitat degradation to riparian habitats. In addition, dewatering and/or water diversion has caused loss of vegetation, resulting in destabilized stream channels and downslope waterway degradation.

While riparian zones have been impacted by such activities to varying degrees, even impaired areas continue to provide shade, stability and organic matter to streams, and habitat for avian and terrestrial wildlife. The SNEP (1996; Vol II, Ch 36, p 1009) noted that riparian areas are especially important in semiarid regions, where the availability of moisture and a cool, shaded microclimate gives these habitats an ecological importance disproportionate to their coverage. Riparian areas in the Inyo National Forest, for example, constitute less than 0.4% of the land area but are essential for at least one phase of life for about 75% of the local wildlife species (Kondolf et al. 1987). In addition, recreational activities essential to local economies are concentrated in riparian corridors, and the regional wetlands are also special natural communities due to their importance to plants and wildlife.

3. PURPOSE AND NEED

This impact analysis supports resource management planning to reduce dense, continuous fuels conditions in riparian areas. The increasing risk of large, severe wildfire poses threats to sensitive species, wildlife habitat, water quality, and recreational value of the area. Recent disturbance events, including fire and drought, have altered fuels dynamics and has led to material departure from desired conditions. As a result, riparian areas are unnaturally dense with continuous fuels profiles that support high severity wildfire. The combination of highly flammable fuel, long dry summers and steep slopes create a significant natural hazard of wildland fire potential in both Mono and Inyo counties, conditions which can ultimately result in death, injury, economic loss, and significant public investment in firefighting efforts. Woodlands and other natural vegetation can be destroyed, resulting in a loss of wildlife habitat, timber resources, scenic quality and recreational resources. Soil erosion, sedimentation of fisheries and reservoirs, and downstream flooding can also result. Change in the regional climate and the resulting snowpack also contributes to increased risk and frequency of wildfires in the region (Westerling et al. 2006, others).

As federal, state, and local entities attempt prepare for, resolve, and recover from wildfire events, the number of fuel reduction projects that include near-stream environments is increasing, bringing new challenges to riparian area management. Fuel management treatments have escalated as the Forest Service and Department of Interior implement the National Fire Plan (USDA/DOI 2001), the Healthy Forests Restoration Act (GAO 2003), and the President's Healthy Forest Initiative (Dombeck et al. 2004; USDA/DOI 2008). Agency Fire and Fuels programs have markedly accelerated the removal of hazardous fuels in high-priority areas in the wildland-urban interface (WUI) and adjacent forests or rangelands. At the state level, significant resources have been allocated for the expansion of CAL FIRE's vegetation program which has set ambition treatment targets (250,000 acres per year) in an effort to reach objectives expressed in Executive Order (EO) B-52-18, signed by former Governor Jerry Brown in May 2018.

Local agencies and nonprofit organizations have also expanded their coordinated activities to address suppression, preparedness, reduction of wildland fuel. Collaborative stewardship groups in Inyo and Mono County have focused their planning efforts to strategically prioritize treatments in areas of

greatest wildfire threat. The Mono County California Community Wildfire Protection Plan (Anchor Point Group, 2009) has estimated Mono County areas as High and Very High fire hazard concentrations in and around Mammoth Lakes, west of Bridgeport, and along the Walker River in northern Inyo County. Bridgeport Valley, Antelope Valley, and the areas to the east of Mono Lake and Crowley Lakes are classified at moderate fire hazard. The Community Wildlife Protection Plan for Inyo County (Anchor Point Group, April 2009) identifies most of the northern and western portions of the County as a high risk for WUI fires, and most of the populated areas of the southern and eastern portions of the county are at moderate risk for exposure to wildfires. With regards wildlands in Inyo County, CAL FIRE FRAP estimated that the Lower Owens River riparian corridor from Pleasant Valley Reservoir south to Owens Lake was at high hazard for wildfires, but most of the very high fire hazard areas remain at higher elevations in western Inyo County.

4. PROPOSED ACTIONS

Proposed actions considered for this analysis are derived from current implementation strategies in the project region. These vegetation treatments aim to reduce the likelihood of a ground fire escalating in intensity and aid the deployment of suppression crews and equipment. This is accomplished by modifying fire behavior through strategic removal or modification of vegetation (Finney and Cohen 2003; Graham et al. 2004). Treatment activities may be applied singularly or in combination and are selected to achieve the desired management objectives for project area. Activities are considered to meet operational needs and to confirm to constraints on the landscape. Treatment activities are defined using CAL FIRE's Vegetation Treatment Program PEIR and are shown below.

Table 4.1. Vegetation Treatment Activities described by the CAL FIRE Vegetation Treatment Program (CAL FIRE VTP).

Treatment Activities	Description	Method of Application
Prescribed Burning	Pile burning: Burning of piles of vegetative material to reduce fuel and/or remove biomass following treatment Broadcast burning: Burning to reduce fuels over a larger area or restore fire resiliency in target fire-adapted plant communities; conducted under specific conditions	Pile burning: Place removed fuels in piles on site and burn fuel Broadcast burning: Burn understory within timber or oak woodlands, or broadcast treatment using fire with a control line along the perimeter
Mechanical Treatment	Use of motorized equipment to cut, uproot, crush/compact, or chop existing vegetation	Mastication, chipping, brush raking, mowing, roller chopping, chaining, skidding and removal, piling; often combined with pile burning
Manual Treatment	Use of hand tools and hand-operated power tools to cut, clear, or prune herbaceous or woody species	Hand pull or grub, thin, prune, hand pile, lop and scatter, hand plant; often combined with pile burning

Prescribed Herbivory[a]	Use of domestic livestock to reduce a target plant population thereby reducing fire fuels	Grazing or browsing by cows, goats, or sheep - Excluded
Herbicides	Chemical application designed to inhibit growth of target plant species	Ground-level application only, such as paint-on stems, backpack hand-applicator, hypo-hatchet tree injection, or hand placement of pellets. No aerial spray is allowed.

[a] Not allowable in the ESNR Project Area because livestock diseases from sheep or goats could spread disease and high mortality to wild bighorn sheep in the region.

These standard mechanisms for forest fuels reduction in riparian habitats are used in various combinations to modify vegetation in the canopy, subcanopy, and near and on the ground surface (Schwilk et al. 2009) and typically target crown, ladder, and surface fuels (Hunter et al. 2007; Jain et al. 2012). Prescribed fire is the primary tool for fuels treatments in riparian and wetland areas and is often combined manual treatments. Mechanical thinning is less commonly employed. However, in some cases, mechanical treatment can be used to create a desired stand structure and composition without having to use prescribed burning, or in areas where there are risks and uncertainties with prescribed burning. Other common practices include follow up herbicide application or tamarisk beetle release, mowing, and flooding to reduce cattail (*Typha* spp). A summary explication of primary treatment types, as further defined by the CalTVP PEIR, is as follows:

Prescribed Fire Treatments. Prescribed burning is the application of fire to vegetation under specified conditions of fuels, weather, and other variables. Prescribed burning is used to restore the ecological function in areas that have departed from their natural fire regime. (Keeley and Syphard 2016). To achieve site-specific resource management objectives, prescribed low intensity surface fires may be used to control vegetation by enhancing the growth, reproduction, or vigor of certain species, in addition to managing fuel loads and/or maintaining a targeted vegetation community. This treatment is predominately utilized for ecological restoration in the grass fuel type, and has moderate potential for ecological restoration treatments in tree fuel types, and a moderate likelihood of being used for fuel breaks in tree and shrub fuel types.

Mechanical Treatments. Mechanical treatment involves the use of motorized equipment (rather than hand or manual equipment), such as wheeled tractors, crawler-type tractors, or specially designed vehicles with attached implements designed to cut, uproot, crush/compact, or chop target vegetation. Mastication treatment entails the use of Low-pressure, smaller (<20,000 lb.), tracked excavators and other tracked equipment with mowing heads that can grind smaller trees and understory vegetation into 1-3” large chips on slopes ≤40% and spread chips throughout the forest are preferred. Mechanical treatment methods that may be used include tilling, drill seeding, mowing, masticating grubbing, and chipping, among others.

Manual Vegetation Treatment. Manual treatments (e.g. hand thinning) consists of conducting physical labor to remove smaller trees (≤8” in diameter) and understory vegetation with various hand operated equipment including chainsaws and chippers. This type of treatment is utilized in sensitive areas around watercourses, steeper slopes ≥40%, near cultural resources, or other key aesthetic areas. Activities

could include the following: thinning trees with chainsaws, loppers, or pruners; cutting undesired competing brush species above ground level to favor desirable species and spacing; pulling, grubbing, or digging out root systems of undesired plants to prevent sprouting and regrowth; and placing mulch around desired vegetation to limit competitive growth.

Herbicide Treatments. Herbicides are chemicals that damage or kill plants and can be classified by their mode of action. They include growth regulators, amino acid inhibitors, grass meristem destroyers, cell membrane destroyers, root and shoot inhibitors, and amino acid derivatives, all of which interfere with plant metabolism in different ways. Limitations in the use of herbicides are addressed by requirements for application methodology, regulatory requirements, label restrictions, and project-specific guidelines. The limitations include the potential to damage or kill non-target plants; development of a resistance to a particular herbicide over time; or toxicity in humans, and domestic or wild animals and insects.

Design Features & Criteria for Fuels Treatments for Riparian Areas

The Aquatic and Riparian Conservation Strategy (Strategy) establishes agency approach for water, watersheds, and aquatic and riparian conservation. The long-term goal of the Strategy is to develop a network of properly functioning watersheds that support populations of aquatic and riparian species and high-quality water. Riparian Conservation Areas (RCAs) and Critical Aquatic Refuges (CARs) require design criteria for designated RCA widths, as described in the 2004 SNFPA ROD, Appendix A, Part B, pages 42 62, and are as follows:

- Perennial Streams: 300 feet on each side of the stream, measured from the bank full edge.
- Seasonally Flowing Streams (includes intermittent and ephemeral streams): 150 feet on each side of the stream, measured from the bank full edge.
- Special Aquatic Features (lakes, wet meadows, bogs, fens, wetlands, vernal pools, and springs) or Perennial Streams with Riparian Conditions extending more than 150 feet from edge of streambank or Seasonally Flowing streams with riparian conditions extending more than 50 feet from edge of streambank: 300 feet from edge of feature or riparian vegetation, whichever width is greater.
- Other Hydrological or Topographic Depressions without a Defined Channel: RCA width and protection measures determined through project level analysis.

Additionally, USFS or BLM lands adhere to the National Best Management Practices for Water Quality Management on National Forest System Lands technical guide (USFS 2012b). For projects within the Inyo National Forest, the Sierra Nevada Forest Plan Amendment (2004 and 2001) requires that a Riparian Conservation Objective (RCO) analysis be completed. The RCO analysis applies to Riparian Conservation Areas (RCAs) as defined above and Riparian Conservation Objective (RCO) Standards and Guidelines provide management direction (Appendix I).

The California Vegetation Treatment Program (CalVTP) developed by the Board of Forestry and Fire Protection utilizes a programmatic Environmental Impact Report (Program EIR) to expedite the CEQA compliance process for vegetation treatments. Standard Program Requirements (SPR) and Mitigation Measures (MM) are used for project specific analysis. For this assessment, SPR BIO-4: Design Treatment to Avoid Loss or Degradation of Riparian Habitat Function, is the primary applicable criteria to retain or improve habitat functions within riparian habitats and requires the following measures:

- Retain at least 75 percent of the overstory and 50 percent of the understory canopy of native riparian vegetation within the limits of riparian habitat identified and mapped during surveys conducted pursuant to SPR BIO-3. Native riparian vegetation will be retained in a well distributed multi-storied stand composed of a diversity of species similar to that found before the start of treatment activities.
- Treatments will be limited to removal of uncharacteristic fuel loads (e.g., removing dead or dying vegetation), trimming/limbing of woody species as necessary to reduce ladder fuels, and select thinning of vegetation to restore densities that are characteristic of healthy stands of the riparian vegetation types characteristic of the region. This includes hand removal (or mechanized removal where topography allows) of dead or dying riparian trees and shrubs, invasive plant removal, selective thinning, and removal of encroaching upland species.
- Removal of large, native riparian hardwood trees (e.g., willow, ash, maple, oak, alder, sycamore, cottonwood) will be minimized to the extent feasible and 75 percent of the pretreatment native riparian hardwood tree canopy will be retained. Because tree size varies depending on vegetation type present and site conditions, the tree size retention parameter will be determined on a site-specific basis depending on vegetation type present and setting; however, live, healthy, native trees that are considered large for that type of tree and large relative to other trees in that location will be retained. Consideration of factors such as site hydrology, erosion potential, suitability of wildlife habitat, presence of sufficient seed trees, light availability, and changes in stream shading may inform the tree size retention requirements.
- Removed trees will be felled away from adjacent streams or waterbodies and piled outside of the riparian vegetation zone (unless there is an ecological reason to do otherwise that is approved by applicable regulatory agencies, such as adding large woody material to a stream to enhance fish habitat, e.g., see Accelerated Wood Recruitment and Timber Operations: Process Guidance from the California Timber Harvest Review Team Agencies and National Marine Fisheries Service).
- Vegetation removal that could reduce stream shading and increase stream temperatures will be avoided.
- Ground disturbance within riparian habitats will be limited to the minimum necessary to implement effective treatments. This will consist of the minimum disturbance area necessary to reduce hazardous fuels and return the riparian community to a natural fire regime (i.e., Condition Class 1) considering historic fire return intervals, climate change, and land use constraints.
- Only hand application of herbicides approved for use in aquatic environments will be allowed and only during low-flow periods or when seasonal streams are dry.

Policy Direction and Plan Conformance.

The Eastside Sierra Nevada Project area encompasses approximately 580,527 acres (68% of the area) of federal owned/managed lands, and 275,777 acres (32%) of state, county, and City of Los Angeles owned/managed property (LA DWP). Actions within the Project area are therefore regulated with respect to compliance by both Federal and State resource policies. Guidelines for protection and

management of riparian resources comply with four Federal laws: The National Environmental Policy Act (NEPA) of 1969; the Clean Water Act (CWA) of 1972; the Endangered Species Act (ESA) of 1973; and the National Forest Management Act of 1976 (NFMA; Reeves 2006; Suzuki and Olson 2008).

California Environmental Quality Act (CEQA) guidelines (§ 15169) allow public agencies to prepare a Master Environmental Assessment (MEA) to support compliance mandates. The Governor's Office of Planning and Research's General Plan Guidelines define the MEA as "a collection of environmental data—a resource that simplifies the data gathering for future negative declarations or EIRs." The 2010 MEA for Mono County (2010) has served as general template for preparing the biological resources analysis for this document. Relevant policy and management documents are as follows:

- Executive Orders 11988 and 11990
- The Inyo National Forest Land and Resource Management Plan (1988)
- The Sierra Nevada Forest Plan Amendment Record of Decision (2004) amended the Inyo LRMP
- The Sierra Nevada Management Indicator Species Amendment Record of Decision (2007)
- Sikes Act, Title II (16 U.S.C. 670g et seq.), as amended
- Federal Land Policy and Management Act (FLPMA) of 1976 (43 U.S.C. 1701 et seq.), as amended.
- BLM Departmental Manual 235.1.1.A, General Program Delegation, Director, Bureau of Land Management
- BLM Departmental Manual 632.1.1-1.6, Endangered Species Management.
- Los Angeles Department of Water and Power: "Owens Valley Land Management Plan." 2010. LADWP, April 2010; available by search on Google Scholar.
- USDA Forest Service, Inyo National Forest: "Biological Assessment for Revision of the Inyo National Forest Land Management Plan; Federally Designated Threatened and Endangered Species and their Designated Critical Habitat and Candidate Species." FEIS for revising the Land Management Plan for the Inyo National Forest. November 2017.
- Inyo County, California Community Wildfire Protection Plan. April 2009. Anchor Point Group, Boulder CO.
- Mono County, California Community Wildfire Protection Plan. April 2009. Anchor Point Group, Boulder CO.
- DOI Bureau of Land Management. Bishop Resource Management Plan.
- Lahontan Region Board Water Quality Control Plan.

Environmental Consequences

Impact Assessment – Determining Thresholds of Significance

To determine the level of significance of an identified impact within the ESNR Project area, the criteria outlined in the CEQA Guidelines are used. CEQA Guidelines Section 15065 directs lead agencies to find that a project may have a significant effect on the environment if it has the potential to:

(1) substantially degrade the quality of the environment,

(2) substantially reduce the habitat of a fish or wildlife special status species,

(3) cause a fish or wildlife population to drop below self-sustaining levels,

(4) threaten to eliminate a plant or animal community,

(5) reduce the number or restrict the range of an endangered, rare, or threatened species, or,

(6) eliminate important examples of the major periods of California history or prehistory.

CEQA Guidelines Section 15206 further specifies that a project shall be deemed to be of statewide, regional, or area-wide significance if it would substantially affect sensitive wildlife habitats including, but not limited to, *riparian lands, wetlands, bays, estuaries, marshes*, and habitats for rare and endangered species as defined by the Fish and Game Code Section 903. CEQA Guidelines Section 15380 provides that a plant or animal species, even if not on one of the official lists, may be treated as "rare or endangered" if, for example, it is likely to become endangered in the foreseeable future. Additional criteria to assess significant impacts to biological resources due to the proposed project are specified in CEQA Guidelines Section 15382 (Significant Effect on the Environment) "…a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance." Appendix G of the CEQA Guidelines indicates that a project would have a significant impact if it would:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFG or USFWS.
- Have a substantial adverse effect on <u>any riparian habitat</u> or other sensitive natural community identified in local or regional plans, policies, regulations, or by the CDFG or USFWS.
- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites. Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.
- Conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other approved local, regional, or state habitat conservation plan.

5. PROJECT AREA

The Eastern Sierra Nevada Riparian Project Area (ESNR Project Area) is located in Mono and Inyo County, California. The ESNR Project Area is bounded in the south by Olancha Creek southwest of Owens Lake, to the west by the 6,400 to 6,500 ft elevation contour, in the north at Mill Creek west of Mono Lake and below Conway Pass, and to the East by a combination of the 6,400-6,500 ft contour, Hutchison Creek/Spring Valley Creek/Fish Slough Creek drainage, and then the Lower Owens River (Fig. 5.1). Additional, specific details on the Project Area will be described and characterized in following sections.

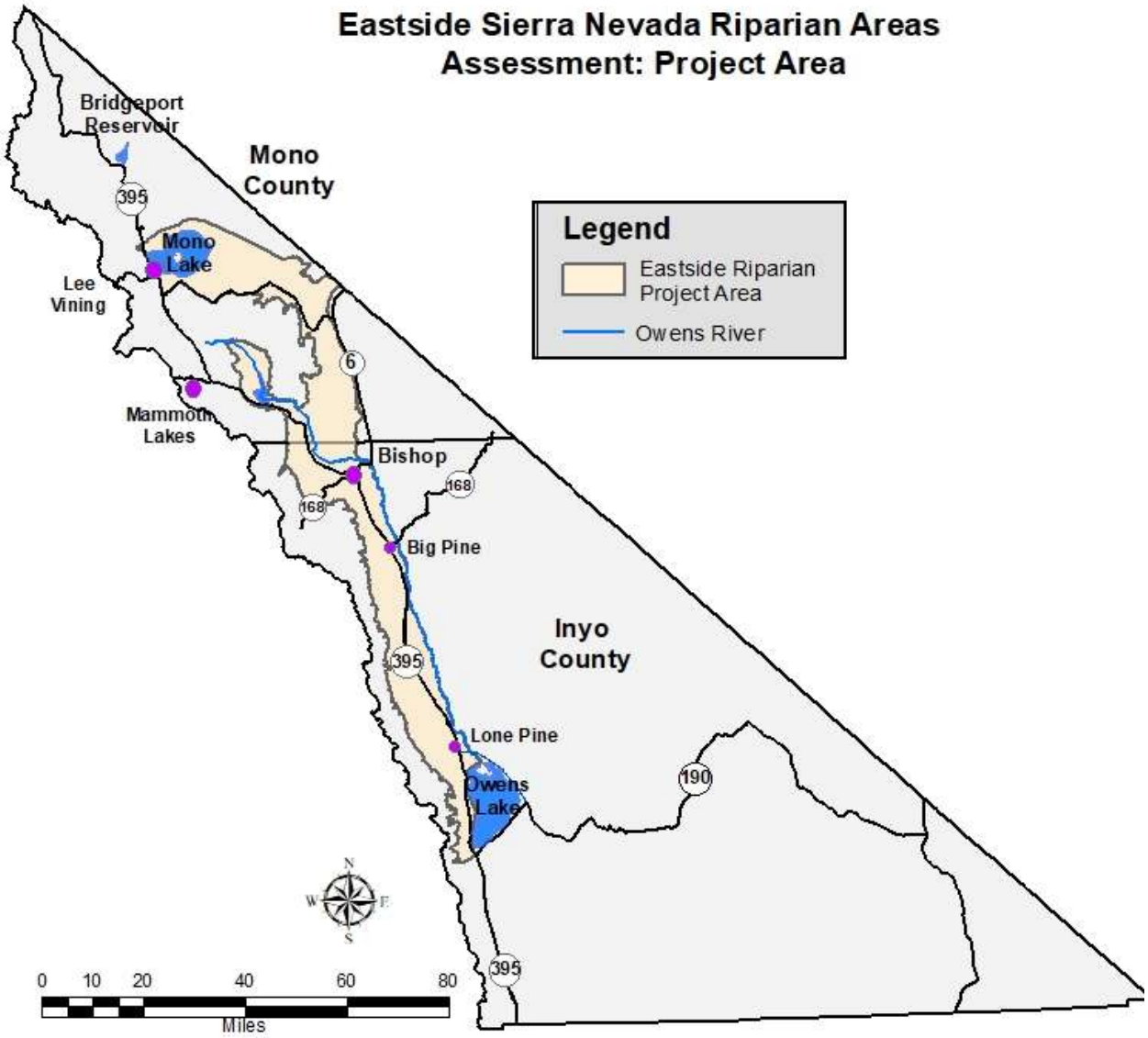


Figure 5.1 ESNR Project area in Mono and Inyo County, California.

Riparian Features

Riparian and water resources in the area include two large, natural lakes (Mono, Owens Lake), several smaller reservoirs (Crowley Lake, Pleasant Valley Reservoir, Lake Tinemaha), the Owens River, and many small headwater (intermittent) and larger streams and creeks (Fig. 5.2).

There are ≈ 445 miles of permanent streams and rivers, and 1,062 miles of headwater or intermittent streams in the Project Area. Based on the application of appropriate size buffers, there are approximately 70,712 acres of Riparian Conservation Areas (RCAs) within the project area (Fig. 5.2).

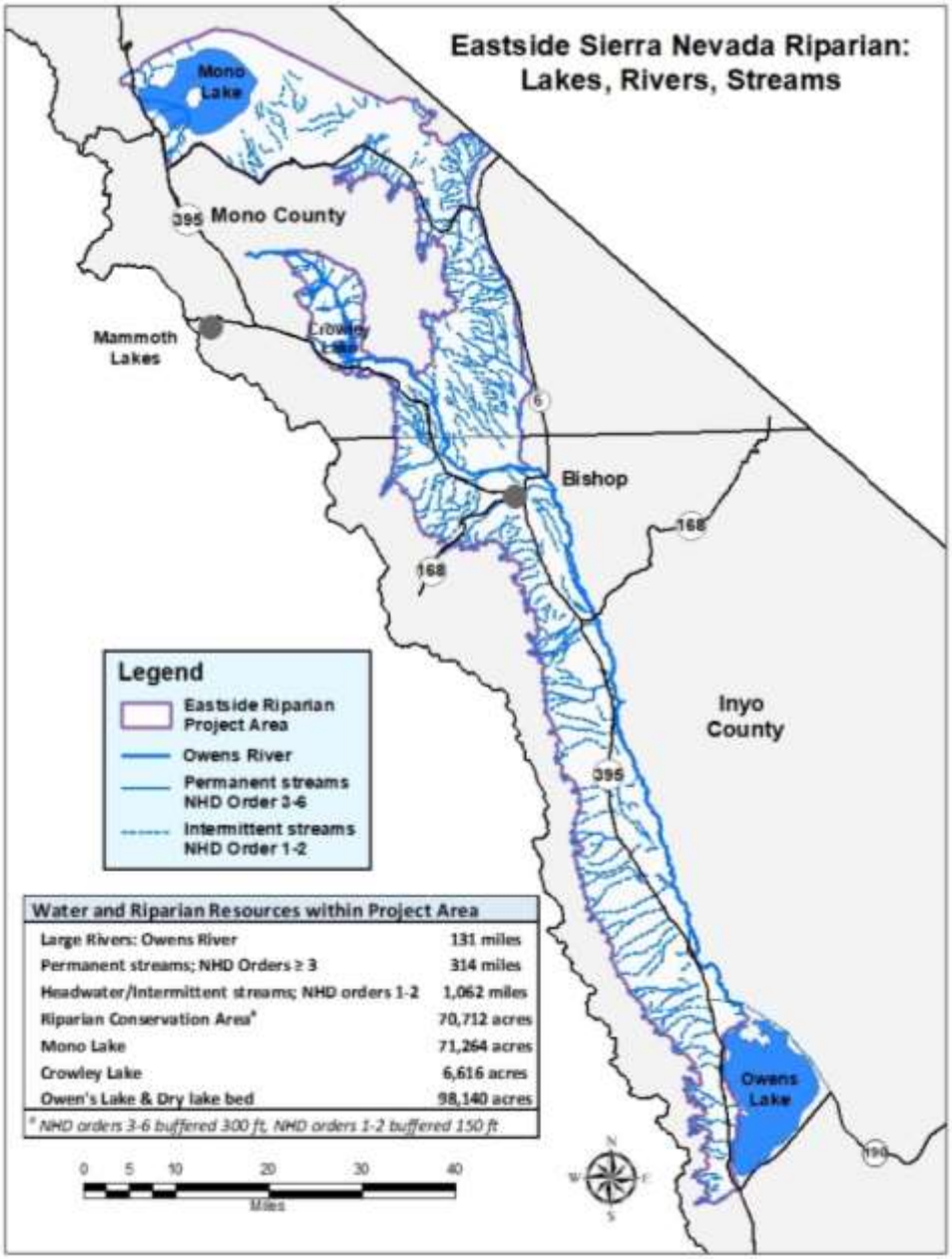


Figure 5.2. Riparian resources within the ESNR Project area, including Riparian Conservation Areas.

Community Wildfire Protection

Wildfires, risk of fire, and fire hazards are important considerations for land management planning for the reasons previously detailed. Fire "Risk" is considered to be the likelihood of ignition occurrence, whereas "Hazard" is determined by combining details on habitats types, proximity of communities to wildland areas where trees, shrubs and other "fuels" can carry fire into them (e.g. the Wildland-Urban Interface (WUI), and fire behavior potential estimated by fuels, weather, and local to regional topography (Anchor Point Group 2009). The Mono County California Community Wildfire Protection Plan (Anchor Point Group, 2009) outlines fire hazards in Mono County, analyzes existing local preparedness and firefighting capabilities, and contains suggested solutions to address identified hazards. Fire hazard has been estimated by CAL FIRE for Mono County; areas of High and Very High fire hazard are concentrated in and around Mammoth Lakes, west of Bridgeport, and along the Walker River in northern Mono County (Fig. 5.3). Bridgeport Valley, Antelope Valley, and the areas to the east of Mono Lake and Crowley Lakes are classified at moderate fire hazard (Fig. 5.3). CAL FIRE has made recommendations on Very High Fire Hazard Severity Zones for Mammoth Lakes, but not for any other cities/communities in Mono County.

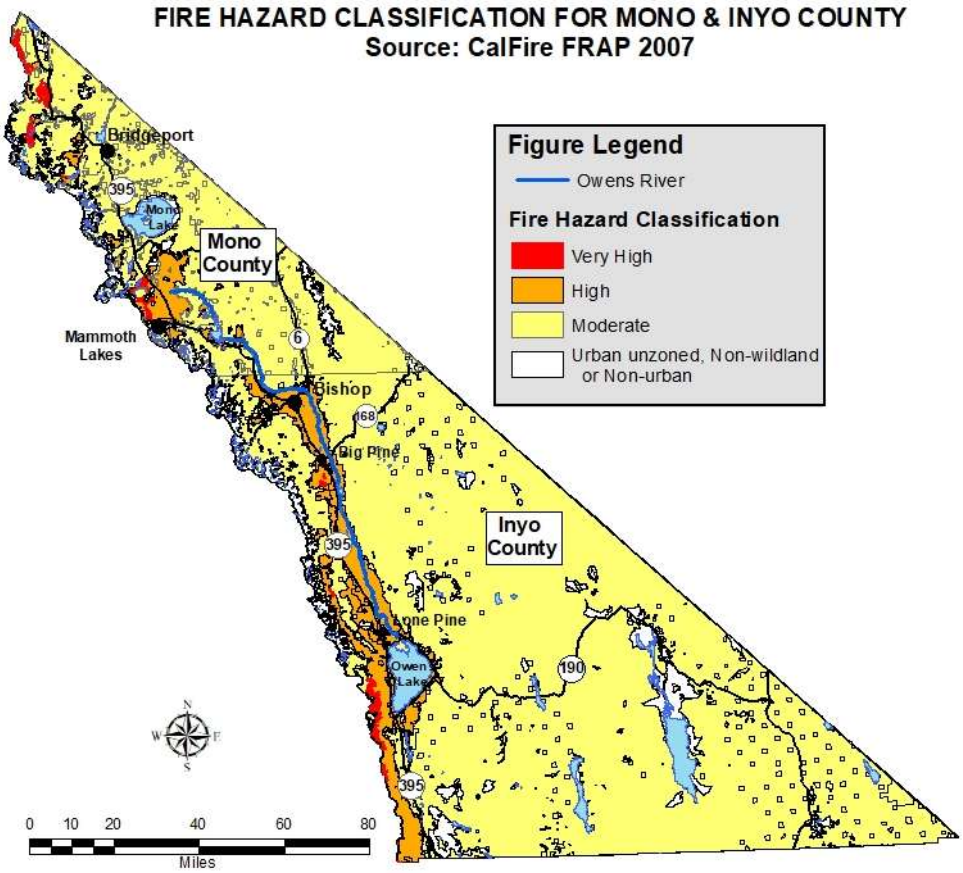


Figure 5.3. Estimates of fire hazard for landscapes in Mono and Inyo County, California. Source: CAL FIRE FRAP: Welcome to Fire Hazard Severity Zones Maps (ca.gov).

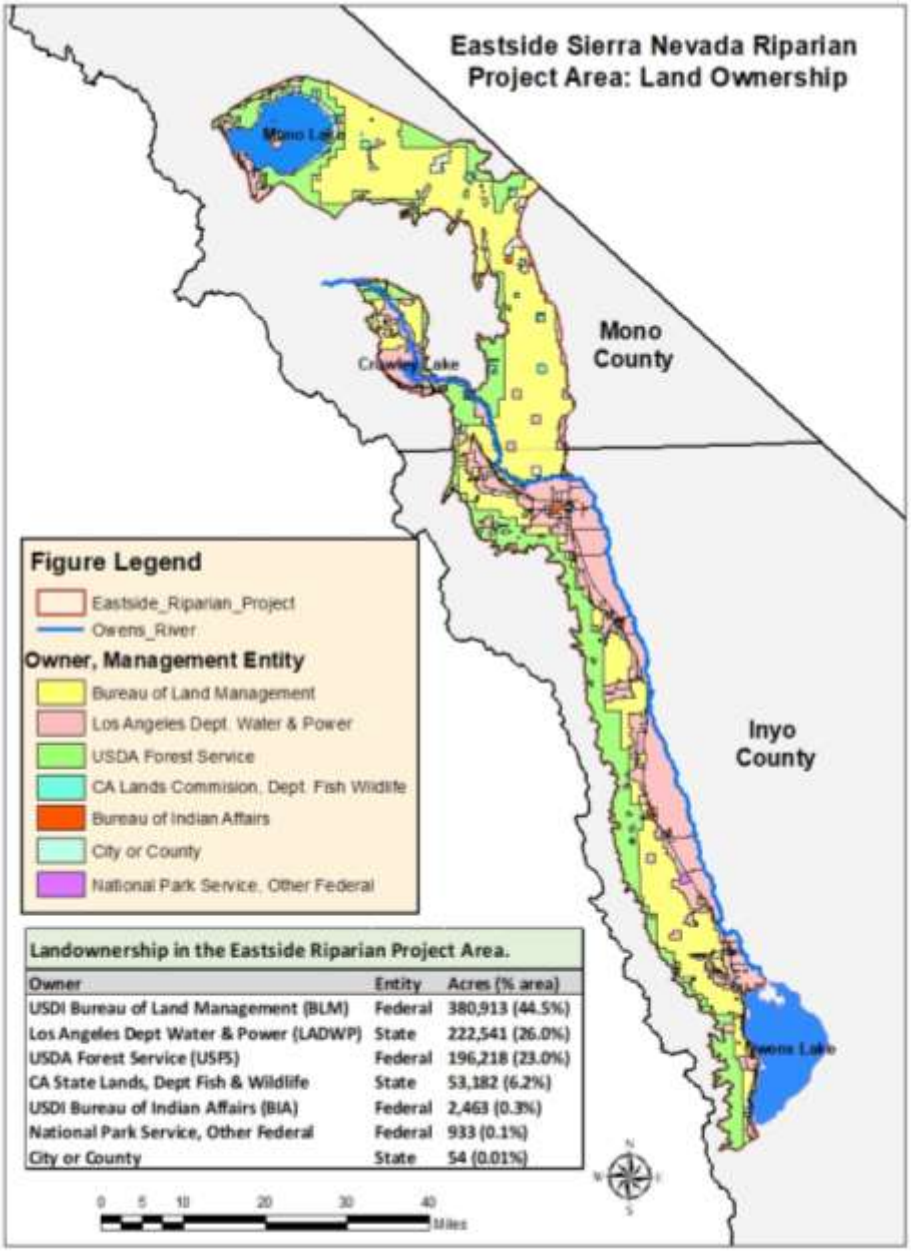
Inyo County also has a "Community Wildlife Protection Plan" (Anchor Point Group, April 2009). Most of the northern and western portions of Inyo County are at a high risk for WUI fires, and most of the populated areas of the southern and eastern portions of the county are at moderate risk for exposure to widlfires. With regards wildlands in Inyo County, CAL FIRE FRAP estimated that the Lower Owens River riparian corridor from Pleasant Valley Reservoir south to Owens Lake was at high hazard for wildfires, but most of the very high fire hazard areas were at higher elevations in eastern Inyo County (Fig. 5.3).

Land Ownership

Land ownership within the ESNR Project Area is predominately federal, including the Bureau of Land Management (44.5%), and the USFS Inyo National Forest (23%; Fig. 5.4). The Los Angeles Department of Water and Power (LADWP) manages 26% of the Project area, focused around Mono Lake, Crowley Lake, and the Owens River (Fig. 5.4). California State Lands (State Land Commission combined with CDFW) administer a relatively limited 6.2% of the Project area, whereas the Bureau of Indian Affairs, National Park Service + Other Federal, and City+County ownership are limited (Fig. 5.4).

For the BLM, the ESNR Project Area includes portions of the Granite Mountain Management Area (Mono Lake Basin to mostly east of Mono Lake), the Long Valley Management Area (Crowley Lake and the upper Owens River), the Benton Management Area (encompassing the Fish Slough area and Spring Valley Creek/Hutchison Creek), and the Owens Valley Management Area (Pleasant Valley down to Lone Pine and the top of Owens Lake). The South Inyo Management Area (BLM) is mostly to the east of the ESNR Project Area. For the Inyo NF, the ESNR Project area includes portions of the Mono Lake, White Mountain and Mt. Whitney Ranger Districts.

The federal land management agencies have planning authority on federal lands, and state agencies have planning authority on state lands. Mono and Inyo County have only limited environmental authority on the federally owned lands managed by the USFS and the BLM. The Counties have planning authority on LADWP lands and any development on those lands must comply with CEQA and the State/County environmental review process. Much of the LADWP lands are environmentally sensitive; e.g., wetlands and critical wildlife habitat.



Landownership in the Eastside Riparian Project Area.

Owner	Entity	Acres (% area)
USDI Bureau of Land Management (BLM)	Federal	380,913 (44.5%)
Los Angeles Dept Water & Power (LADWP)	State	222,541 (26.0%)
USDA Forest Service (USFS)	Federal	196,218 (23.0%)
CA State Lands, Dept Fish & Wildlife	State	53,182 (6.2%)
USDI Bureau of Indian Affairs (BIA)	Federal	2,463 (0.3%)
National Park Service, Other Federal	Federal	933 (0.1%)
City or County	State	54 (0.01%)

Figure 5.4. Land ownership within the ESNR Project Area in Mono and Inyo County.

Fire Risk and Fire History

The Fire Probability for Carbon Accounting Tool developed by CAL FIRE (Fire Probability for Carbon Accounting) was used to estimate that the overall mean annual probability of wildfire occurrence in the Project area was 31% (Fig. 5.5). Although this is a low annual probability of fire, notice that fire probability increases with elevation along the western margin of the project area, reinforcing that fires in dense, overgrown/decadent vegetation along stream-associated riparian zones (RCAs) will wick fire

either upslope into higher elevation forest habitats, or downslope into low elevation shrublands. Data on fire perimeters from CAL FIRE indicate that 51 small to medium sized fires (500 to 10,000 acres), and 9 large fires (>10,000 acres) occurred in Mono and Inyo County during the last 20 years (2001 to spring 2021, hereafter "recent" fires; Fig. 5.5). For historical context, 21 fires that were larger than 500 acres previously occurred in Mono and Inyo County from 1980 to 2000, and none of those were larger than 10,000 acres.

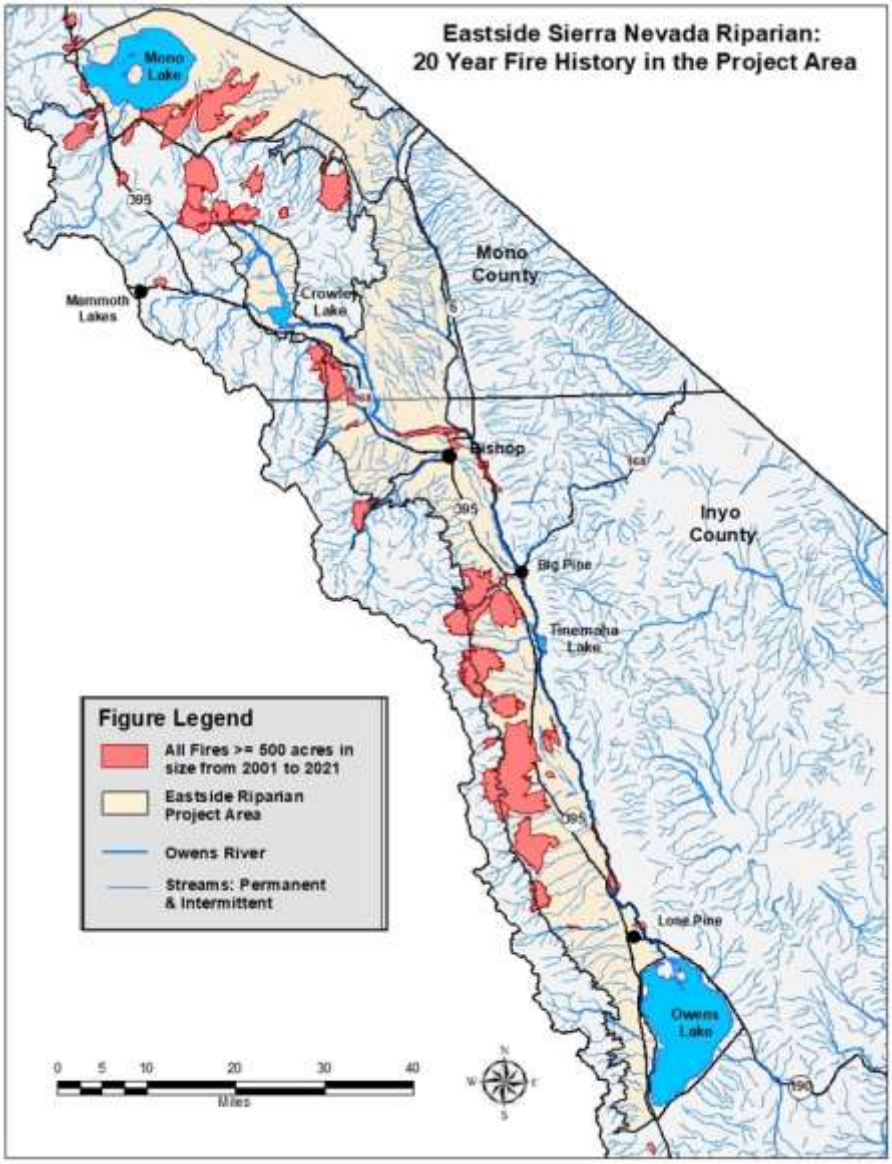


Figure 5.5. Fire history (≥ 500 acres) for the ESNR Project Area from 2001 to 2021 (recent era fires). Fires illustrated on the map were those that occurred on BLM, USFS, or CDF managed areas. All recent fires that occurred on CDF administered lands (State and LADWP properties) are displayed, not just those ≥ 500 acres in size.

Many of the recent fires occurred on the slopes to the west of Highway 395, and burned upslope into the higher elevation conifer forests above 6,500 ft. There were three recent fires (size range 2,714 to 5,461 acres) that burned in riparian habitats along the Upper Owens River north of Crowley Lake, and 11 recent fires (range 87 to 2,076 acres) that burned in riparian areas along the Lower Owens River from Pleasant Valley Reservoir downstream to Owens Lake.

Many recent fires in Mono and Inyo County have not only burned severely in upland shrub and pinyon pine vegetation, but have been carried more rapidly through riparian vegetation. In these arid eastern Sierra Nevada systems, some of the highest fuel loads are in the riparian corridors with disturbance adapted species such as aspen, willow (*Salix* spp) and water birch (*Betula occidentalis*).

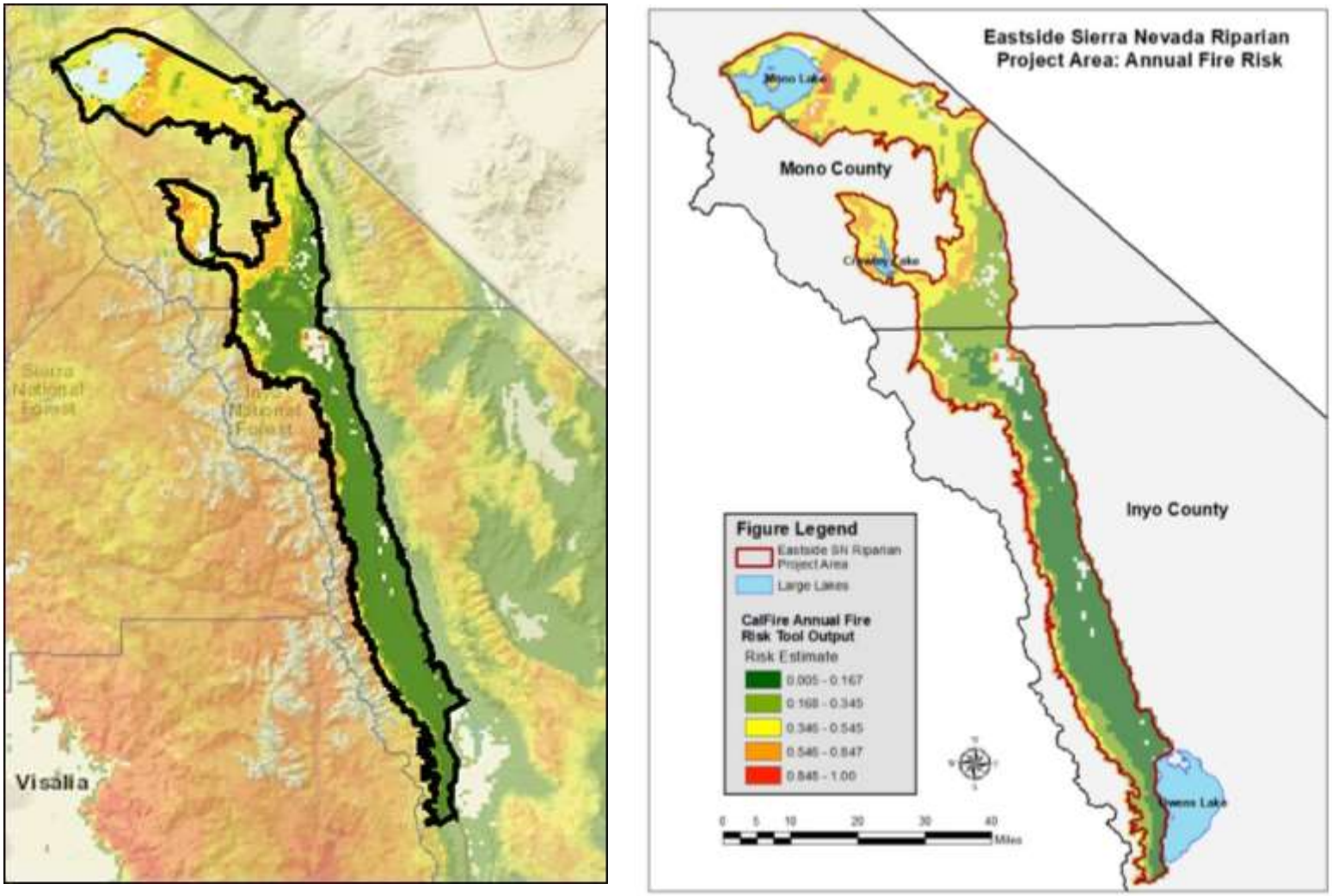
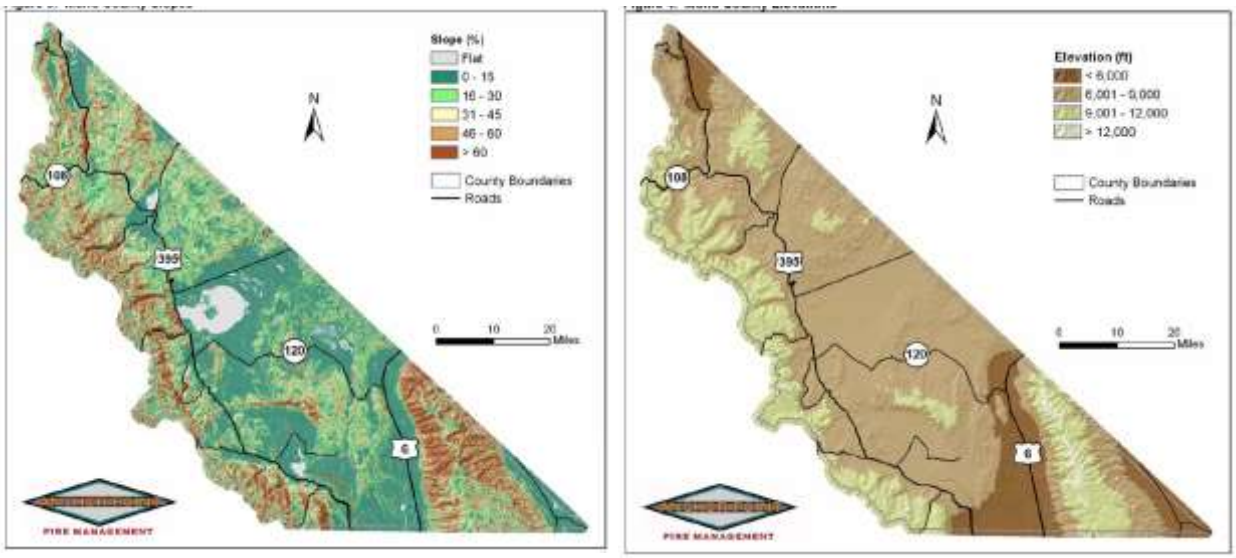


Figure 5.6. Model estimated annual fire risk in the Sierra Nevada and in the Eastside Sierra Nevada Project Area. Data are from the CAL FIRE "Fire Probability for Carbon Accounting Tool" (Fire Probability for Carbon Accounting), which estimates the mean projected annual probability of wildfire occurrence for the period 2021 to 2050.

Biophysical Features of Mono and Inyo County

Mono County is highly varied in terms of topography and climate (Fig. 5.7). The study area encompasses the high country of the eastern Sierra Nevada at one extreme, where annual snowfall reaches 385 inches in some places; at the other extreme is the Chalfant Valley, which represents a significant desert area. Many different climate and life zones are encompassed by this large and diverse county. Vegetation and coverage ranges from the heavy mixed-conifer timber of the Sierra Nevada to the sparse desert shrubs grasses of Chalfont Valley (east side of Mono County; Fig. 5.7).



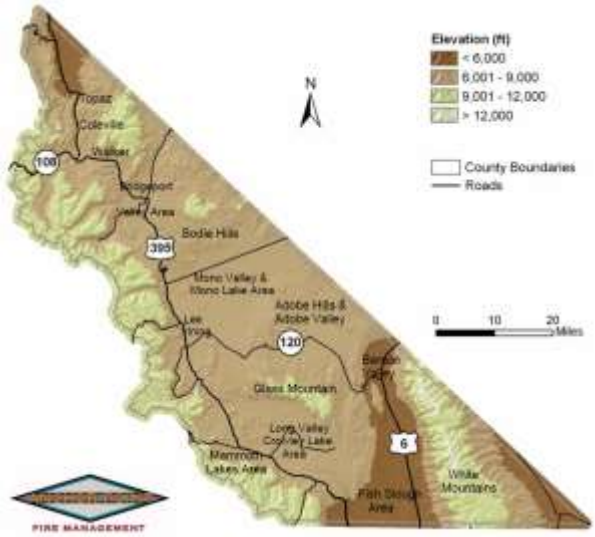
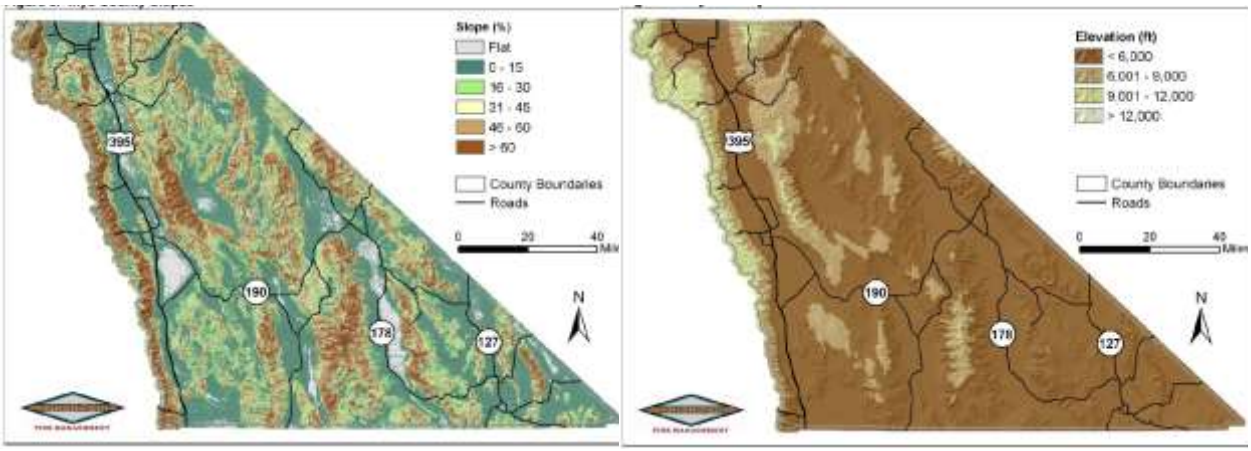


Figure 5.7. Maps for Slope (top left), Elevation/topography (top right), and important placenames (bottom right) for Mono County, California (Source: Mono County Community Wildfire Protection Plan; Anchor Point Group 2009).

Inyo County is even more variable in topography and climate (Fig. 5.8); the county includes the highest (Mt. Whitney 14,505 ft) and the lowest (Badwater Flats 282 ft below sea level) points in the continental United States. Some of the higher elevations of the eastern Sierra Nevada average 385 inches (32 feet) of snowfall per year, and Death Valley averages only 2.5 inches of precipitation per year. Death Valley experiences an average temperature of 115° F in July, and is one of the hottest and driest places in the western hemisphere. Inyo County encompasses many different climate and life zones, and vegetation ranges from the mixed-conifer timber of the Sierra Nevada to the sparse desert shrubs and grasses of Death Valley and the Amargosa Desert (southeast area of the county; Fig. 5.8).



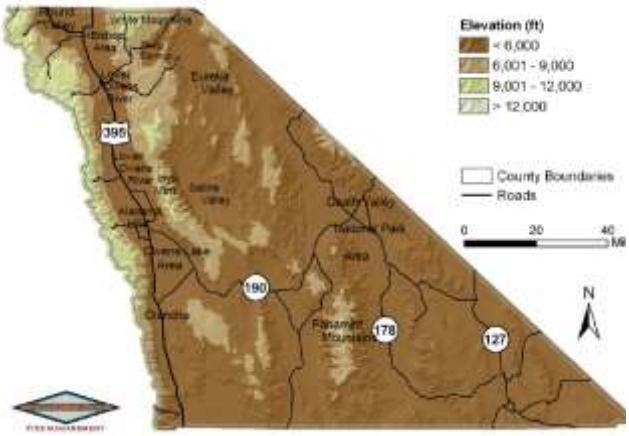


Figure 5.8. Maps for Slope (top left), Elevation/topography (top right), and important placenames (bottom right) for Inyo County, California. Source: Inyo County Community Wildfire Protection Plan (Anchor Point Group 2009).

6. LANDSCAPE CONTEXT

California Deserts Province

On the larger landscape, the ESNR Project area is within the California State Wildlife Action Plan "Deserts" Province (Fig. 6.1; CA SWAP 2015 update: https://wildlife.ca.gov/SWAP). The Deserts Province extends from the California-Mexico border on the south and Colorado River on the southeast, north to Topaz Lake on the California-Nevada border. The province's western border is formed by the Peninsula Mountain Ranges and Transverse Mountain Range in southern California, and the Sierra Nevada in central California. The Deserts province is the extension of desert regions located to the east and south of California in the states of Nevada and Arizona, and in Mexico. The Deserts Province has five different subregions: from north to south (Fig. 6.1), but for this assessment, we are most interested in the Mono subregion (341d), and the Southeastern Great Basin subregion (341f; Fig. 6.1) because the ESNR Project Area is within them.

Mono & Southwestern Great Basin Ecoregions

The northern Mono ecoregion is composed of isolated mountain ranges separated by alluvial fans and basins. Elevations range from 4,400 to more than 14,200 feet in the White Mountains. The Southeastern Great Basin ecoregion is characterized by basin and range topography (i.e., widely-separated short ranges in desert plains) and contains isolated mountains, plateaus, alluvial fans, basins, and dunes (elevation ranges from approximately 1,000 to 11,000 feet; CA SWAP 2015: https://wildlife.ca.gov/SWAP).

Climate and Soils

The dominant topographic features influencing climate in the ESNR Project Area are the Sierra Nevada mountain range to the west and the White Mountains to the east. In association with regional and local scale topography, precipitation in the two counties encompassing the ESNR Project area varies greatly on a seasonal, annual and geographic basis. The climate is semiarid with a mean annual rainfall ranging from 5.2 inches in Lone Pine (Inyo County) to 30 inches at Mammoth Pass, and 15.7 inches at Lee Vining (Mono County). At high elevations above the Owens Valley in Mono County up to 65% to 75% of the precipitation falls as snow during winter months. Cold winters with below-freezing temperatures and hot, dry summers are typical of the region in general. The mean July temperature is around 79° F and 100° F in Lee Vining and Lone Pine, respectively, compared to a mean January temperature of 40° F in Lee Vining, and 57° F in Lone Pine. The frost-free season is 135 days (Lee Vining) to 300 days (Lone Pine).

Geology and soils influence vegetation types in the ESNR Project Area. Mono County contains several "special" soil types on which atypical vegetation may occur, including glacial alluvium derived from granitic bedrock, volcanic ash deposits, and alkaline-saline drained basins. Soils of volcanic ash deposits occur on nearly flat to rolling terrain of volcanic tuff, tuffaceous sandstone, and old alluvium. Many of these soils are well- to excessively drained, and may be mined for pumice. Soils that occur on glacial moraines and in glacially derived alluvium along the Sierra Nevada foothills are deep, well-drained loams and sandy clay loams with abundant gravel and cobbles. These soils are relatively undeveloped, and, consequently, have little organic matter. Soil horizon thickness varies from shallow to deep. Vegetation types that typically grow occur on these soils includes big and low sagebrush (*Artemesia* spp), shadscale (*Atriplex* spp), fourwing saltbush (*A. canescens*), Fremont dalea (*Psorothamnus fremontii*), Nevada dalea (*P. polydenius)*, littleleaf horsebrush (*Tetradymia glabrata*), spiny hopsage (*Grayia spinose*), needleleaf

rabbitbrush (*Ericameria teretifolia*), bitterbrush (*Purshia tridentata*), Nevada ephedra (*Ephedra nevadensis*), and mixed perennial grasses. The primary use is grazing.

Inyo County soils are on alluvial fans, fan terraces, and stabilized dunes on stream terraces. The soils formed in moderately fine textured alluvium of granitic origin and windblown deposits from mixed sources. The surface is covered with 0 to 2 percent rock fragments. Soils that form in alkaline-saline internally drained basins often have a high percentage of sodium. The high pH and high sodium content of these alkaline-saline soils interfere with the growth of most plants. In closed basins or where drainage is poor due, excessive salt buildup occurs in soils. Vegetation is shadscale, white bursage (*Ambrosia dumosa*) and desert needlegrass (*Achnatherum speciosum*). Uses are somewhat restricted because of soil texture, chemistry and drainage, but Inyo soils are used for rangeland and wildlife habitat.

Water Resources

The ESNR Project Area is part of the South Lahontan hydrologic region in southeastern California encompassing nearly 26,700 square miles. The boundary of the region extends north from the Sierra Nevada, San Gabriel, San Bernardino, and Tehachapi Mountains to the drainage divide between Mono Lake and East Walker River; and to the east to the Nevada border. This region includes portions of Fresno, Inyo, Kern, Los Angeles, Madera, Mono, San Bernardino, Tulare and Tuolumne counties. The regional climate for areas east of the Sierra Nevada is hot desert to steppe with hot, dry summers and mild dry winters with little precipitation. Vegetation in the eastern foothills consists mostly of sagebrush, desert shrub, and pinyon-juniper forest, with small areas of fir-spruce on high peaks. Foothill communities give way to Mojave Desert shrub to the east and south of the Sierra Nevada. As previously described, elevations within the region range from 282 feet below sea level in Death Valley to 14,505 feet at the peak of Mount Whitney. Major mountain ranges include the Sierra Nevada, White Mountains, Inyo Mountains, Panamint Mountains, and Avawatz Mountains.

The ESNR Project area includes multiple streams, rivers, and lakes important for agriculture, municipal water, groundwater recharge, public recreation, and many species of plants and animals. Within Mono County there are five higher order permanent streams (NHD Stream Order ≥ 3) originating in the eastern Sierra Nevada, which are tributaries to Mono Lake, the Upper Owens River, or Crowley Lake; Lee Vining Creek, Rush Creek, Hot Creek, Convict Creek, and Rock Creek. Similarly, in Inyo County, ten permanent streams are tributaries to Pleasant Valley Reservoir, the Owens River, and Lake Tinemaha; Lower Rock Creek, Pine Creek, Fish Slough Creek, Bishop Creek, Horton Creek, Big Pine Creek, Tinemaha Creek, Oak Creek, Lone Pine Creek, and Cottonwood Creek. Numerous other lower order streams (≤ NHD stream order 2), including those from the White and Inyo Mountains to the east, provide ephemeral flows but generally only during the wet season. Other valuable hydrologic resource features in the LADWP Middle and Lower Owens River riparian area include multiple canals, flowing wells and springs. Stream flows of all streams in ESNR Project area are dependent upon the annual snowpack, resulting in two distinct flow periods: a relatively brief snow runoff period (May through August) when approximately 66% of the mean annual water yield passes downstream, and a lengthy low-flow period of 34% of the mean annual water yield (September through April) maintained primarily by groundwater, lake or glacier outflow.

Issues related to quality of surface water in the ESNR Project Area arise from erosion and sedimentation from agriculture, roads, livestock grazing, and nonpoint source pollution from storm water runoff, acid drainage from inactive mines, and arsenic and uranium in some wells and surface water from

decomposing granite. For groundwater and drinking water, water quality issues include high salinity, and volatile organic compounds (VOCs) from mining drainage, overdraft, and fuel tank leaks. Sedimentation concerns result from flash storm flows with high peak discharge, lack of vegetation, poorly consolidated geology, and steep channel morphology could result in debris flows, erosion and sediment yield. Moreover, wildfires could result in sedimentation of rivers from increased surface erosion, and gullying (PEIP 3.11- 9).

Photo credit: Becky Pierce, Bishop CA.

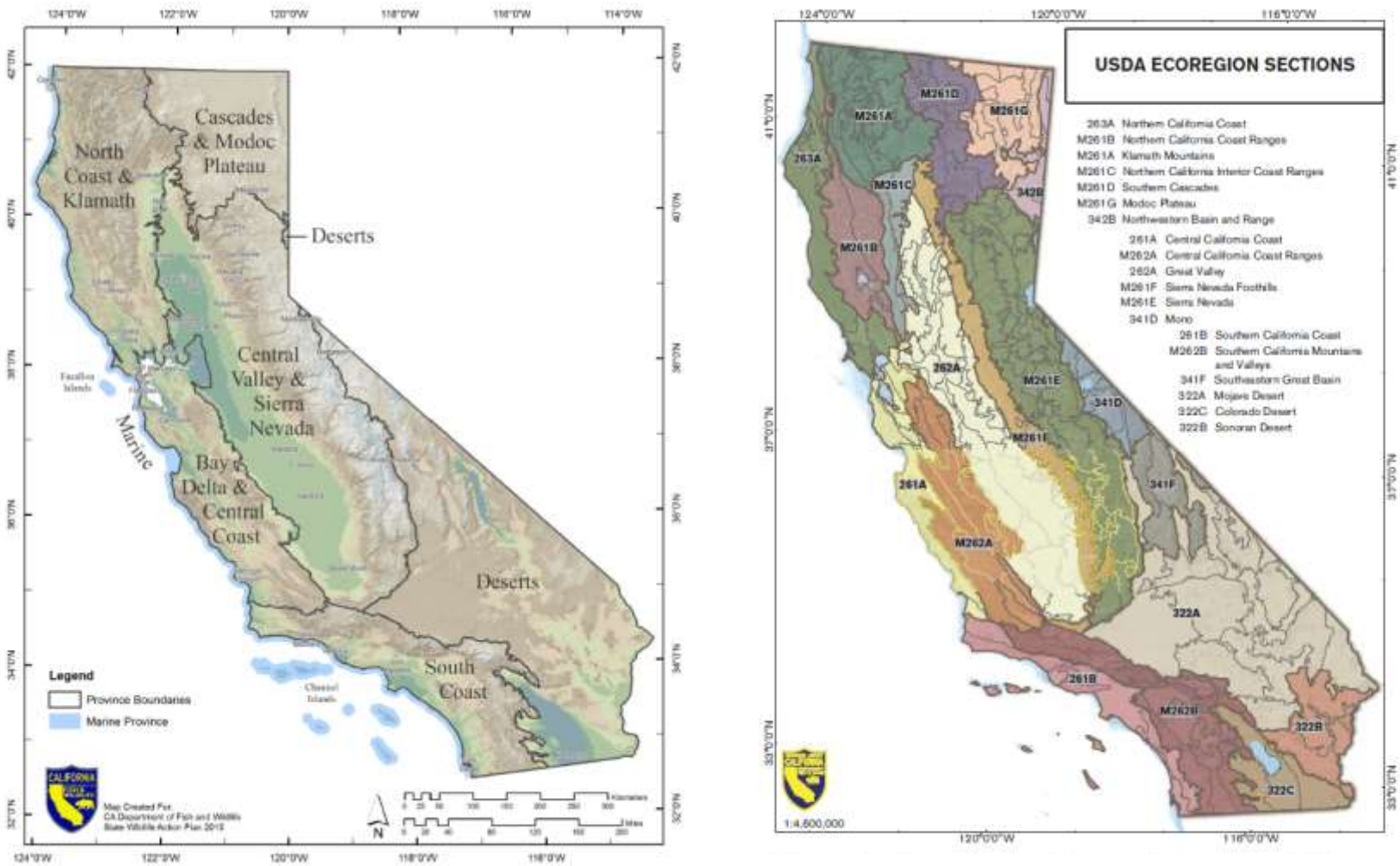


Figure 6.1. The large-scale environmental setting for the ESNR Project Area; the Project is within the California Deserts Province, and is within both the Mono Ecoregion (341D; north of Bishop) and Southeastern Great Basin Ecoregion (341F; south of Bishop). Source: CA SWAP 2015 Update: https://wildlife.ca.gov/SWAP.

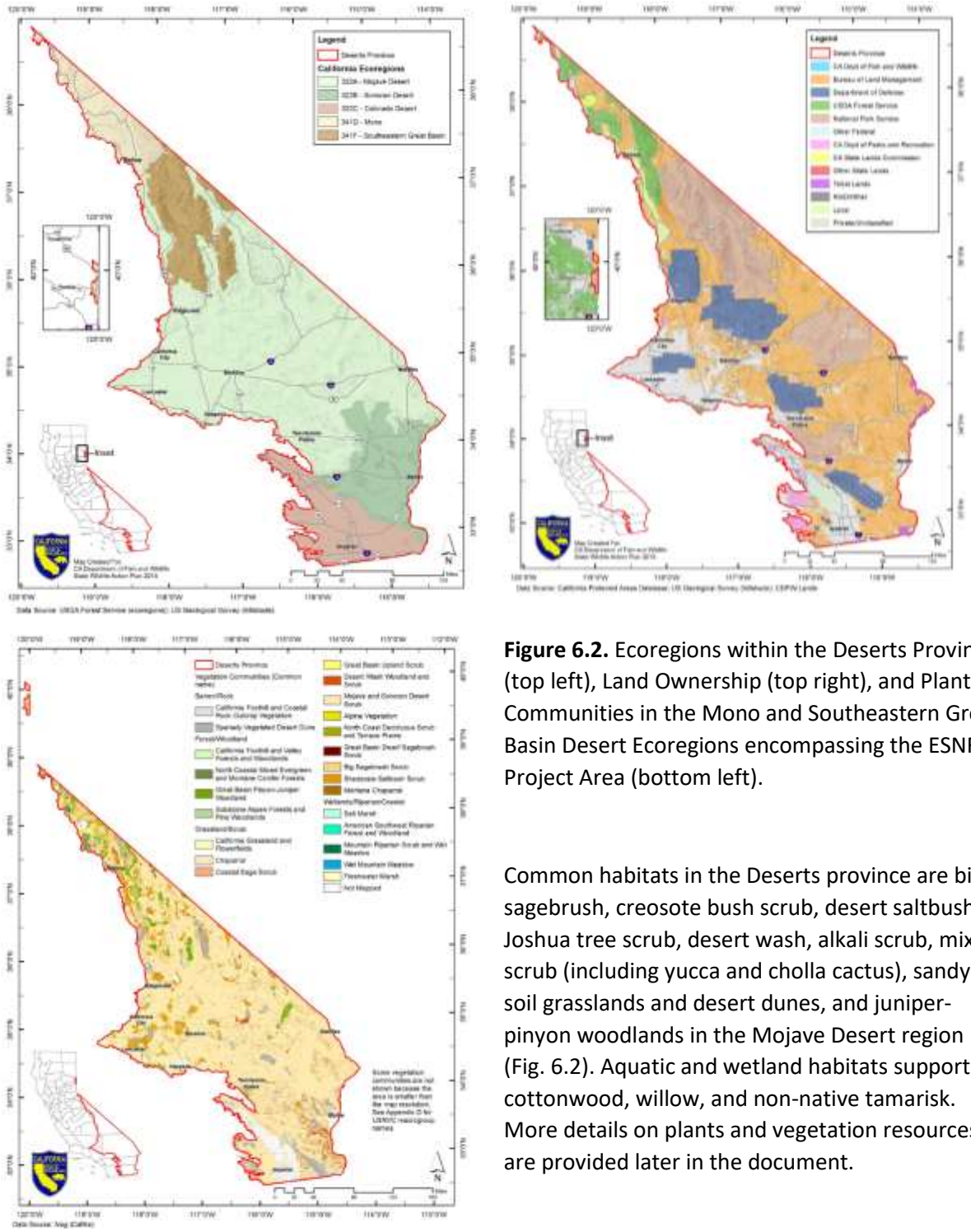


Figure 6.2. Ecoregions within the Deserts Province (top left), Land Ownership (top right), and Plant Communities in the Mono and Southeastern Great Basin Desert Ecoregions encompassing the ESNR Project Area (bottom left).

Common habitats in the Deserts province are big sagebrush, creosote bush scrub, desert saltbush, Joshua tree scrub, desert wash, alkali scrub, mixed scrub (including yucca and cholla cactus), sandy soil grasslands and desert dunes, and juniper-pinyon woodlands in the Mojave Desert region (Fig. 6.2). Aquatic and wetland habitats support cottonwood, willow, and non-native tamarisk. More details on plants and vegetation resources are provided later in the document.

Ecological or Land Use Pressures of Conservation Importance for the Desert Provinces

Mono and Inyo County are within the California Deserts Province, and the major pressures identified by the CA State Wildlife Action Plan (2015 update) as affecting the viability of conservation targets and Special Status species of plants and animals in the Deserts Province Ecoregions are summarized in Table 6.1. These are considered the most significant pressures to the selected conservation targets in the province, representing a semi-comprehensive list (CA SWAP 2015 update: https://wildlife.ca.gov/SWAP).

Table 6.1. Important **a**nthropogenic pressures in the Deserts Province impacting the Mono and Southeastern Great Basin Ecoregion vegetation communities in and around the ESNR Project area. Source: CA State Wildlife Action Plan, 2015 Update.

	Ecoregion and Vegetation Communities At Risk	
Anthropogenic Pressure	**Mono**	**Southeastern Great Basin**
Annual and Perennial crops	--	SW Riparian Forest & Woodland
Climate Change	Great Basin Pinyon Juniper Woodland Big Sagebrush Scrub	SW Riparian Forest & Woodland Great Basin Upland Scrub High Desert Wash Scrub
Dams, Water Mgt/Water Use	--	SW Riparian Forest/Woodland
Fire, Fire Suppression	Great Basin Pinyon Juniper Woodland Big Sagebrush Scrub	Great Basin Upland Scrub High Desert Wash Scrub
Housing and Urban Areas	Big Sagebrush Scrub	SW Riparian Forest/Woodland
Invasive Plants/Animals	Great Basin Pinyon Juniper Woodland Big Sagebrush Scrub	SW Riparian Forest/Woodland Great Basin Upland Scrub High Desert Wash Scrub
Livestock/Farming/Ranching	Great Basin Pinyon Juniper Woodland Big Sagebrush Scrub	Great Basin Upland Scrub High Desert Wash Scrub
Other Ecosystem Modifications	Big Sagebrush Scrub	
Parasites/Pathogens/Diseases	Big Sagebrush Scrub	SW Riparian Forest/Woodland
Recreational Activities	Big Sagebrush Scrub	SW Riparian Forest/Woodland
Renewable Energy	--	SW Riparian Forest/Woodland Great Basin Upland Scrub High Desert Wash Scrub
Mining and Quarrying	--	Great Basin Upland Scrub High Desert Wash Scrub

7. BIOLOGICAL RESOURCES

Development and a range of human land uses are at the nexus for environmental concerns over effective conservation of natural resources in Mono and Inyo County. Key considerations are the conservation of a variety of natural resources, including riparian habitats, wetlands, special-status species of plants and animals, unique habitat types, wildlife habitat, and fisheries/aquatic habitats. Special status species are the primary focus of most Biological Assessments/Evaluations in environmental documents, but habitat considerations become an important additional consideration when Critical Habitats are designated for ESA listed species. For any riparian-focused project overlapping with lands administered by the Bureau of Land Management or the Inyo National Forest, a BA will be necessary for Special Status Threatened or Endangered species in the ESNR Project Area, and a BE will be needed for all USFS Sensitive Species in the area. LADWP administers a large portion of the Project area, and would be responsible for Biological Assessments/Evaluations as part of their agreements and land stewardship coordination with the state of California, CDFW, the BLM, the USFS, and USFWS.

In this section we identify and describe the occurrence and status of Special Status species (SS species) within the Mono and Inyo County portions of the Project Area, while providing general information and inventories. In the initial stages of any major project, consultation with the USFWS would occur, typically using the USFWS IPaC Planning website: IPaC: Home (fws.gov). USFWS IPaC will subsequently provide a list of Threatened, Endangered and Candidate species in or near the Project Area. Our experience has been that the IPaC lists overstate the number of species that actually have historic and current ranges within project areas. Avoiding the completion of time-consuming Biological Assessment, Effects Analyses is important from both cost and logistical considerations, and actual empirical data on species presence/absence can help reduce the number of species known present in any project area. For this reason, we also present tables from the California Natural Diversity Database including actual known occurrences of SS species in the project area. We also used other sources to determine if the current**,** extant range for SS species are likely to overlap with the ESNR Project Area. Species of Special Concern (SSC) is an informal designation used by CDFW for declining wildlife species not proposed for listing as threatened or endangered. This designation does not provide legal protection. The California Native Plant Society (CNPS) maintains an inventory of California's sensitive plant species, which summarizes information on the distribution, rarity, and endangerment of California's vascular plants. In addition, the CNPS provides an inventory of native plant communitiesconsidered of special concern by various State and federal resource agencies, academic institutions, conservation groups, and local stakeholders.

Eastside Sierra Nevada Special Status Species

The California Natural Diversity Database (CNDDB) is maintained by the Habitat Conservation Division of the California Department of Fish and Wildlife (CDFW 2009a). CNDDB is used as the primary source for information about species with special protection status; the primary function of the CNDDB is to gather and disseminate data on the status and locations of rare and endangered plants, animals and vegetation types in the state (Bittman 2001). The CNDDB also includes the CNPS plant list and protected natural communities. The goal of the program is to help conserve California's biological diversity by providing government agencies, the private sector, and conservation groups with information to promote better-informed land-use planning decisions and improved resource management. The CNDDB only records actual sightings of rare species and natural communities; therefore, absence of a species or habitat in

the database does not indicate with certainty that a rare plant or animal does not occur in a specific Project area. In most cases, individuals or entities considering a new project or action in the ESNR Project Area will need to investigate reports from agencies, research projects, and the scientific literature to obtain the most current data for species occurence and habitats.

Table 7.1. Special Status Species of Greatest Conservation Need in the California Desert Provinces Mono and Southeastern Great Basin Ecoregion. Sources are (1) an official U.S. Fish and Wildlife Service list of threatened and endangered species (USFWS IPaC) within the Eastside Riparian Project area polygon, (2) Inyo National Forest Species of Concern (SOC), and (3) the 2015 California State Wildlife Plan Focal Species of Conservation Strategies [CA SWAP Conservation Focal Species (CFS)].

Type, Common Name (Scientific name)	Status and Source
Mammals	
Fisher (*Pekania pennanti*)	ESA Endangered (IPaC)
Sierra Nevada Bighorn Sheep (*Ovis canadensis sierrae)**	ESA Endangered (IPaC)
Desert Bighorn Sheep (*Ovis canadensis nelsoni*)*	Inyo NF SOC
Sierra Marten (*Martes caurina sierra*)	Inyo NF SOC
Broad-footed mole* (*Scapanus latimanus*)*	CA SWAP CFS
Pallid bat (*Antrozous pallidus*)*	CA SWAP CFS
Long-eared bat (*Myotis evotis*)*	CA SWAP CFS
Fringed myotis (*Myotis thysanodes*)*	CA SWAP CFS
Long-legged myotis (*Myotis volans*)*	CA SWAP CFS
Western mastiff bat (*Eumops perotis californicus*)*	CA SWAP CFS
American pika (*Ochotona princeps*)*	CA SWAP CFS
Pygmy rabbit (*Brachylagus idahoensis*)*	CA SWAP CFS
White-tailed jackrabbit (*Lepus townsendii townsendii*)*	CA SWAP CFS
Sierra Nevada mountain beaver (*Aplodontia rufa californica*)*	CA SWAP CFS
American beaver (*Castor canadensis*)	CA SWAP CFS
Little pocket mouse (*Perognathus longimembris*)	CA SWAP CFS
Great Basin pocket mouse (*Perognathus parvus*)	CA SWAP CFS
Desert woodrat (*Neotoma lepida*)	CA SWAP CFS
Southern grasshopper mouse (*Onychomys torridus ramona*)*	CA SWAP CFS
Porcupine (*Erethizon dorsatum*)*	CA SWAP CFS
Sierra Nevada red fox (*Vulpes vulpes necator*)	CA SWAP CFS
California wolverine (*Gulo gulo*)*	CA SWAP CFS
American badger (*Taxidea taxus*)*	CA SWAP CFS
Western spotted skunk (*Spilogale gracilis*)	CA SWAP CFS
Pronghorn (*Antilocapra americana*)*	CA SWAP CFS
Mule deer (*Odocoileus hemionus*)	CA SWAP CFS
Bighorn sheep (*Ovis canadensis*)*	CA SWAP CFS
Birds	
California Condor (*Gymnogyps californianus)*	ESA Endangered (IPaC)
Southwestern Willow Flycatcher (*Empidonax traillii extimus)*	ESA Endangered (IPaC)
Western Snowy Plover (*Charadrius nivosus nivosus)*	ESA Threatened (IPaC)
Yellow-billed Cuckoo (*Coccyzus americanus)*	ESA Threatened (IPaC)
Willow flycatcher (*Empidonax traillii brewsteri* & *E.t. adastus*)	Inyo NF SOC
Bi-State greater sage-grouse (*Centrocercus urophasianus*)	Inyo NF SOC; CA SWAP CFS

Mt. Pinos sooty grouse (*Dendragapus fuliginosus howardi*)	Inyo NF SOC
Bald eagle (*Haliaeetus leucocephalus*)	Inyo NF SOC
Golden eagle (*Aquila chrysaetos*)	CA SWAP CFS
Ferruginous hawk (*Buteo regalis*)	CA SWAP CFS
Cooper's hawk (*Accipiter cooperii*); nesting	CA SWAP CFS
Northern harrier (*Circus cyaneus*)*	CA SWAP CFS
Prairie falcon (nesting) (*Falco mexicanus*)	CA SWAP CFS
American peregrine falcon (*Falco peregrinus anatum*)*	CA SWAP CFS
California spotted owl (*Strix occidentalis*)	Inyo NF SOC
Great gray owl (*Strix nebulosa*)	Inyo NF SOC
Short-eared owl (*Asio flammeus*)*	CA SWAP CFS
Long-eared owl (*Asio otus*)	CA SWAP CFS
Burrowing owl (*Athene cunicularia*)*	CA SWAP CFS
Loggerhead shrike (*Lanius ludovicianus*)*	CA SWAP CFS
Gray vireo (*Vireo vicinior*)*	CA SWAP CFS
Bank swallow* (*Riparia riparia*)	CA SWAP CFS
Common yellowthroat (*Geothlypis trichas*)*	CA SWAP CFS
Yellow-breasted chat (*Icteria virens*)*	CA SWAP CFS
Yellow warbler (*Setophaga petechia*)*	CA SWAP CFS
Sage sparrow (*Artemisiospiza* spp)	CA SWAP CFS
Inyo California towhee (*Melozone crissalis eremophilus*)*	CA SWAP CFS
Savannah sparrow (*Passerculus sandwichensis*)*	CA SWAP CFS
Summer tanager (*Piranga rubra*)*	CA SWAP CFS
Vesper sparrow (*Pooecetes gramineus*)	CA SWAP CFS
Brewer's sparrow (*Spizella brewer*)	CA SWAP CFS
Chipping sparrow (*Spizella passerina*)	CA SWAP CFS
Yellow-headed blackbird (*Xanthocephalus xanthocephalus*)*	CA SWAP CFS
Gray-crowned Rosy-Finch (*Leucosticte tephrocotis*)*	CA SWAP CFS
Least bittern (*Ixobrychus exilis)*	CA SWAP CFS
Amphibians	
Mountain Yellow-legged Frog (*Rana muscosa)*	ESA Endangered (IPaC)
Sierra Nevada Yellow-legged Frog (*Rana sierrae)*	ESA Endangered (IPaC)
Yosemite Toad (*Anaxyrus canorus)*	ESA Threatened (IPaC)
Black toad (*Anaxyrus exsul*)	Inyo NF SOC; CA SWAP CFS
Inyo Mountains salamander (*Batrachoseps campi*)	Inyo NF SOC; CA SWAP CFS
Kern Plateau salamander (*Batrachoseps robustus*)	Inyo NF SOC
Northern leopard frog (*Lithobates pipiens)*	CA SWAP CFS
Reptiles	
Mohave desert tortoise (*Gopherus agassizii*)	CA SWAP CFS
Panamint alligator lizard (*Elgaria panamintina*)	CA SWAP CFS
Fishes	
Owens Pupfish (*Cyprinodon radiosus)*	ESA Endangered (IPaC)
Owens Tui Chub (*Gila bicolor ssp. Snyderi)*	ESA Endangered IPaC)
California golden trout (*Oncorhynchus mykiss aguabonita*)	Inyo NF SOC
Terrestrial Invertebrates	
Monarch Butterfly (*Danaus plexippus)*	ESA Candidate Species (IPaC)

Sierra sulphur (*Colias behrii*)	Inyo NF SOC
Square dotted blue (*Euphilotes battoides mazourka*)	Inyo NF SOC
Mono Lake checkerspot (*Euphydryas editha monoensis*)	Inyo NF SOC
Boisduval's blue (*Plebejus icarioides inyo*)	Inyo NF SOC
San Emigdio blue (*Plebulina emigdionis*)	Inyo NF SOC
Apache fritillary (*Speyeria nokomis apacheana*)	Inyo NF SOC
A cave obligate pseudoscorpion (*Tuberochernes aalbui*)	Inyo NF SOC
Aquatic Invertebrates	
Western pearlshell mussel (*Margaritifera falcata*)	Inyo NF SOC
Wong's springsnail (*Pyrgulopsis wongi*)	Inyo NF SOC
Owens Valley springsnail (*Pyrgulopsis owensensis)*	Inyo NF SOC
Flowering Plants	
Fish Slough milk-vetch (*Astragalus lentiginosus piscinensis)*	ESA Threatened (IPaC)
Conifers and Cycads	
Whitebark Pine (*Pinus albicaulis)*	ESA Proposed Threatened (IPaC)

*Indicates the species meets the criteria as a Species of Greatest Conservation Concern.

Rare and Endemic Plant Species

According to the Sierra Nevada Ecosystem Project (SNEP 1996; Vol II, pages 691-697), the Sierra Nevada represents nearly 20% of the California land base yet contains over 50% of the state's flora. Approximately 405 vascular plant taxa are endemic to the Sierra Nevada, and of these, 218 are considered rare by conservation organizations and/or state and federal agencies. Another 168 rare taxa have been identified as having at least one occurrence in the Sierra Nevada. The SNEP from 1996 also previously indicated that the lack of field surveys and scientific studies limited the understanding of plant distribution and information, but that has likely improved in the interim. Table 7.2 is a list of the USFWS IPaC plants in the ESNR Project Area. Table 7.3 reviews all of the current CNDDB records for various protected plant species within the ESNR Project area, and Table 7.4 identifies special-status plant communities and habitats within the ESNR Project Area.

Table 7.2. USFWS Official List of Threatened, Endangered and Candidate species in the ESNR Project Area. Sources: official U.S. Fish and Wildlife Service list of threatened and endangered species (USFWS IPaC) within the Eastside Riparian Project area polygon.

Type, Common Name (Scientific name)	Status and Source
Flowering Plants	
Fish Slough Milk-vetch (*Astragalus lentiginosus var. piscinensis)*	Federal Threatened (IPaC; Critical habitat)
Conifers and Cycads	
Whitebark Pine (*Pinus albicaulis)*	Federal Proposed Threatened (IPaC)

*Indicates the species meets the criteria as a Species of Greatest Conservation Concern for the CA State Wildlife Action Plan.

Table 7.3. California Natural Diversity Database records for plant species within the ESNR Project area. Status identifiers are critically imperiled (S1), Imperiled (S2), vulnerable (S3), possibly extirpated (SH), and rare or endangered in CA but more common elsewhere (2B). Note: Organisms with ranks of S1-S3 are considered Sensitive and should be addressed in the environmental review processes of CEQA and its equivalents. Source: Special Vascular Plants, Bryophytes, and Lichens List (ca.gov).

Organism, Species name	N	Most Recent	County	Elevation Range	Species Status; Notes
Dicot plants					
Silver-leaved milk-vetch (*Astragalus argophyllus* var. *argophyllus*)	25	2008	Both	4080 to 4200	S2, BLM Sensitive
Geyer's milk-vetch (*Astragalus geyeri* var. *geyeri*)	2	1973	Both	38	S2
Horn's milk-vetch (*Astragalus hornii* var. *hornii*)	3	1919	Inyo	1100	S1, BLM Sensitive
Long Valley milk-vetch (*Astragalus johannis-howellii*)	68	2012	Mono	6700 to 6960	S1, BLM and USFS Sensitive
Lemmon's milk-vetch (*Astragalus lemmonii*)	10	2005	Mono	6700 to 7000	S2, BLM and USFS Sensitive
Fish Slough milk-vetch (*Astragalus lentiginosus* var. *piscinensis*)	61	2010	Both	4160	S1, ESA Threatened
Mono milk-vetch (*Astragalus monoensis*)	13	2017	Mono	7090 to 7875	S2, BLM and USFS Sensitive
Shockley's milk-vetch (*Astragalus serenoi* var. *shockleyi*)	7	1957	Inyo	3900 to 6500	S3
Hillman's silverscale (*Atriplex argentea* var. *hillmanii*)	2	1973	Inyo	3800	S2
Smooth saltbush (*Atriplex pusilla*)	129	1938	Mono	6900	SH
Bodie Hills rockcress (*Boechera bodiensis*)	2	2001	Mono	6900	S3, BLM and USFS Sensitive
Masonic rockcress (*Boechera cobrensis*)	10	1982	Mono	6500	S3
Pinyon rockcress (*Boechera dispar*)	36	2009	Both	4700 to 7000	S3
Wheeler's dune-broom (*Chaetadelpha wheeleri*)	5	2011	Mono	4280 to 4500	S2
Fiddleleaf hawksbeard (*Crepis runcinata*)	139	2015	Both	4000 to 6900	S3
Sand dune cryptantha (*Cryptantha fendleri*)	1	-	Mono	6400	S1
Globose cymopterus (*Cymopterus globosus*)	1	1998	Mono	6550	S1
Booth's evening-primrose (*Eremothera boothii* ssp. *boothii*)	29	2012	Both	3900 to 7400	S3
Booth's hairy evening-primrose (*Eremothera boothii* ssp. *intermedia*)	19	1983	Inyo	3840 to 3900	S3
Utah monkeyflower (*Erythranthe utahensis*)	11	2010	Mono	6400	S1
Inyo hulsea (*Hulsea vestita* ssp. *inyoensis*)	2	1998	Mono	6300	S1,S2
Alkali ivesia (*Ivesia kingii* var. *kingii*)	119	2008	Mono	4230 to 6982	S2, BLM Sensitive
Sagebrush loeflingia (*Loeflingia squarrosa* var. *artemisiarum*)	7	1998	Inyo	3960 to 3980	S2, BLM Sensitive
Mono Lake lupine (*Lupinus duranii*)	17	2010	Mono	6845 to 8000	S2, BLM and USFS Sensitive

McGee Meadows lupine (*Lupinus magnificus* var. *hesperius*)	9	2008	Inyo	5300 to 7100	S1, BLM Sensitive
Intermontane lupine (*Lupinus pusillus* var. *intermontanus*)	4	1980	Both	3900	S2
Torrey's blazing star (*Mentzelia torreyi*)	61	2015	Both	3880 to 6440	S2
Dwarf monolepis (*Micromonolepis pusilla*)	8	2007	Mono	Not listed	S3
Suksdorf's broom-rape (*Orobanche ludoviciana* var. *arenosa*)	10	2002	Both	6480 to 6800	S2
Nevada oryctes (*Oryctes nevadensis*)	25	1992	Inyo	3660 to 8310	S2
Small-flowered grass-of-Parnassus (*Parnassia parviflora*)	6	1938	Both	7300 to 7600	S2
Marble rockmat (*Petrophytum caespitosum* ssp. *acuminatum*)	1	2015	Inyo	6800	S2, USFS Sensitive
Naked-stemmed phacelia (*Phacelia gymnoclada*)	7	1979	Mono	7000	S2
Inyo phacelia (*Phacelia inyoensis*)	54	2006	Both	3600 to 7000	S2, BLM and USFS Sensitive
Parish's popcorn flower (*Plagiobothrys parishii*)	41	2009	Both	3650 to 6434	S1, BLM and USFS Sensitive
Narrow-leaved cottonwood (*Populus angustifolia*)	2	2005	Inyo	5740	S2
Frog's-bit buttercup (*Ranunculus hydrocharoides*)	3	1994	Inyo	4140 to 5050	S1
Owens Valley checkerbloom (*Sidalcea covillei*)	109	2017	Inyo	3580 to 4650	S2, BLM and USFS Sensitive
Alkali tansy-sage (*Sphaeromeria potentilloides* var. *nitrophila*)	29	2017	Mono	6480 to 7000	S2
Western seablite (*Suaeda occidentalis*)	2	2016	Inyo	4000	S2
Dune horsebrush (*Tetradymia tetrameres*)	10	2011	Mono	6400 to 6600	S2
Foxtail thelypodium (*Thelypodium integrifolium* ssp. *complanatum*)	15	1984	Both	3820 to 6985	S2
Many-flowered thelypodium (*Thelypodium milleflorum*)	1	1976	Mono	4400	S3
Dedecker's clover (*Trifolium dedeckerae*)	1	1983	Inyo	7500	S2, BLM and USFS Sensitive
Golden violet (*Viola purpurea* ssp. *aurea*)	10	2011	Mono	6700	S2
Monocot plants					
Great Basin onion (*Allium atrorubens* var. *atrorubens*)	2	2008	Both	5380 to 7000	S2
Inyo County star-tulip (*Calochortus excavatus*)	163	2012	Both	3750 to 7200	S2, BLM and USFS Sensitive
Salina Pass wild-rye (*Elymus salina*)	27	1983	Inyo	4100	S2,S3
Hot springs fimbristylis (*Fimbristylis thermalis*)	24	1989	Both	4180 to 4230	S1,S2; 2B
Prairie wedge grass (*Sphenopholis obtusata*)	2	1983	Inyo	4700	S2
Slender-leaved pondweed (*Stuckenia filiformis* ssp. *alpina*)	2	1969	Mono	6800	S2,S3
Marsh arrow-grass (*Triglochin palustris*)	15	1974	Mono	7000	S2
Western single-spiked sedge (*Carex scirpoidea pseudoscirpoidea*)	2	1938	Mono	7000	S2

Important Vegetation Communities in the Project Area

The CNDDB identifies 20 natural communities of special management concern within the Mono and Southeastern Great Basin Ecoregion areas. Ecologists describe vegetation in terms of both physiographic features of the environment in which it occurs and particular associations of species. Some characteristic types of ESNR Project area vegetation are listed below (sourced primarily but not soley from: Owens Valley Committee » Flora – Part I):

Alkaline Sink Scrub -Alkaline Herb. This community is characterized by alkaline crusted soils and low moisture availability. The vegetation is primarily herbaceous and halophytic (salt-loving) in nature. The dominant species are rabbitbrush (*Chrysothamnus nauseosus*), greasewood (*Sarcobatus vermiculatus*), and saltgrass (*Distichlis spicata*).

Freshwater Marsh-Wet Marsh. This plant community is characterized by the water table at the surface originating from non-lake sources, a presence of standing water, and nutrient rich soil that is oxygen deprived. The dominant species are Monkey Flower (*Mimulus guttatu*), Common Cattail (*Typha latifolia*), foxtail barley (*Hordeum jubatum*) and other grasses and sedges.

Pinyon-Juniper Woodland. Pinyon-Juniper woodland typically occurs at higher altitudes, where the climate is colder and wetter. Woodlands are classified by being open forests where trees and intermixed with shrubs and grasses. The presence of Pinyon and Juniper is dependent on the moisture availability, altitude, and soil depth. The dominant species in this community are pinyon pine (*Pinus monophylla*), Utah juniper (*Juniperus osteosperma*), Mormon tea (*Ephedra virdis*), and cut-leaf mahogany (*Cercocarpus ledifolius*).

Sagebrush Dry Scrublands. This community is the most common in the Mono Basin and in many upland habitats. It is characterized by a sparse herbaceous layer and a shrub cover of > 5%. Due to the volcanic activity in the area, the soils are usually deep, well drained, and nonalkaline. Plants in this community must be able to tolerate a variety of extreme conditions and most are equipped with large deep taproots. The dominant species are big sagebrush (*Artemisia tridentata*), bitterbrush, giant blazing star (*Mentzelia laevicaulis*), and desert peach (*Prunus andersonii*).

Riparian forest and shrub communities. These forest and scrub communities occur along the Owens River and streams flowing from the east slope Sierra Nevada. The soils are layers of fine and coarse material that has been deposited by varying stream levels. Important tree species include quaking aspen (*Populus tremuloides*), Fremont cottonwood (*Populus fremontii*), Goodding's black willow (*Salix gooddingii*), red willow (*Salix laevigata*) and black oak (*Quercus kelloggii*) on some streams. Common shrubs include coyote willow (*Salix exigua*) and wood rose (*Rosa woodsit*). Wild rye (*Leymus triticoides*) is a common grass, and rushes and sedges are abundant as well. Salt Cedar (aka Tamarisk; *Tamarix ramosissima*), a non-native shrubby tree, has invaded many riparian areas in the Owens Valley and is the object of ongoing eradication efforts. Riparian forest communities statewide are classified as "very threatened" by the California Natural Diversity Database (Sawyer and Keeler-Wolf 1995).

Jeffrey Pine Forest. This plant community will typically occur only at higher elevations on the west margin of the ESNR Project area above 6,000 ft elev. The dominant species are Jeffrey pine (*Pinus jeffreyi*), Lupines (*Lupinus* spp), and prickly phlox (*Leptodactylon pungens*).

Alkali meadow and shrub communities. These plant communities occur in areas of shallow groundwater on the valley floor. Two native grasses are characteristic of alkali meadows: sacaton (*Sporobolus airoides*) and saltgrass. The meadows are home to several endangered species such as star tulip (*Calochortus excavatus*) and Coville's checkerbloom (*Sidalcea covillei*). Alkali meadows themselves are classified as "very threatened" by the CNDDB Database (Sawyer and Keeler-Wolf 1995). Alkali shrub communities are typically dominated by such plants as Nevada saltbush (*Atriplex lentiformis* ssp. *Torreyi*), rabbitbrush, greasewood, and inkweed (*Suaeda moquinii*).

Upland xerophytic shrub communities. These occur on the broad bajadas and alluvial fans which descend from canyon mouths of the Sierra Nevada and the White and Inyo Mountains. Common species include shadscale (*Atriplex confertifolia*), Nevada ephedra, and California buckwheat (*Eriogonum fasciculatum*). At the northern end of the valley there are large stands of blackbrush (*Coleogyne ramosissima*) as well as such Great Basin species as sagebrush (*Artemisia* spp) and bitterbrush. In the southern half of the valley Mojave Desert species such as creosote bush (*Larrea tridentata*), and burro bush (*Ambrosia dumosa*) occur.

Groundwater-dependent vegetation. In arid environments water is often a limiting factor for plant growth. There are two basic strategies plant species have evolved for dealing with water stress; drought tolerance and drought evasion Drought tolerant plants have developed strategies to maximize their efficiency in use of water. This allows them to thrive in areas where moisture is not adequate for most species to survive. Alluvial fans and slopes of desert mountains are characteristic landforms for drought tolerant species. Some local examples are shadscale and creosote bush. Drought evasive plants, on the other hand, have developed strategies to maximize growth in areas where a reliable supply of water is available. They out-compete drought tolerant species where water is abundant but don't occur at all where it is not and so evade drought entirely. They typically occur along rivers and streams and in areas where groundwater is close to the surface. Groundwater-dependent meadow vegetation originally covered large areas of the floor of the Owens Valley floor, as well as narrow strips along streams coming down from the Sierra Nevada and isolated patches surrounding springs. Much of the original acreage of groundwater dependent meadow was cleared for agriculture and for towns.

Table 7.4. Riparian-associated and other important vegetation communities in the Mono and Southeastern Great Basin Ecoregions for the ESNR Project area. Source: CA SWAP 2015 update: https://wildlife.ca.gov/SWAP.

USNVC [a] Habitat Common Name	Ecoregions	USNVC Vegetation Community
Riparian associated		
American Southwest Riparian Forest and Woodland	Mono, SEGB	Warm Southwest Riparian Forest
Brackish (Estuarine) Submerged Aquatic Vegetation	Mono	Temperate Pacific Intertidal Shore
Desert Wash Woodland and Scrub	Mono, SEGB	North American (NA) Warm-Desert Xero-Riparian
Freshwater Marsh	Mono, SEGB	Western NA Freshwater Marsh
Mountain Riparian Scrub and Wet Mountain Meadow	Mono	Western NA Montane-Subalpine Wet Shrubland Wet Meadow
North Coastal & Montane Riparian Forest Woodland	Mono	Vancouverian Flooded and Swamp Forest
Salt Marsh, Salt Marsh Meadows	Mono, SEGB	NA Salt Marsh, Warm Semi-desert Alkali-saline wetland
Sage or Shrublands		
Big Sagebrush Scrub	Mono, SEGB	Western NA Tall Sage Shrubland and Steppe
Great Basin Dwarf Sagebrush Scrub	Mono, SEGB	Western NA Dwarf Sage Shrubland and Steppe
Great Basin Upland Scrub	Mono, SEGB	Inter-Mountain Dry Shrubland and Grassland
Mojave and Sonoran Desert Scrub	Mono	Mojavean–Sonoran Desert Scrub
Montane Chaparral	Mono, SEGB	Cool Interior Chaparral
Montane Upland Deciduous Scrub	Mono, SEGB	Western Cordilleran Montane Shrubland and Grassland
Shadscale-Saltbush Scrub	Mono, SEGB	Great Basin Saltbush Scrub
Forest or Woodland		
Great Basin Pinyon-Juniper Woodland	Mono	Intermountain Basins Pinyon–Juniper Woodland*
North Coastal Mixed Evergreen/Montane Conifer Forest	Mono, SEGB	Californian–Vancouverian Montane and Foothill Forest
Pacific Northwest Subalpine Forest	Mono	Vancouverian Subalpine Forest
Subalpine Aspen Forests and Pine Woodlands	Mono, SEGB	Rocky Mountain Subalpine and High Montane Conifer Forest
Other		
Western Upland Grasslands	Mono, SEGB	Western NA Temperate Grassland and Meadow
Alpine Vegetation	Mono	Vancouverian Alpine Scrub, Forb Meadow, and Grassland
Sparsely Vegetated Desert Dune	Mono	NA Warm Semi-Desert Cliff, Scree, Other Rock

[a] U.S. National Vegetation classification system macrogoup name (SWAP 2015 update).

Landcover and Vegetation/Habitat Types

The Mono and Inyo County are at the boundary of two biogeographic provinces, the Great Basin and the Californian, and contains both mountain and desert plant series. Landcover and vegetation types have been mapped by the Land Cover Mapping and Monitoring Project (LCMMP, also known as CALVEG), a collaborative effort between the California Department of Fire and Forestry Protection (CAL FIRE) and the U.S. Forest Service (2005). The LCMMP used Landsat Thematic Mapper (TM) satellite imagery to map data with a minimum map unit of 2.5 acres. The Mono ecoregion is in the western part of the Great Basin, just east of the Sierra Nevada in the elevation range 4,400 to 14,200 ft. The Southeastern Great Basin ecoregion comprises the southern Great Basin in the Basin and Range geomorphic province, characterized by widely-separated short mountain ranges separated by desert plains, including isolated mountains, plateaus, alluvial fans, basins, and dunes (elevation range: 1,000 to 11,000 ft). The single dominant landcover type (CWHR Lifeform) in the ESNR Project area is shrublands (WHR-SHB: 62.1%), followed by non and sparsely vegetated (WHR_NFO: 9.4%), Herbaceous (WHR_HEB: 7.5%), and Sierran Conifer (WHR_CON: 5.0%). Other minor landcover types are Hardwood Forest/Woodland (WHR_HDW: 0.5%) and Mixed Conifer/Hardwood Forest Woodlands (WHR_MIX: 0.13%; Table 7.5).

Vegetation types (e.g., CWHR Habitat Types) are much more diverse than landcover types, with approximately 31 different habitat types (Table 7.5). Sagebrush (28%), Desert scrub (16.2%), Bitterbrush (7.9%) and Alkali desert scrub (7.6%) are the most common terrestrial vegetation types in the Project area (Table 7.5). The three most common riparian-associated habitats are Lacustrine (6.0%), wet meadow (2.5%) and Montane Riparian (0.5%) (Table 7.5). Large tree habitat types make up less than 1% of the overall Project area (Table 7.5). Importantly, however, we did not have access to CalVeg data for most LADWP owned/managed lands along the Lower Owens River, such that the overall area of riparian-associated habitats in Table 7.5 are somewhat under represented. However, a narrative summary of habitats within the Lower Owens River area managed by LAWDP follows. Major vegetation types that comprise at least one percent of the LAWDP Lower Owens River area include water, marsh, wet alkali meadow, alkali meadow, riparian shrub, riparian gallery forest, rabbitbrush-saltbush scrub/meadow, rabbitbrush-saltbush scrub, and abandoned agriculture. Hydrophytic vegetation (albeit sometimes scant) is dominant in all of these major vegetation types. Hydric soil, wetland hydrology and hydrophytic vegetation definitive of jurisdictional wetlands are present in about one-third of the LADWP riparian areas. Additional details on vegetation and habitats in the Middle and Lower Owens River LAWDP Project area are available in LADWP Owens Valley Land Management Plan (April 2010).

Table 7.5. Existing California Wildlife Habitat Relationships habitats (acres) in the ESNR Project area in Mono and Inyo County, California (total area ≈ 892,288 acres). Preliminary estimates; habitat data were not available for areas near the Owens River which are managed/administered by LADWP.

CWHR Lifeforms	Project Area
Shrublands; WHR_SHB	554,270 (62.1%)
Non and sparsely vegetated; WHR_NFO	83,559 (9.4%)
Herbaceous; WHR_HEB	66,847 (7.5%)
Sierran Conifer; WHR_CON	44,180 (5.0%)
Hardwood Forest/Woodland; WHR_HDW	4,476 (0.50%)
Mixed Conifer/Hardwood Forest Woodlands; WHR_MIX	1,245 (0.14%)

CWHR Habitat Types (habitat codes)	
Riparian Associated Habitats	
Lacustrine (LAC)	53,904 (6.0%)
Wet Meadow (WTM)	22,463 (2.5%)
Montane Riparian (MRI)	4,614 (0.5%)
Desert Riparian (DRI)	726 (0.1%)
Valley Foothill Riparian (VRI)	90 (<0.1%)
Fresh Emergent Wetland (FEW)	84 (<0.1%)
Riverine ((RIV)	59 (<0.1%)
Shrublands, Chaparral, Pinyon-Juniper, or Grasslands	
Sagebrush (SGB)	249,998 (28.0%)
Desert scrub (DSC)	144,192 (16.2%)
Bitterbrush (BBR)	70,755 (7.9%)
Akali desert scrub (ACS)	68,086 (7.6%)
Annual grasslands (AGS)	41,444 (4.6%)
Pinyon Juniper (PJN)	40,867 (4.6%)
Barren (BAR)	23,564 (2.6%)
Desert wash (DSW)	11,937 (1.3%)
Mixed Chaparral (MCH)	7,457 (0.8%)
Montane Chaparral (MCP)	1,337 (0.1%)
Perrenial Grassland (PGS)	391 (< 0.1%)
Juniper (JUN)	104 (< 0.1%)
Larger Trees and Forested Habitats	
Eastside pine (EPN)	3,161 (0.4%)
Montane Hardwood-Conifer (MHC)	1,235 (02%)
Montane Hardwood (MHW)	993 (0.1%)
Aspen (ASP)	701 (0.1%)
Sierra mixed conifer (SMC)	36 (<0.1%)
Valley Oak Woodland (VOW)	12 (<0.1%)
Jeffrey Pine (JPN)	12 (<0.1%)
White Fir (WFR)	0 (<0.1%)
Human associated	
Urban (URB)	3,601 (0.4%)
Cropland (CRP)	2,711 (0.3%)
Pasture (PAS)	37 (<0.1%)
Deciduous orchard (DOR)	7 (<0.1%)
Streams and Lakes (miles or acres)	
Headwater and Intermittent streams (NHD Orders 1+2)	1,062 miles
Smaller streams (NHD Order 3)	142 miles
Permanent streams (NHD Orders ≥ 4 (4, 5, 6)	172 miles
Large Rivers; Owens River	131 miles
Mono Lake	71,264 acres
Crowley Lake	6,616 acres
Owens Lake/Dry Lakebed	98,140 acres

Biological Research and Wildlife Areas

There are several wildlife-focused research areas and wildlife recreational viewing areas within the Project Area. To encourage ongoing research, agencies have declared these sites research areas. Table 7.6 lists these areas and describes their locations, and the important natural resources within them.

Table 7.6. Important ecological areas and recognized important wildlife (viewing) areas that are partly or completely within the ESNR Project area. The summary below includes Audubon Important Bird Areas (IBAs), which do not have defined administrative boundaries (California Important Bird Areas | Audubon).

Name	Entity	Area	Description
River Spring Lakes Ecological Reserve	CDFW	Mono County	Reserve includes a unique and natural spring system. The spring provides habitat for a relictual population of spring snails and possibly other species, and has a diversity of reptiles/amphibians
Mono Lake Highlands and ML Basin Bird Area	USFS, CDFW	Mono County	Global and State Priority IBA including critical terrestrial and inland water habitats for a diverse avifauna
Adobe Valley Bird Area	BLM, CDFW	Mono County	State Priority IBA including critical terrestrial and inland riparian habitats for a diverse avifauna
Long Valley/Crowley Lake Bird Area	LADWP		Global and State Priority IBA including critical terrestrial and inland riparian habitats for a diverse avifauna
Glass Mountain Bird Area	BLM, USFS	Mono County	State Priority IBA; Adobe Valley to Crowley Lake features extensive big sagebrush and mixed conifer forest isolated from the Sierra Nevada
Fish Slough Ecological Reserve	CDFW	Units in both Mono and Inyo County	Important wetland and riparian habitats unique to the area, and also supports endangered/rare fish, plants and animals.
Owens River, Lower Owens River Project (LORP)	LADWP	Inyo County	State Priority IBA including critical terrestrial and riparian habitats for a diverse avifauna
Fish Springs and Black Rock Fish Hatcheries	CDFW	Inyo County	Both hatcheries produce trout for stocking in nearby waters
Round Valley Wildlife Area	CDFW	Units in both Mono and Inyo County	Provide high quality winter range, migration corridor, and spring holding areas for mule deer
Black Rock Waterfowl Management Area	LADWP	Inyo County	Enhance/Maintain habitat for waterbirds of all types; flooding water into wetland areas for wildlife habitat/forage/stopover

Cartago Wildlife Area	CDFW	Inyo County, east of Owens Lake (dry)	Provides habitat for waterfowl, wading birds and shorebirds including western snowy plovers, white-faced ibis and rails
Owens Lake Important Bird Area	LADWP	Inyo County	State Priority IBA including critical terrestrial and riparian-associated habitats for a diverse avifauna

8. WILDLIFE

The plant communities and habitats within the Mono and Inyo County region provide habitats for a diversity of resident and migratory wildlife, including birds, reptiles and amphibians, fish and invertebrates. No comprehensive biological survey of the county has been conducted; however, the CNDDB catalogs known occurrences of species with special protection status (SS species). SS species include federally listed or proposed species and Species of Conservation Concern (SCC). Although other species are identified in this document, and may be managed under specific law, regulation or policy, the term "special status species" only applies to federally listed or proposed species and SCC.

The CNDDB, maintained by the Habitat Conservation Division of the California Department of Fish and Game (CDFW: California Natural Diversity Database), is used as the primary source (but not the only source) for information about SS Species in the state. One of the primary functions of the CNDDB is to gather and disseminate data on the status and locations of rare and endangered plants, animals and vegetation types. The CNDDB also includes the California Native Plant Society (CNPS) plant list and protected natural communities (CNPS Inventory of Rare Plants | California Native Plant Society). The goal of the program is to help conserve California's biological diversity by providing government agencies, the private sector, and conservation groups with information to promote better-informed land-use decisions and improved resource management. The CNDDB only records actual sightings of rare species and natural communities; therefore, absence in the database does not mean that a rare plant or animal does not occur in a given area. In addition to indicating the federal and state status of species, the database also represents the status of species the CDFW has identified as "species at risk", which may not have formal legal protection. These species are listed on the CDFW's "Special Animals List." Rare and uncommon species are also identified, even if they do not have federal, state or CDFW status.

The two federal land management agencies with significant land ownership within the Inyo and Mono County Project area, the USDA Forest Service (USFS) and the USDOI Bureau of Land Management (BLM) maintain their own lists of sensitive species, which are essentially SS Species with regards management activities on those federal land areas. The BLM manual §6840, Special Status Species Management requires State Directors to designate sensitive species within their respective jurisdictions and, at least every 5 years, to review and update their sensitive species lists in coordination with State wildlife agencies (CDFW). BLM sensitive species are: (1) species listed or proposed for listing under the Endangered Species Act (ESA), and (2) species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA. In addition to those species designated as sensitive by the State Director, all Federal candidate species and delisted species in the five years following delisting are to be conserved as BLM sensitive species. Sensitive species are managed as SS Species, along with federally listed and proposed species, which are automatically treated as SS Species.

The BLM's Threatened and Endangered Species Program manages all threatened, endangered, and designated Bureau Sensitive species on USDI public lands including mammals, reptiles, birds, amphibians, invertebrates, fish, and plants. Under the Endangered Species Act, the BLM is required to implement conservation programs to recover imperiled species and their habitats and ensure BLM authorized activities are carried out without contributing to further harm of the species or its habitat. Whenever the BLM is considering an action that may affect a federally-listed or proposed species or its critical habitat, the BLM consults with the US Fish and Wildlife Service for recommendations to minimize or avoid potential adverse effects. BLM special status species are: (1) species listed or proposed for listing under the Endangered Species Act (ESA), and (2) species requiring special management consideration to promote their conservation and reduce the likelihood and need for future listing under the ESA, which are designated as Bureau sensitive by the BLM State Director(s). All Federal candidate species, proposed species, and delisted species in the 5 years following delisting are conserved/managed as BLM sensitive species.

The USFS definition of sensitive species (Forest Service Manual 2670.5) are those plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by significant current or predicted downward trends in population numbers or density, and/or significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution. USFS policy is that sensitive species of native plant and animal species must receive special management emphasis to ensure their viability and to preclude trends toward endangerment that would result in the need for Federal listing. On USFS lands managers must consider impacts to sensitive species by analyses of the significance of adverse effects of a proposed or continuing project/management activity to local populations of sensitive species, habitats, and to the viability of the species as a whole. USFS policy directs the Regional Foresters to identify sensitive species occurring within the Region according to these guidelines: "They shall examine the following sources as possible candidates for listing as sensitive species: 1. Fish and Wildlife Service or National Marine Fisheries Service candidates for Federal listing (categories 1 and 2) under Federal Register Notice of Review. 2. State lists of endangered, threatened, rare, endemic, unique, or vanishing species, especially those listed as threatened under State law. 3. Other sources as appropriate in order to focus conservation management strategies and to avert the need for Federal or State listing as a result of National Forest management activities." For example, the Inyo NF periodically reviews and updates the list of animal species within the forest that are species of conservation concern (USDA Inyo National Forest 2018).

Plant communities in the Eastside Sierra Nevada Project area may support characteristic assemblages of wildlife species, or species of special management interest may use particular habitats in the ESNR Project area on a daily or seasonal basis. Although a particular habitat may be used by a SS Species/management interest species for only for a short period, that habitat may be crucial to the species' survival. The spring breeding habitat for the California gull at Mono Lake is one example of this crucial dependence, as are the big sagebrush and riparian areas in Round Valley for mule deer and mountain lions. Some specialist species, such as the Bi-state sage grouse, are restricted to a single habitat type, while generalist species, such as the mule deer and mountain lion range over many different habitats in the ESNR Project Area.

9. MAMMALS

Owens Valley mammals include species from several different biogeographic regions including the Great Basin, Mojave Desert, White-Inyo Mountains, and the Sierra Nevada, as well as species unique to the groundwater-dependent alkali meadows on the valley floor. Also, California in general has a diversity of habitats from Marine to Desert, which support a rich diversity of mammals.

Mammals have multiple specialized physiological, anatomical, and behavioral adaptations that enable them to endure extreme heat, cold and aridity. The greatest challenge to mammals in the Eastern Sierra is the summer heat and aridity associated with the various desert and chaparral plant communities, and the cold, snow and scarce food of mountain winters. Table 9.1 includes a comprehensive list of SS Species and two species of regional CDFW focus in Inyo and Mono County. This list is organized by approximate descending level of conservation concern based on agency lists and number of status designations.

Table 9.1. Special Status mammal species of greatest conservation need in the California Desert Provinces Mono and Southeastern Great Basin Ecoregions. Sources are (1) State of California Natural Diversity Database (CNDDB), (2) an official U.S. Fish and Wildlife Service list of threatened and endangered species (USFWS IPaC) within the Eastside Riparian Project area polygon, (3) Inyo National Forest Species of Concern (USFS Sensitive), (4) the BLM Special Status Animal Species for the Bishop Field Office (BLM Sensitive) and (5) the 2015 California State Wildlife Plan Focal Species of Conservation Strategies (CA SWAP CFS).

Common Name (Scientific name)	Status and Source
Pacific fisher (*Pekania pennanti*)	Federal SSN DPS Endangered[b] (IPaC), CA Threatened
Sierra Nevada Bighorn Sheep (*Ovis canadensis sierrae)*[a]	Federal and CA Endangered (IPaC)
Sierra Nevada red fox (*Vulpes vulpes necator*)	CA Threatened, CA SWAP CFS
Mohave ground squirrel (*Spermophilus mohavensis*)	CA Threatened, BLM Sensitive
California wolverine (*Gulo gulo*)	CA Threatened, CA SWAP CFS
Pygmy rabbit (*Brachylagus idahoensis*)	BLM and USFS Sensitive, CA SSC and CA SWAP CFS
Desert Bighorn Sheep (*Ovis canadensis nelsoni*)	BLM and USFS Sensitive, CA SWAP CFS
Townsend's big-eared bat (*Corynorhinus townsendii*)	BLM and USFS Sensitive, CA SSC
Fringed myotis (*Myotis thysanodes*)	BLM and USFS Sensitive, CA SWAP CFS
Pallid bat (*Antrozous pallidus*)	BLM and USFS Sensitive, CA SSC and CA SWAP CFS
Owens Valley vole (*Microtus californicus vallicola*)	BLM Sensitive, CA SSC
Spotted bat (*Euderma maculatum*)	BLM Sensitive, CA SSC
Long-eared bat (*Myotis evotis*)	BLM Sensitive, CA SWAP CFS
Western mastiff bat (*Eumops perotis californicus*)	BLM Sensitive, CA SWAP CFS
Small-footed myotis (*Myotis ciliolabrum*)	BLM Sensitive
Yuma myotis (*Myotis yumanensis*)	BLM Sensitive
Sierra Marten (*Martes caurina sierra*)	USFS Sensitive and Management Indicator Species[c]
Mule deer (*Odocoileus hemionus*)	CA SWAP CFS, USFS Management Indicator Species[c]
Northern flying squirrel (*Glaucomys sabrinus*)	USFS Management Indicator Species[c]
Southern grasshopper mouse (*Onychomys torridus ramona*)	CA SSC and CA SWAP CFS
Sierra Nevada mountain beaver (*Aplodontia rufa californica*)	CA SSC and CA SWAP CFS
White-tailed jackrabbit (*Lepus townsendii townsendii*)	CA SSC and CA SWAP CFS
Long-legged myotis (*Myotis volans*)	CA SWAP CFS

Pronghorn (*Antilocapra americana*)	CA SWAP CFS
American badger (*Taxidea taxus*)	CA SWAP CFS
Western spotted skunk (*Spilogale gracilis*)	CA SWAP CFS
Desert woodrat (*Neotoma lepida*)	CA SWAP CFS
Great Basin pocket mouse (*Perognathus parvus*)	CA SWAP CFS
Little pocket mouse (*Perognathus longimembris*)	CA SWAP CFS
Broad-footed mole (*Scapanus latimanus*)	CA SWAP CFS
American beaver (*Castor canadensis*)	CA SWAP CFS
North American Porcupine (*Erethizon dorsatum*)	CA SWAP CFS
American pika (*Ochotona princeps*)	CA SWAP CFS
Mountain lion (*Puma concolor*)	Mammal of CDFW Focus

[a] There is a USFWS Critical Habitat designation for this species, which maps at elevations above the Project area.
[b] The Southern Sierra Nevada Distinct Population Segment of this species in listed under the ESA as Endangered.
[c] Mule deer is a USFS Management Indicator Species (MIS) for oak-associated hardwood, hardwood conifer habitats, and the Sierra marten and northern flying squirrel are USFS MIS for Late seral closed canopy coniferous forest habitats.

USFWS IPaC Mammals in the ESNR Project Area

Sierra Nevada Bighorn Sheep Sierra Nevada Bighorn Sheep live exclusively in the Sierra Nevada of California. Historically they inhabited an extensive region that spanned from Sonora Pass in the north to

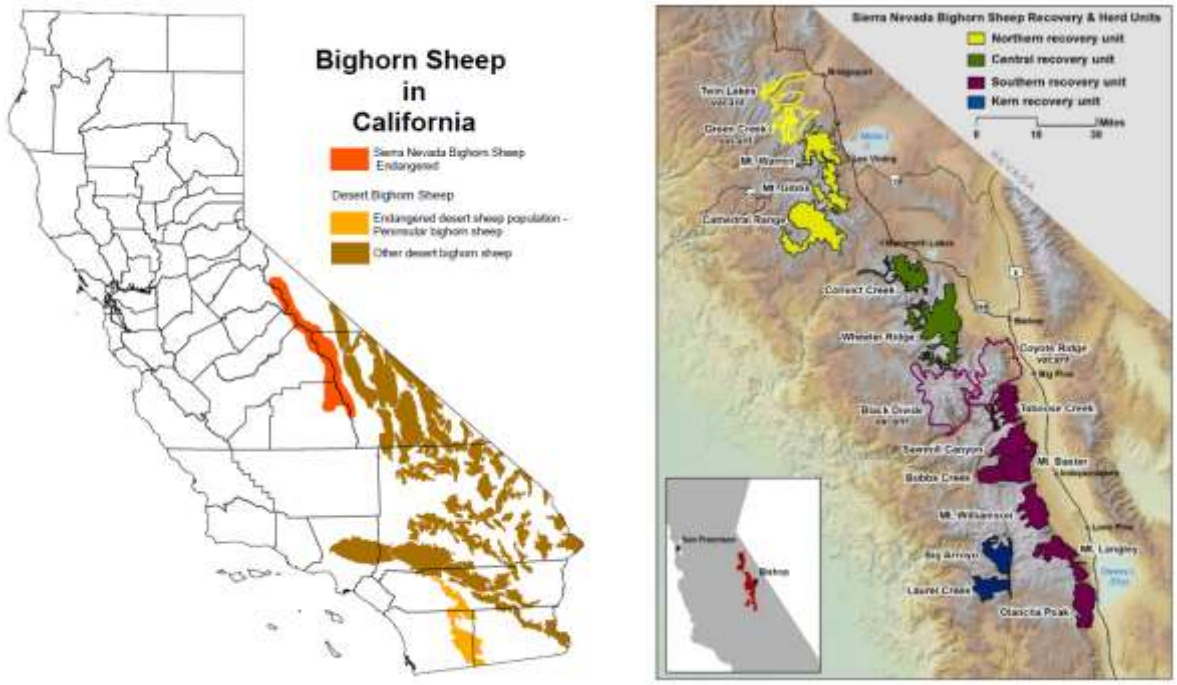


Figure 9.1 Maps of the distribution of bighorn sheep in California and the current known distribution of the endangered Sierra Nevada bighorn sheep. Source CDFW Desert Bighorn Sheep Facts.

Olancha Peak in the south; they also were found as far west as the Mineral King region within Sequoia National Park (Fig. 9.1). Today this subspecies of mountain sheep occupies 14 of the 16 herd units

identified within the Sierra Nevada Bighorn Sheep Recovery Plan (Draft Final Recovery Plan (ca.gov) for recovery. The northernmost populations lie along the eastern boundary of Yosemite National Park (Excelsior Peak). Other herds are distributed further south along the western slopes of the Owens Valley to the southeastern boundary of Sequoia National Park (Mt. Langley). This subspecies was identified by USFWS IPaC consultation as present in the ESNR Project Area (Table 8.1). During most of the year these animals are typically only found at high elevations (≥ 10,000 feet) to the west of the Project area. In winter and early spring before high elevation snowmelt, however, Sierra Nevada bighorn sheep will often be present at lower elevations (5,000 to 9,000 feet) along the western portion of the ESNR Project area from near Mono Lake down to Owens Lake (Fig. 9.1). Future projects would need to plan accordingly.

Pacific Fisher. The fisher is a forest carnivore with a historic distribution in North America spanning the boreal forest zone of Canada, the central and northern Rocky Mountains, the Great Lakes region and northeastern United States, and mountainous areas of western North America from California to British Columbia (Gibilisco 1994). Ecologically, fishers are a mature or old forest-obligate species (Zielinski et al. 2005), and their numbers were reduced historically by the combination of intensive trapping and loss of mature forest habitats.

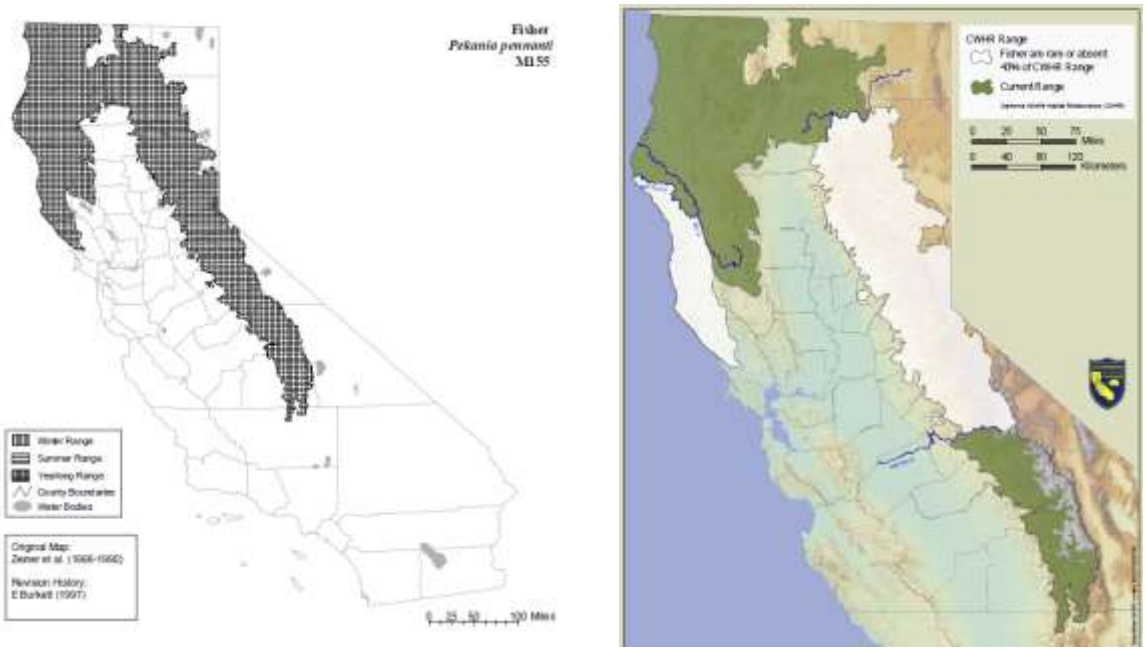


Figure 9.2. Estimated range of the Pacific fisher in California including the current range for the species. Source: CDFW (both maps).

In California, the historic range of fishers (Fig. 9.2) has been reduced to a current range where this forest carnivore is geographically separated into two remnant populations (Grinnell et al. 1937), a relatively large population in northern California, and a smaller population south of the Merced River in Yosemite National Park referred to as the Southern Sierra Nevada Distinct Population Segment (SSN Fisher DPS). The current spatial separation of fishers in California is considered due to widespread timber harvest and fur trapping during the early to mid-1900s (Zielinski et al. 2005). Total population size is unknown but probably is at least in the low hundreds of thousands; for example, the harvest in North America

during the 1983-1984 trapping season was about 20,000 (Novak et al. 1987), and the average in the 1960s and 1970s was about 13,000 (Strickland et al. 1982).

Historically, the USDA Forest Service had long considered fishers to be a Sensitive Species in the Pacific Southwest Region. In 2004, the USFWS determined that the West Coast population of fishers was warranted for listing under the Endangered Species Act, but it wasn't until May 2020 that the SSN Fisher DPS was officially listed as endangered under the ESA (USFWS, 85 Federal Register {FR} 29532). The final rule listing the SSN fisher DPS in California as endangered became effective in June 2020.

Fishers are regarded as habitat specialists in the western United States (Buskirk and Powell 1994), occurring only at mid- to lower elevations in mature conifer and mixed conifer/hardwood forests characterized by dense canopies and abundant large trees, snags, and logs (Powell and Zielinski 1994). Fishers commonly use hardwood stands in summer but prefer coniferous or mixed forests in winter. They generally avoid areas with little forest cover or significant human disturbance and conversely prefer large areas of contiguous interior forest (see USFWS 2004). Powell (1993) concluded that forest type is probably not as important to fishers as the vegetative and structural aspects that lead to abundant prey populations and reduced fisher vulnerability to predation. Several studies have shown that fishers are associated with riparian areas (see USFWS 2004), which are in some cases protected from logging and generally more productive, thus having the dense canopy closure, large trees and general structural complexity associated with fisher habitat (Dark 1997). Riparian areas may be important to fishers because they provide important rest site elements, such as broken tops, snags, and coarse woody debris.

In the SSN Fisher DPS these animals occupy approximately 4,400 km^2 of mid-elevation, mixed-coniferous forest between the Merced River in Yosemite National Park in the north to the Greenhorn Mountains in the Sequoia National Forest in the south (Spencer et al. 2015). In the SSN Fisher DPS and along the west margin of the ESNR Project Area, fishers are found in mid-elevation forest environments of moderately moist, coniferous, and mixed-conifer forests (CWHR habitat types SMC, WFR, PPN/JPN, MHC, and MCP/MCH) (Sweitzer et al. 2016a; Zielinski et al. 2013). Within such habitat, fishers are associated more commonly with forests that are >50% mature forest, and comprise a contiguous, complex mosaic (USFWS 2019).

Various sources of information on the distribution of fishers in the Sierra Nevada (Fig. 9.2) suggests that it is very uncommon for these animals to occur on the eastern slopes of the Sierra Nevada, preferring instead the Sierra Nevada Mixed Conifer forest habitat type below 7,500 ft elevation on the western slope (Spencer et al. 2015). Therefore, future actions within riparian habitat in the Eastern Sierra Nevada Project area would not need to prepare detailed Effects Analyses for this USFWS IPaC listed species.

Fishers have a NatureServe Global ranking of G5 (Secure - rangewide), a State rank S2 (Imperiled), and the SSN Fisher DPS is ESA endangered and CESA threatened. The West Coast DPS of fishers in proposed threatened. Known threats to fishers are diverse including predation by larger carnivores, vehicle-collision mortality, disease, exposure to a variety of herbicide and pesticide toxins (Sweitzer et al. 2016b), and loss of foraging and denning habitat by high severity wildfires (Thompson et al. 2021).

Table 9.2. California Natural Diversity Database species records for mammals within the ESNR Project Area. All "S" Species Status rankings (S1, S2, S3, etc.) are based on NatureServe Explorer data (NatureServe Explorer; NatureServe 2021).

Organism, Species name	N	Most Recent	County	Elevation Range	Species Status[a]
Pallid bat (*Antrozous pallidus*)	96	2004	Both	3,720-4,900	S3, CA SSC, BLM and USFS Sensitive
Sierra Nevada mountain beaver (*Aplodontia rufa californica*)	2	1990	Mono	6500	S2S3, CA SSC
Pygmy rabbit (*Brachylagus idahoensis*)	7	2003	Mono	6,490-6,800	S3, CA SSC, BLM and USFS Sensitive
Townsend's big-eared bat (*Corynorhinus townsendii*)	37	2014	Both	3,720-7,350	S2, CA SSC; BLM and USFS Sensitive
Argus Mtn kangaroo rat (*Dipodomys panamintinus argusensis*)	8	1973	Inyo	3,600	S1S3
North American porcupine (*Erethizon dorsatum*)	28	1965	Mono	6,618-7,863	S3
Spotted bat (*Euderma maculatum*)	31	1999	Both	3,550-6,457	S3, CA SSC, BLM Sensitive
Western mastiff bat (*Eumops perotis californicus*)	2	1999	Mono	6457	S3S4, CA SSC, BLM Sensitive
California wolverine (*Gulo gulo*)	11	1953	Both	5,620-7,060	S1, USFS Sensitive
Silver-haired bat (*Lasionycteris noctivagans*)	25	1977	Inyo	1260	S3S4
Hoary bat (*Lasiurus cinereus*)	5	1999	Both	6457	S3
White-tailed jackrabbit (*Lepus townsendii townsendii*)	29	1942	Both	4,140-7,650	S3, CA SSC
Owens Valley vole (*Microtus californicus vallicola*)	85	1989	Inyo	1,130-6,000	S3, CA SSC, BLM Sensitive
Yuma myotis (*Myotis yumanensis*)	2	1999	Mono	6457	S4, BLM Sensitive
Sierra Nevada bighorn sheep (*Ovis canadensis sierrae*)	24	1998	Inyo	9,200-12,400	S2
Mount Lyell shrew (*Sorex lyelli*)	10	1977	Mono	6,850-8,000	S3S4, CA SSC
Sierra Nevada red fox (*Vulpes vulpes necator*)	31	2011	Both	4,150-9,830	S1, USFS Sensitive

[a] S1, species is critically imperiled; S2, species is imperiled; S3, species is vulnerable; S4, species is apparently secure.

Table 9.3. List of Special Status mammals that may not be present in the ESNR Project Area based on no records for their presence in CNDDB records for the Project Area. Additional investigation would be necessary before excluding them from consideration when preparing planning analyses and compliance documents.

Species	Status	Notes or comments
Pacific fisher	ESA Endangered[a]	Project area is below the typical elevation range for the species
Broad-footed mole	CESA Threatened/BLM Sensitive	Likely present
Mohave ground squirrel	CESA Threatened, BLM Sensitive	Likely present
Desert Bighorn Sheep	BLM and USFS Sensitive	Possibly seasonally present
Fringed myotis	BLM and USFS Sensitive	Likely present
Long-eared bat	BLM Sensitive/SWAP CFS	Will be present
Sierra marten	USFS Sensitive, USFS MIS	Possible present in winter, west margin only
Small-footed myotis	BLM Sensitive	Will be present
Southern grasshopper mouse	SWAP CFS, CA SSC	Present, Lower Owens River area
American badger	SWAP CFS	Will be present
American pika	SWAP CFS	Not present; below typical elevation range
Desert woodrat	SWAP CFS	Will be present
Great Basin pocket mouse	SWAP CFS	Likely present
Little pocket mouse	SWAP CFS	Present, Lower Owens River area
Long-legged myotis	SWAP CFS	Will be present
Mule deer	SWAP CFS	Known present
Pronghorn	SWAP CFS	Present
Western spotted skunk	SWAP CFS	Will be present

[a] Endangered in the Southern Sierra Nevada DPS region (south of the Merced River to the Kern Plateau).

Review of Special Status Mammals in the ESNR Project Area

Among the 32 species identified in Table 9.1 and by a search of current CNDDB records summarized in Table 9.2, nineteen SS mammals are potentially absent in the ESNR Project area (Table 9.3). We obtained and reviewed the most recent available range maps (CDFW CWHR: California's Wildlife) for all of the SS mammals (Table 9.1) to determine those from Table 9.3, which, although not in the CNDDB records within the ESNR Project Area polygon, will likely be present and important for consideration during environmental planning. For example, mule deer and pronghorn are both known present in the ESNR Project Area (Kucera 1992), particularly in the Round Valley area where multiple scientific publications have described aspects of the population biology of mule deer (Pierce et al. 2000).

Broad-footed mole. The geographic range/distribution of the broad-footed mole overlaps significant portions the ESNR Project in both Mono and Inyo County (Fig. 9.3). This mole prefers moist, fairly rich soils with little vegetation, and optimal habitats are annual and perennial grassland, pasture, montane and valley foothill riparian, and aspen. Also occurs in wet meadow, and a variety of open forest habitats. Moles play an important role in soil development through their burrowing activities, and this species' elevational range is from sea level to 9,800 ft. Broad-footed mole has a NatureServe Global rank G5 (Secure), and is a CA SWAP Conservation Focal Species).

Mohave ground squirrel. This species is rare throughout its range and likely will not occur within the ESNR Project area except possibly near Olancha Creek at the south margin of the project area (Fig. 9.3). Optimal habitats are open desert scrub, alkali desert scrub, Joshua tree, and annual grasslands at elevations between 1,800 and 5,000 ft elevation. Mohave ground squirrel was previously described as *Spermophilus mohavensis*, but underwent taxonomic revision which resulted in splitting the genera (Helgen et al. 2009).

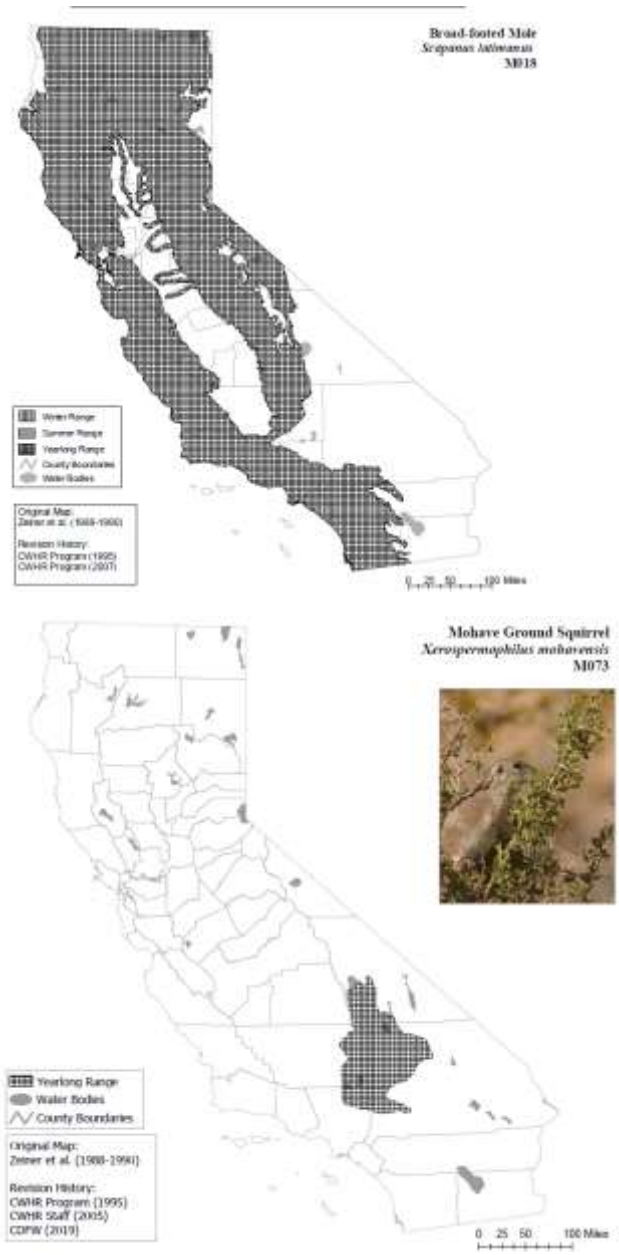


Figure 9.3. California Wildlife Habitat Relationships range maps for the Broad-footed mole (top) and the Mohave Ground squirrel (bottom). Source: CDFW California's Wildlife.

The Mohave ground squirrel has a patchy, discontinuous distribution (Hafner 1992; Gustafson 1993) in the northwestern corner of the Mohave Desert in Inyo and San Bernardino County, California. This squirrel is apparently abundant and extant at several sites, but rapid urban development of parts of historical range, mining, off road vehicle use, cultivation of habitat, livestock grazing, and climatic change are continuing threats. Mohave ground squirrel has a NatureServe Global ranking of G2 (Imperiled), a State rank S2 (Imperiled), is CESA Threatened, and is a BLM sensitive species.

Sierra Marten. The geographic range/distribution of the Marten (CESA Threatened, USFS MIS, BLM Sensitive) overlaps the western boundary of the ESNR Project Area in both Mono and Inyo County (Fig. 9.4). Marten will mostly likely be occasionally present in the project area during winter at elevations

above 5,500 ft elevation. Martens in the Sierra Nevada are ranked G4G5 (Apparently Secure/Secure), but S3 (Vulnerable) in California. The *sierrae* subspecies is ranked by NatureServe as T3, indicating they are thought to be vulnerable and at moderate risk of extinction due to a restricted range, relatively few populations (often 80 or fewer), recent and widespread declines or other factors. Martens are listed as Species of Special Concern (SSC) by California Department of Fish and Wildlife and were designated a Species of Greatest Conservation Need (SGCN) in the California State Wildlife Action Plan (CDFW 2015). Sierra marten are Region 5 Forest Service sensitive and Management Indicator Species.

Wolverine. Wolverines were once widespread in the Sierra Nevada of California (Fig. 9.4), but are currently present only in high elevation forests north of Lake Tahoe. At present, wolverines are found in the North Cascades in Washington and the Northern Rocky Mountains in Idaho, Montana, Oregon (Wallowa Range), and Wyoming. Although individual wolverines have recently been found in a small part of their historic range in the northern Sierra Nevada of California and in the Southern Rocky Mountains of Colorado, the species has not established breeding populations in these areas (Wolverine | US Fish and Wildlife Service (fws.gov). The wolverine has a NatureServe Global rank G4 (Apparently secure), a State rank S1 (Critically imperiled), is CESA Threatned, and is a CA SWAP Conservation Focal Species.

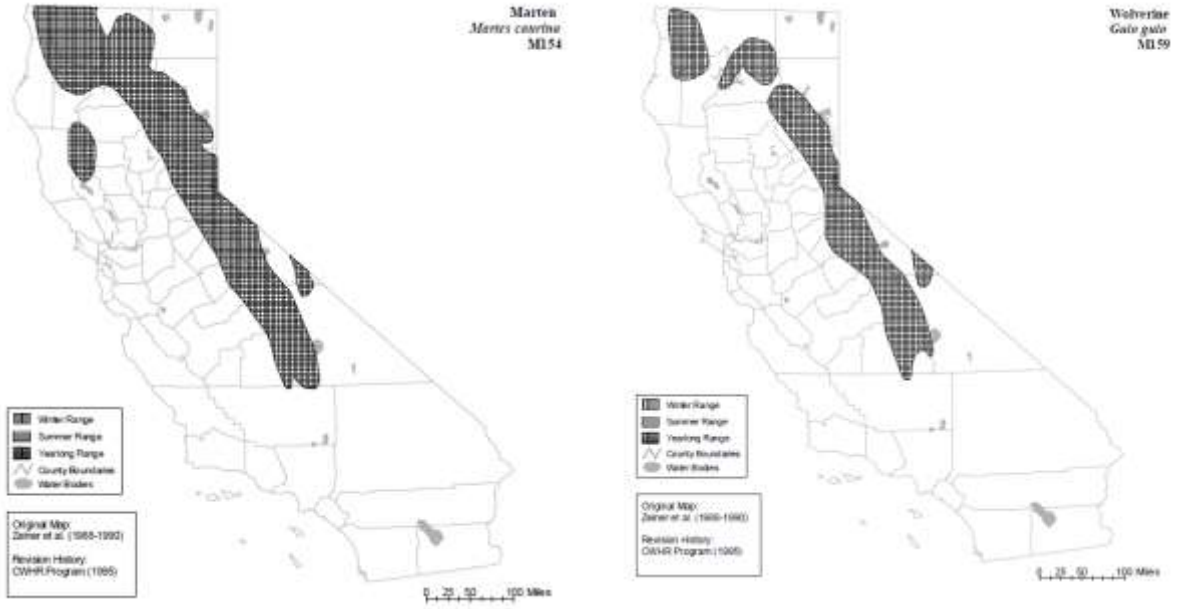


Figure 9.4. Estimated range for the Marten (left) and Wolverine (right) in California based on data assessed for the California Wildlife Habitat Relationships system. Source: CDFW California's Wildlife.

Sierra Nevada Red fox. The Sierra Nevada red fox (SN red fox) will be very uncommon or most likely entirely absent in the ESNR Project Area (Fig. 9.5, they are typically found only above 7,000 ft elevation in the central Sierra Nevada (Sierra Nevada Red Fox (ca.gov). SN Red Fox are the only red fox that occurs naturally in the high mountain habitats of the Sierra Nevada and southern Cascade mountains of eastern California. They live in the open conifer woodlands and mountain meadows near treeline. They do not occur in the coastal mountain ranges or in low elevation habitats. According to recent genetic studies, SN Red Fox are not found only in California; the range for this subspecies of red fox extends north into

the mountains of southern Oregon and western Nevada. SN red fox populations have declined because of poisoning and trapping, habitat destruction from logging and livestock grazing, and disturbance from off-road vehicles and snowmobiles. Trapping the species is banned in California, and climate change is projected to dramatically shrink the fox's habitat as warming pushes it farther up mountain slopes.

This subspecies was just recently (Aug 2021) recommended for listing as endangered by the USFWS. SN red fox may be found in a variety of high elevation mountain habitats, including alpine dwarf-shrub, wet meadow, subalpine conifer, lodgepole pine, red fir, aspen, montane chaparral, montane riparian, mixed conifer, and ponderosa pine. Jeffrey pine, eastside pine, and montane hardwood-conifer also may also be habitat for this animal.

American Badger. The American badger will be present and widespread in the ESNR Project Area (Fig. 9.5). Badgers are an uncommon, permanent resident found throughout most of the California except in the North Coast area (Grinnell et al. 1937). This species is most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils. There are no local or regional threats known or identified for this species. American badger has a NatureServe Global ranking of G5 (Secure), and it is a CA SSC, but has no other state or agency designation.

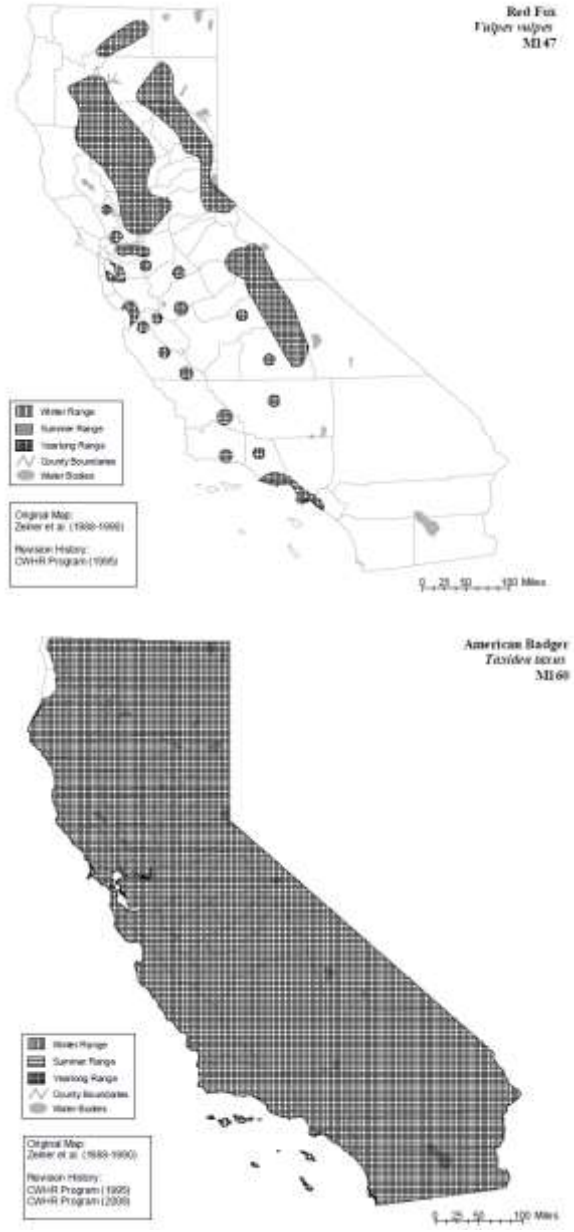


Figure 9.5. California Wildlife Habitat Relationships range maps for the Red fox (top) and the American badger (bottom). Source: CDFW California's Wildlife.

Owens Valley vole. The Owens Valley vole is a little-known subspecies of California vole located in the Owens Valley of California. It is a California State Species of Concern, but very little is known about the status of the population and threats to its existence. Pleistocene climate change and mountain barriers are thought to have geographically isolated this subspecies from the other California voles for more than 14,000 years. Multiple factors such as natural aridity, land cultivation, construction of highways and canals, and local urbanization have fragmented the subspecies into an unknown number of subpopulations (Owens Valley Vole Research (ca.gov).

Owens valley vole is known from multiple localities on the floor of the Owens Valley, including the lower drainages flowing from both the Sierra Nevada on the west and White-Inyo mountains on the east, from the northern fringe of Owens Lake to at least Round Valley, Fish Slough, and the mouth of Silver Canyon north and northeast of Bishop (Patton and Conroy 2017). CDFW initiated a study in summer 2011 to investigate potential environmental impact by humans on the Owens Valley vole through genetic analysis. Genetic variation and population structure of the Owens Valley vole were used to assess divergence among subpopulations, and to test for potential recent losses of genetic diversity. Three trapping sites were selected that represented the northernmost and southernmost known portions of the Owens Valley Voles range as well as a site in the middle. These sites were Fish Slough Ecological Reserve, Black Rock on the Owens River and Cartago Springs Wildlife Area. All voles were trapped using standard techniques. Trapped voles were weighed, measured, and genetic samples taken before release. Genetic samples were later analyzed at the Museum of Vertebrate Zoology at UC Berkeley. Genetic richness was roughly equal across the range of the Owens Valley vole.

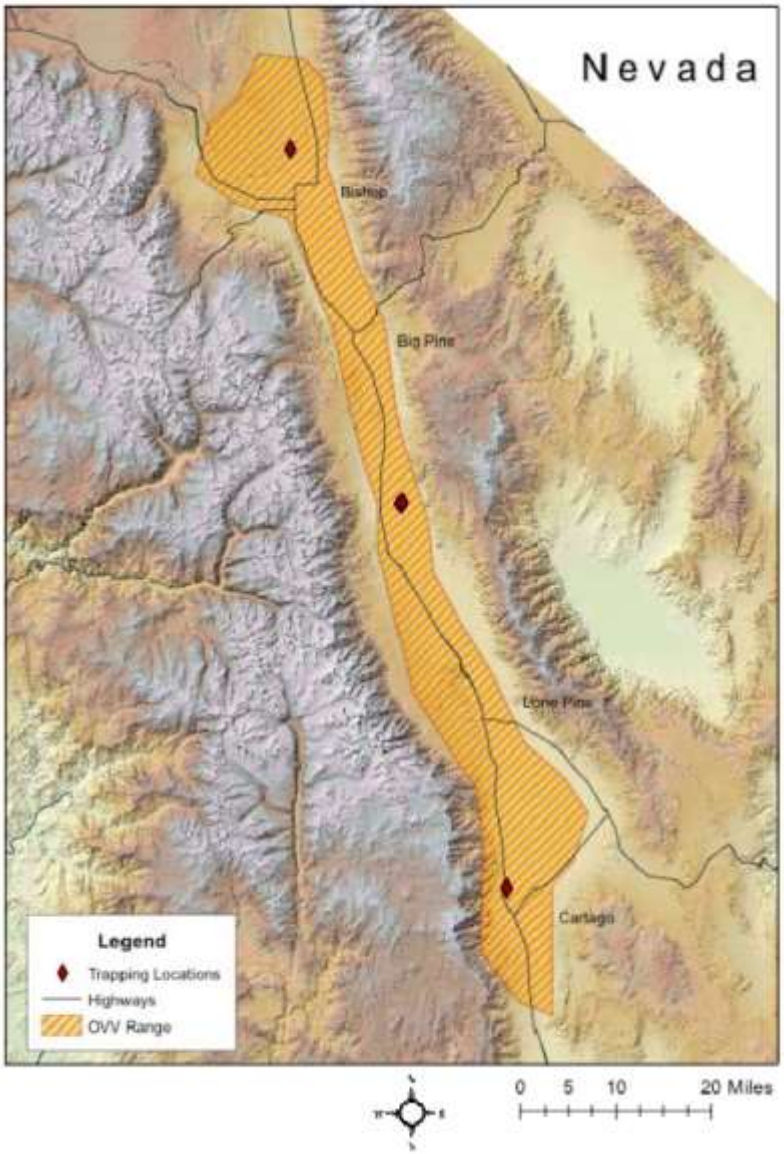


Figure 9.6. Estimate range of the Owens Valley vole in the ESNR Project Area in Mono and Inyo, California. Source: [Owens Valley Vole Research (ca.gov).]

Analysis of the genetic material from the three sites yielded some interesting insights into the Owens Valley Vole. Two species were detected co-existing at Fish Slough Ecological Reserve, the Owens Valley vole and montane vole (*Microtus montanus*). There appeared to be healthy breeding populations throughout the range of the Owens Valley vole (Owens Valley Vole Research (ca.gov).

Although listed as a CA species of special concern, data from CDFW suggest the risks to the Owens Valley voles are moderate. Owens Valley vole has a NatureServe Global ranking of G5 (Secure), a State rank S3 (Vulnerable), it is a CA Species of Special Concern, and it is a BLM Sensitive Species. There are no major threats and there is no evidence to support concern for low probability of persistence.

Pygmy Rabbit. Pygmy rabbit has a moderately large range in the Great Basin and Intermountain region of western North America; the species range has decreased as shrub-steppe/sagebrush habitats have been lost and degraded as a result of fire, grazing, invasion of exotic annuals, and agricultural conversion. The geographic range of the pygmy rabbit will overlap the ESNR Project area, particularly between Mono Lake and in sagebrush flats and foothill uplands around Crowley Lake (Fig. 9.7). Although the range of this species in this region is primarily in Nevada (not shown), it does include a slight portion of the Mono Lake Basin and nearby uplands (Fig. 9.7).

The loss and degradation of habitat through fire, grazing, invasion of exotic annuals, energy development, and agricultural conversion (Whisenant 1990; Knick and Rotenberry 1997) are probably the most significant factors contributing to pygmy rabbit population declines. Sagebrush cover is critical to pygmy rabbits, and eradication of sagebrush therefore detrimental to the species (Holochek 1981). Fragmentation of sagebrush communities also poses a threat to populations of pygmy rabbits (Weiss and Verts 1984) because dispersal potantial is limited. Under current climate-change projections, further invasion by downy brome (*Bromus tectorum*) into sagebrush habitat is likely to occur, as is invasion by woody species, and fire frequency will likely continue to increase. Climate change is thus likely to exacerbate the existing primary threats such as frequent wildfire and invasive nonnative plants.

The pygmy rabbit has a NatureServe Global ranking of G4 (Apparently Secure), a State ranking S3 (Vulnerable) (NatureServe 2021), is a BLM and USFS Sensitive Species, and a CA SWAP Conservation Focal Species. There is no current scientific information indicating that pygmy rabbits are in decline in this area, but there is the potential for loss of sagebrush habitats by high intensity wildfire.

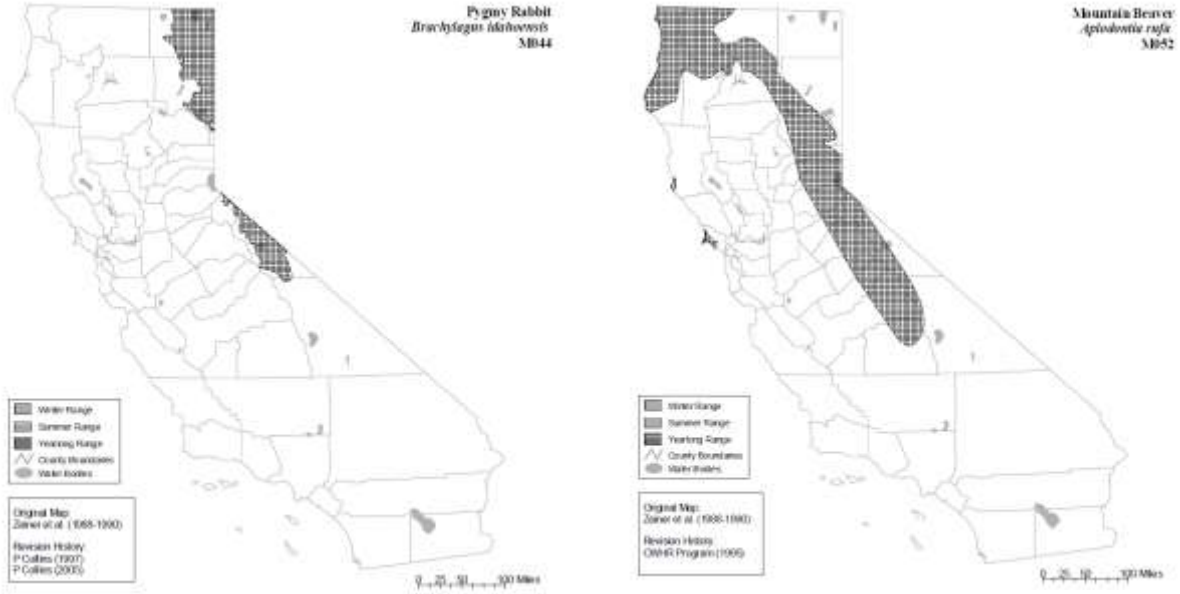


Figure 9.7. California Wildlife Habitat Relationships range maps for the Pygmy rabbit (left) and the Mountain beaver (right). Source: CDFW California's Wildlife.

Mountain Beaver. The subspecies Sierra Nevada mountain beaver (*Aplodontia rufa californica*) has a very limited distribution, occurring only within the Sierra Nevada, in small, somewhat isolated or disjunct areas. Mountain beaver may be present along stream drainages (permanent) along the western border of the Project area, and likely oly above 5,000 ft elevation (Fig. 9.7). Limiting factors identified as threats to persistence for Sierra Nevada mountain beavers include narrow habitat requirements, low population densities, limited dispersal capability, a low reproductive rate that limits resilience to disturbance, and habitat degradation or loss (USDA Forest Service 2018). The Sierra Nevada mountain beaver has a NatureServe Global rank of G5 (Secure), and a California State rank of S2S3 (Imperiled to Vulnerable). This subspecies is also recognized by CDFW as a species of special concern (CA SSC) and a species of greatest conservation need.

Southern Grasshopper Mouse. The Southern grasshopper mouse is common in arid desert habitats of the Mojave Desert and southern Central Valley of California. Alkali desert scrub and desert scrub habitats are preferred, with somewhat lower densities are expected in other desert habitats, including succulent shrub, wash, and riparian areas. This species will be present in the ESNR Project area, but primarily in the lower Owens River area, and in the Fish Slough valley/Spring Mountain Creek area northeast of Bishop (Fig. 9.8). Southern grasshopper mouse has a NatureServe Global rank of G5 (Secure), and it is a species of special concern and CA SWAP Conservation Focal Species in California.

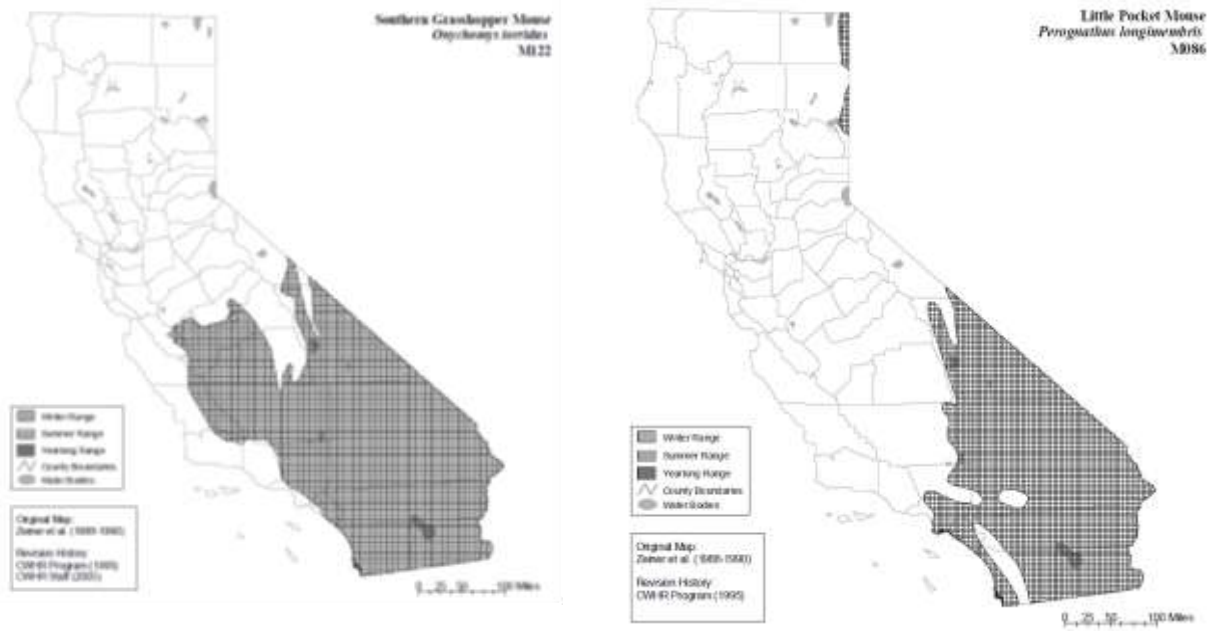


Figure 9.8. Estimated California Wildlife Habitat Relationships range maps for the Southern grasshopper mouse (left) and the Little pocket mouse (right) in California.

Little Pocket Mouse. The Little pocket mouse is a common to abundant yearlong resident of the southern deserts, and it will be present in the ESNR Project Area along the Lower Owens River Fig. 9.8). The range of this species extends northward into southeastern Mono, Tulare, and Kern counties, but it does not occur in central California west of the Sierra Nevada (Williams et al. 1993). Preferred habitats include areas with sandy soil overlain with pebbles, on slopes with widely spaced shrubs (preferred for burrowing; Hall 1946), but also gravel washes and stony soils (Beatley 1976; Miller and Stebbins 1964). Also occurs in sagebrush habibats, creosote bush, and cactus communities in Lower and Upper Sonoran

life zones. The burrows are plugged during the day for thermoregulation and security. Feeds primarily on seeds, plus green vegetation in spring. Forages mainly under shrub canopy. Stores food in underground burrow. Elevations range from sea level to 5,600 ft.

Little pocket mouse has a NatureServe Global rank of G5 (Secure), no State rank, and is a CA SWAP conservation focal species in California (Table 9.8).

Townsend's Big-eared Bat. Townsend's big-eared bat is found throughout California, including essentially all of the ESNR Project area, where habitats are appropriate (Fig. 9.9). The large range of the species in the western US includes southwestern British Columbia, western Washington, western Oregon, and northwestern and west-central California This species is found in all but subalpine and alpine habitats, and may be found at any season throughout its range. Once common, Townsend's big-eared bat is now considered uncommon in California; local populations tend to be small, and the overall recent trend is not well known (apparently declining in some areas, yet stable or increasing in other areas). Roosts used by Townsend's big-eared bats in caves and old mines are vulnerable to disturbance and/or destruction (e.g., recreational caving or mine exploration, mine reclamation, and renewed mining in historic districts). The species is not yet known to be afflicted by white-nose syndrome, but this fungal disease occurs throughout much of the eastern portion of the range of *C. townsendii*. Elevational range extends from near sea level to at least 10,800 ft in some areas. Townsend's big-eared bat has a NatureServe Global ranking of G4 (Apparently Secure), a State rank S2 (Imperiled), is a BLM and USFS Sensitive species, and a Species of Conservation Concern in the California.

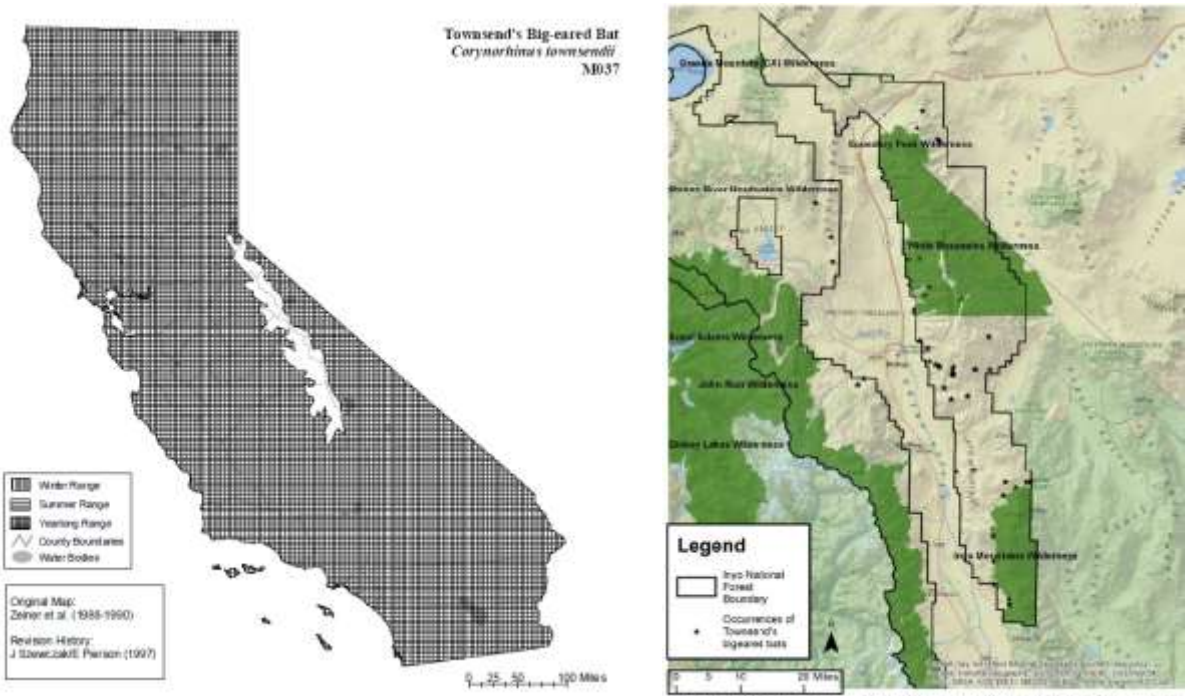


Figure 9.9. California Wildlife Habitat Relationships range map for the Townsend's big-eared bat (left), and Inyo National Forest map showing the distribution of the species in Inyo NF and across most of ESNR Project Area (right. Source: CDFW California's Wildlife, USDA Inyo NF 2018).

Pallid Bat. The pallid bat is a locally common species of low elevations in California, and it will be present throughout the ESNR Project area (Fig. 9.10). Pallid bats occur throughout California except for

the high Sierra Nevada and extreme northwestern California. Pallid bats occur in a wide range of habitats including desert scrub, grassland, oak woodland, and mixed hardwood and coniferous forest (Baker et al. 2008). They roost in small to large groups, using many different types of roosts including rock crevices, trees basal hollows and cavities, buildings, bridges, and occasionally caves and mines (Barbour and Davis 1969; Hermanson and O'Shea 1983; Rabe et al. 1998; Baker et al. 2008). Pallid bats use both live and dead trees, roosting in cavities, basal hollows, and under loose bark (Orr 1954; Rainey et al. 1992; Lewis 1994; Pierson et al. 1996; Rabe et al. 1998; Johnston and Gworek 2006; Baker et al. 2008). They use a variety of tree species for roost sites including oaks, cedar, pine, and even giant sequoia (*Sequoiadendron giganteum*).

The pallid bat has a NatureServe Global rank of G4 (Apparently Secure), a State rank of S3 (Vulnerable). The pallid bat is currently a BLM and a USFS sensitive species, and it is a Species of Special Concern and a Species of Greatest Conservation Need by CDFW. This species has also been assigned a High Priority designation by the Western Bat Working Group (2016), indicating this species should be considered one of the highest priorities for funding, planning, and conservation actions as it is considered imperiled or are at high risk of imperilment.

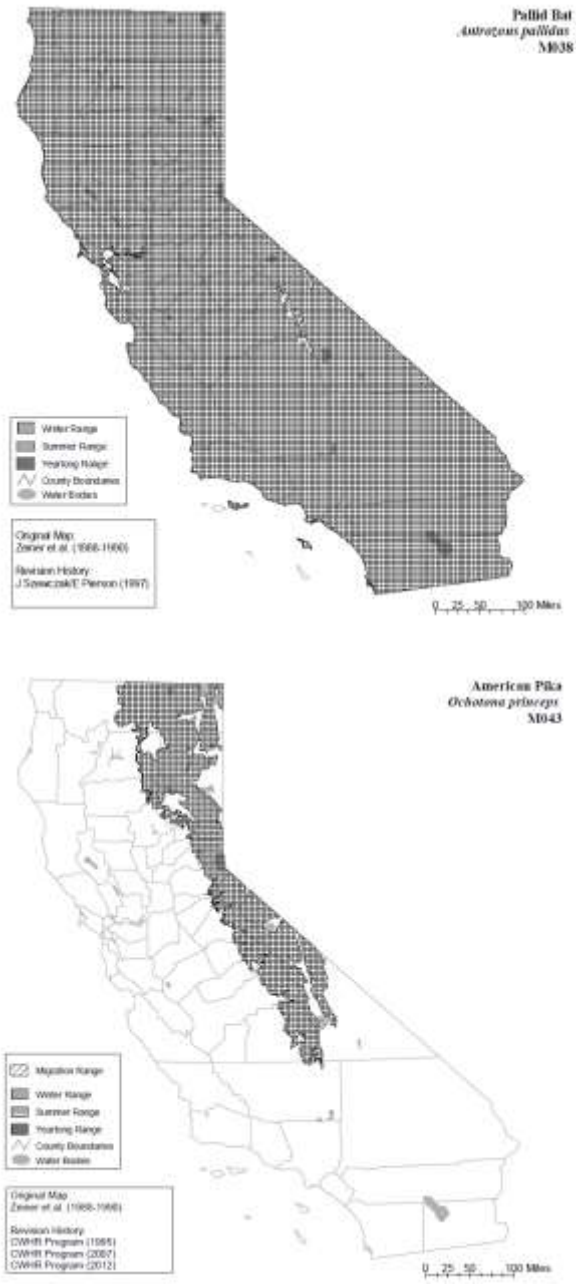


Figure 9.10. California Wildlife Habitat Relationships range maps for the Pallid bat (top) and American pika (bottom). Source: CDFW California's Wildlife.

American Pika. The American pika is a common resident of rock and talus slopes of the Cascades and Sierra Nevada from the Oregon border south down across the Sierra Nevada in Tulare and Inyo County. In the ESNR Project area American pika will occur primarily in high elevation wilderness over 6,000 ft elevation (Fig. 9.10). Populations appear restricted to relatively high elevation rock and talus slopes, bordering alpine meadows or herbaceous understories of forest edges. Many populations are insular, particularly those below timberline (Smith 1974; Orr 1977). The extent of rocky perimeter may be a good predictor of pika density (Smith and Weston 1990), and the lower limit of pika distribution in the Sierra Nevada may be set by excessive heat (MacArthur and Wang 1973; Smith 1974). There is evidence of upslope movement

of pikas presumably in response to warming temperatures at lower elevation sites (McDonald and Brown 1992; Beever et al. 2016). Prediction models estimating effects of climate change and the interpretation of such models on pika populations and persistence is mixed. The USFWS (2010) concluded that pika populations at mid to high elevations in the Sierra Nevada should not be at risk of extirpation by the year 2050, based on cooler projected temperatures at higher elevations. USFWS (2010) also concluded that lower elevation populations may be at higher risk based on projected warmer temperatures. Stewart et al (2015) modeled future climate change scenarios, projecting the number of occupied sites in the Sierra Nevada may decline from 39 to 88 percent by the year 2070. Millar and Westfall (2010) found pika populations in the Sierra Nevada and southwestern Great Basin are; thriving, able to persist in a wide range of thermal environments, and are showing little evidence of extirpation or decline. While there is uncertainty related to climate change effects and pika persistence, it is generally agreed that extirpation in mainland areas, such as the Sierra Nevada, have exhibited lower rates of extirpation than more isolated or insular areas (Beever et al. 2016). The pika subspecies in the Sierra Nevada*, Ochotona princeps schisticeps* (Hafner and Smith 2010), has a NatureServe Global rank of G5 (Secure) and a subspecies rank of T4 (Apparently Secure) (NatureServe 2021). American pika has a State rank of S2S3 and is a CA SWAP Conservation Focal Species.

White-tailed jackrabbit. This species is an uncommon to rare year-round resident of the upper eastern slope of the Sierra Nevada, primarily from the Oregon border south to Tulare and Inyo County (Fig. 9.11). White-tailed jackrabbit will have significant range overlap with the ESNR Project area, except near Owens Lake (Fig. 9.11). Mono and Inyo County are at the western and southern most limits of the known distribution for western whitetailed jackrabbit. Preferred habitats are sagebrush, subalpine conifer, juniper, alpine dwarf-shrub, and perennial grassland, but this jackrabbit also uses low sagebrush, wet meadow, and early successional stages of various conifer habitats. There is seasonal movement from higher to lower elevations in winter (Orr 1937, 1940; Ingles 1965; Lim 1987). While formerly widespread throughout this range, white-tailed jackrabbit populations are now fragmented, and numbers apparently have declined drastically. The white-tailed jackrabbit has a NatureServe Global rank of G5 (Secure), a subspecies rank of T5 (Secure), and a California State rank of S3? (Vulnerable with uncertainty). This subspecies is also recognized by CDFW as a Species of Special Concern and is a CA SWAP Conservation Focal Species.

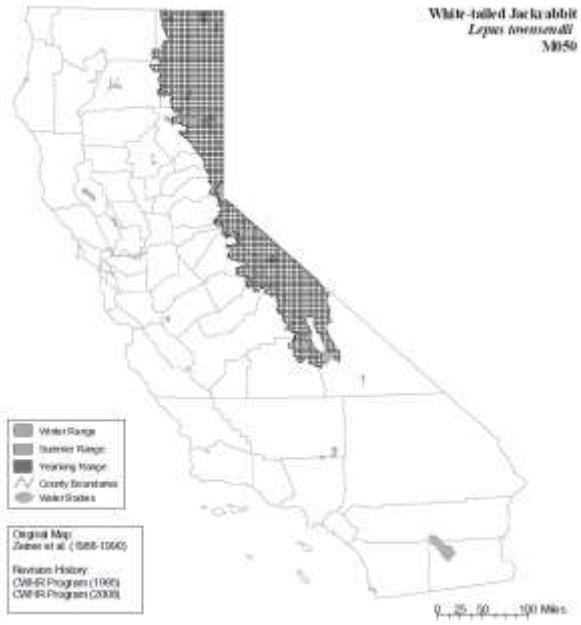


Figure 9.11. California Wildlife Habitat Relationships range map for white-footed jackrabbit. Source: CDFW California's Wildlife.

Yuma Myotis. The Yuma myotis has a widespread distribution in western North America, and this bat is widespread in California. It is common in the Mojave and Colorado Desert regions, including essentially all of the ESNR Project area (Fig. 9.12). This bat will often roost in large numbers in natural and human-made structures, and can be vulnerable to roost disturbance and loss. The species occurs in both pristine and altered habitats, and can be locally common. Optimal habitats are open forests and woodlands with sources of water over which to feed. Details of distribution, roost requirements, and threats are otherwise poorly known. This bat species occurs in a wide variety of habitats ranging from sea level to 11,000 ft, but it is uncommon to rare above 8,000 ft.

Yuma myotis has NatureServe Global rank G5 (Secure), a State rank S4 (Apparently Secure), and is a BLM Senstive Species.

Western Mastiff Bat. Western mastiff bat has a large range in the southwestern United States and Mexico. This bat occurs in southern Inyo County, but will not have a range presence within the ESNR Project area (Fig. 9.12).

Western mastiff bats occur in many open, semi-arid to arid habitats, including conifer and deciduous woodlands, coastal scrub, annual and perennial grasslands, palm oases, chaparral, desert scrub, and urban. The species uses many differenty types of roosts, and colony sizes are typically small. Population trend is uncertain, but abundance has probably been relatively stable or slowly declining over recent decades. Western mastiff bats may be affected by a wide range of potential threats, but the population impact of these factors is not well known except perhaps in the most severely affected regions (e.g., southern California) where extensive habitat alteration is associated with a reduction in populations. Localized threats include habitat loss/degradation and roost

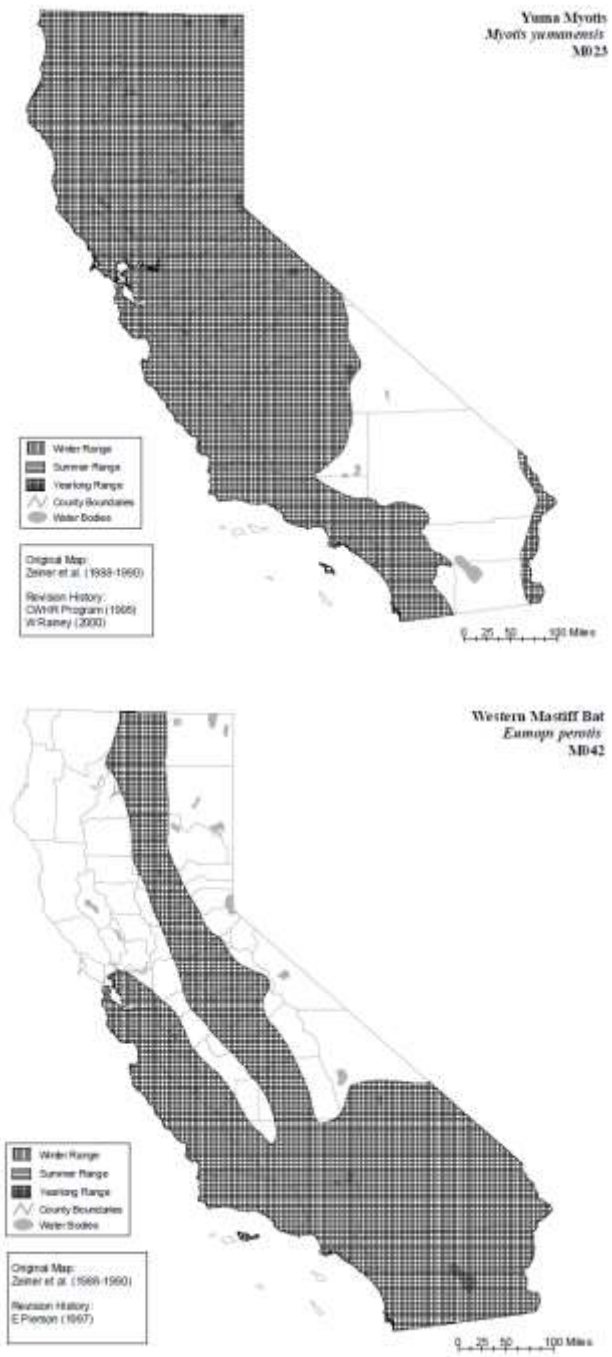


Figure 9.12. California Wildlife Habitat Relationships range maps for the Yuma myotis (top) and the Western mastiff bat (bottom). Source: CDFW California's Wildlife.

disturbance from human activities, colony elimination by pest control operators and public health officials, and possibly direct and indirect effects of pesticide use. Western mastiff bat has a NatureServe Global rank G4 (Apparently secure), no State rank, is a BLM Sensitive Species, and is a CA SWAP Conservation Focal Species.

Long-eared myotis. This bat has a widespread distribution in western North America, across large areas of California, and will have significant distribution overlap with the ESNR Project Area (Fig. 9.13). Long-eared myotis occupy a diverse array of habitats, including lowland, montane, and subalpine woodlands, forests, shrublands, and meadows, wooded stream courses, and areas over water bodies (Findley et al. 1975; Hoffmeister 1986; Manning and Jones 1989; Armstrong et al. 1994; Oliver 2000, Adams 2003). Occurs regularly in low numbers across its range, uses wide range of often plentiful roost sites, and the population trend is uncertain but probably relatively stable or slowly declining. No known major threats, but these bats may be affected closure of abandoned mines, recreational caving, and forest management practices that results in reduced availability of roost sites in snags and trees with loose bark. A single *Myotis evotis* was found dead with white-nose syndrome in Washington State in 2019, but at present this disease threat is considered low. Long-eared myotis have a NatureServe Global rank G5 (Secure), a State rank S3 (Vulnerable), and they are a BLM Sensitive Species and CA SWP Conservation Focal Species.

Small footed Myotis. The small-footed myotis is a common bat of arid upland habitats in California on both the west and east sides of the Sierra Nevada, and will be present over most of the ESNR Project area (Fig. 9.13). Small-footed myotis occurs in a wide variety of habitats, primarily in relatively arid wooded and brushy uplands near water. This species is found from sea level to at least 8,900 ft elevation. Small-footed myotis have a NatureServe Global rank G5 (Secure), a State rank S3 (Vulnerable), and they are a BLM Sensitive Species.

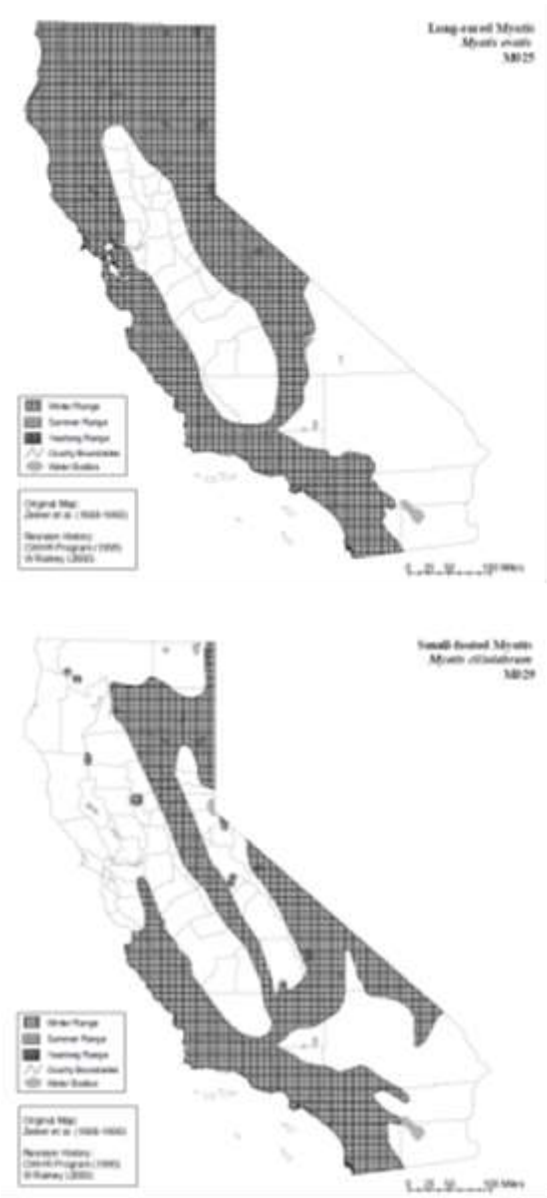


Figure 9.13. California Wildlife Habitat Relationships range maps for the Long-eared myotis (top) and the small-footed myotis (Bottom). Source: CDFW California's Wildlife.

Spotted bats. The spotted bat has been found at a small number of localities, mostly in the foothills, mountains and desert regions of southern California (Watkins 1977). Spotted bats will be present across all of the ESNR Project area (Fig. 9.14), and in habitats such as arid desert grasslands and mixed conifer forests. Elevational range extends from below sea level to above 10,000 ft elevation. Population size is unknown but this species is not as rare as previously believed; population trend is probably stable or slowly declining (NatureServe 2021). Distribution of spotted bats may be patchy and limited to areas with suitable roosting habitat, predominately high cliff faces (Easterla 1973; Wai-Ping and Fenton 1989; Pierson and Rainey 1998). Little is known about possible threats to spotted bats because of lack of knowledge of this species; spotted bats roost in remote locations and threats to roosts seem unlikely (NatureServe 2021). The spotted bat has a NatureServe Global rank of G4 (Apparently Secure) and a State rank S3 (Vulnerable). The spotted bat is recognized as CDFW Species of Special Concern, and is a BLM Sensitive Species. Also, the Western Bat Working Group considers spotted bat as a species of concern because of limited information available, and uncertainty as to life history and population trends.

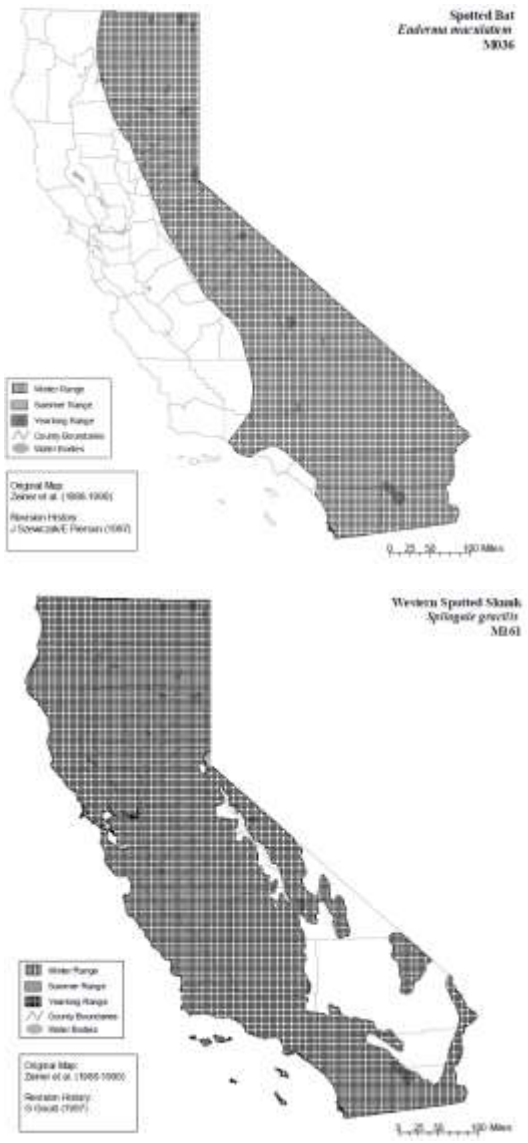


Figure 9.14. California Wildlife Habitat Relationships range maps for the spotted bat (top) and the western spotted skunk (bottom). Source: CDFW California's Wildlife.

Western spotted skunk. Western spotted skunk is a common to uncommon, permanent resident in most habitats in California, except high mountains and very dry deserts (Grinnell et al. 1937). This species will likely be common in the ESNR Project area (Fig. 9.14). Spotted skunks occur in shrub and brush habitats with moderate canopy-closure. Also inhabits open forest and woodland with scattered openings, and riparian habitats. Domestic dogs, great horned owls, and humans appear to be the primary predators. Spotted skunks consume large numbers of insects and small mammals, and can be an important carrier of rabies. Spotted skunk has a NatureServe Global rank of G5 (Secure), and is CA SWP Conservation Focal Species.

Other Mammals. Other species from Table 9.1, which are listed as CA SWAP Conservation Focal Species include Pronghorn, Desert woodrat, Great Basin pocket mouse, American beaver, and North American porcupine. All of these Conservation Focal Species have ranges that overlap with the ESNR Project area to varying levels (Fig. 9.15). Summary species accounts were not prepared for these mammals, but they will be present and important for consideration for projects in the ESNR Project Area.

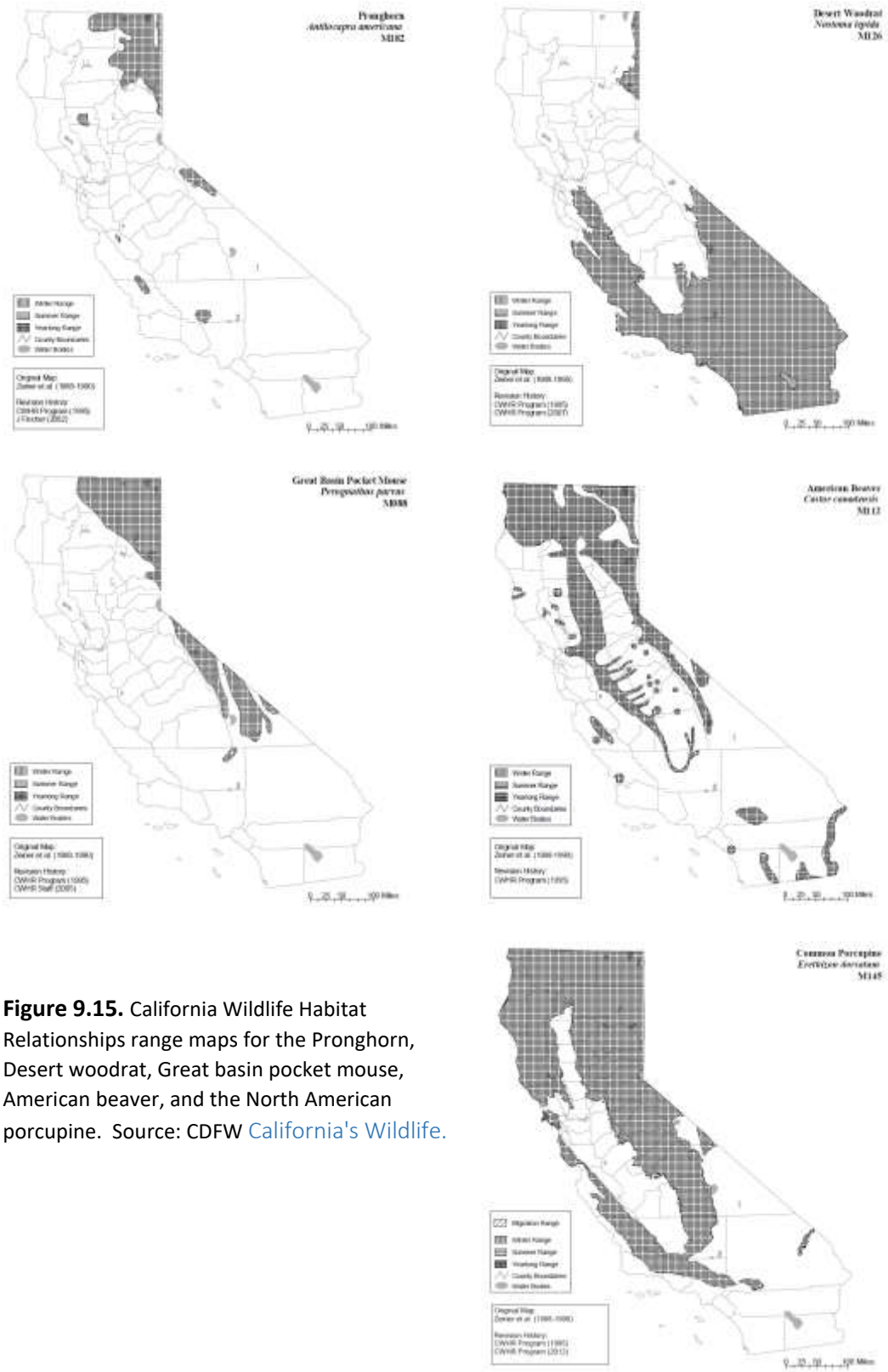


Figure 9.15. California Wildlife Habitat Relationships range maps for the Pronghorn, Desert woodrat, Great basin pocket mouse, American beaver, and the North American porcupine. Source: CDFW California's Wildlife.

USFS Management Indicator Species Mammals in the ESNR Project Area. There are three USFS Inyo NF Management Indicator Species in or near the ESNR Project area.

Mule deer are the MIS for Oak-associated hardwood, hardwood/conifer habitats, and mule deer are common within the project area (Fig. 9.16).

Both the Sierra marten (Fig. 9.4 above) and the Northern flying squirrel (Fig. 9.16) are MIS' for Late seral closed canopy coniferous forest coniferous habitats in the Inyo NF. However, this type of forest habitat is very rare to absent in the Eastern Sierras below 6,500 ft elevation.

Although Sierra marten may occasionally be present below 6,500 ft elevation (*winter only*), the range of northern flying squirrel likely does not overlap any significant portion of the ESNR Project area (Fig. 9.16). Therefore, future projects in the area will not need to consider potential impacts to this Inyo NF MIS mammal.

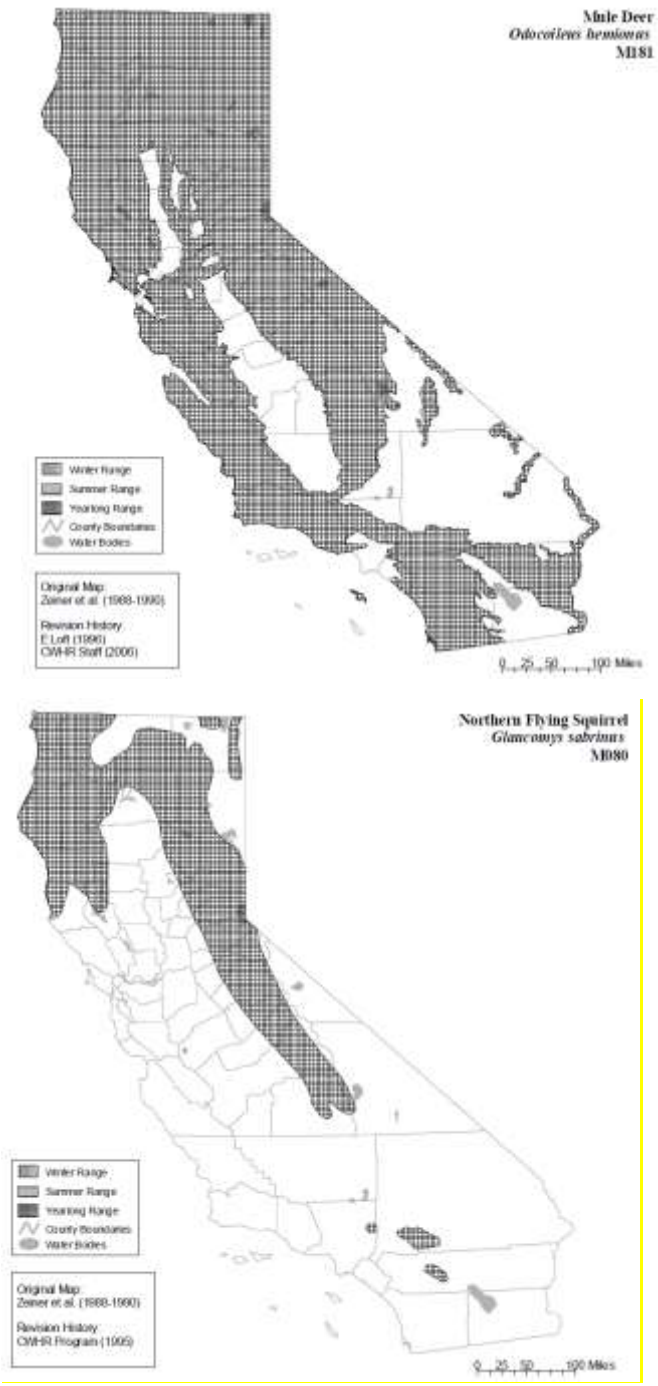


Figure 9.16. California Wildlife Habitat Relationships range map for the Mule Deer (top), and Northern flying squirrel (bottom). Source: CDFW California's Wildlife.

Focal CDFW Management Mammals

Mule Deer. Although mule deer are not a SS Species in the CNDDB, they are a state important managed big game mammal, and they are present in the ESNR Project area. Mule deer provide wildlife viewing, recreational and ecological value, as well as economic value to the public. Mule deer populations have experienced periodic declines over much of the last century and causes of the declines remain speculative and controversial. Possible causes include loss of habitat due to development, deterioration of forages, competition with other ungulates, predation, disease, increased hunting mortality, poaching, severe winter weather, and droughts. In response to concerns regarding dynamics of mule deer populations, CDFW initiated an intensive research project on mule deer ecology in the eastern Sierra Nevada in 1997, with the goal being to elucidate the factors responsible for limiting growth of mule deer populations. The Deserts Province Region and particularly the area around Bishop and Mammoth Lakes, has diverse habitats for mule deer, ranging from low and high desert scrub/shrublands, foothill woodlands, and high subalpine shrubs and mountain meadows. There are seven recognized deer herds in Mono and Inyo County, and individuals from four of these herds occur in and around the Round Valley area northeast of Bishop. The majority of mule deer habitat in around Round Valley is on public or state lands administered by the Inyo NF, BLM, and LADWP. Also, prior research on mule deer had been completed in this area that provided important background biological data (Kucera 1988). For these reasons CDFW chose the deer population that overwinters in Round Valley and summers in the nearby Sierra Nevada for the intensive research/population study.

Drawing credit: CDFW.

Round Valley is bounded to the west by the Sierra Nevada, particularly Mount Tom (13,651 ft) and Wheeler Ridge (11,942 ft), to the south by large boulders and granite ridges of the Tungsten Hills and Buttermilks, and to the east by Highway 395. Vegetation of Round Valley is characteristic of the western Great Basin and the sagebrush belt. Summer range for mule deer that overwinter in Round Valley occurs on both sides of the Sierra crest at high elevations ranging from 7,200 ft to >11,800 ft. The eastern slope of the Sierra

Photo credit: KL Monteith.

View from near Tom's Place south into mule deer winter range in Round Valley with Mount Tom marking the western edge of Round Valley within the ESNR Project area. **Photo:** KL Monteith.

Nevada up to approximately 7,000 ft is dominated by the sagebrush vegetation zone. Areas occupied by mule deer in the ESNR Project Area include a full complement of predators on winter and summer ranges; mountain lions, coyotes, bobcats, and black bears.

In California, long distance migration among large mammals is rare, and mule deer in Round Valley are migratory. Mule deer that overwinter in Round Valley undertake long distance seasonal migrations from wintering areas on alluvial fans at the base of eastern Sierra Nevada, through the Owens River Valley to and from winter range in the volcanic tablelands at the north end of the Owens Valley in Long Valley and around Crowley Lake. Many mule deer from Round Valley also migrate westward and upslope during spring into high elevation summer ranges over the crest of the Sierra Nevada to high country alpine/subalpine shrublands and mountain meadows (Kucera 1988; Pierce et al. 2000; Fig. 9.17). During their seasonal migrations, these mule deer typically pause in "holding areas" while temperatures warm and high elevation snow melts. In fall, the pattern reverses with mule deer traveling back downslope to spend the winter either in Round Valley, or in pinyon-juniper woodlands and sagebrush shrubland in the Glass Mountain area northeast of Crowley Lake (Pierce et al. 1999).

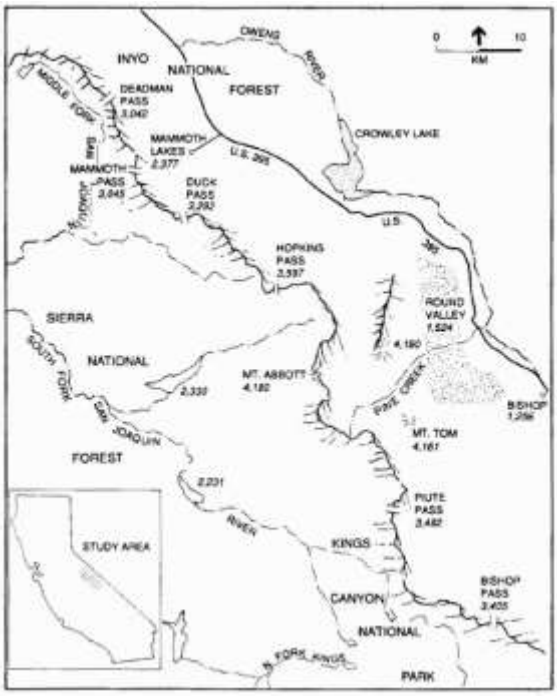


Photo: *TR Stephenson.*

Figure 9.17. Map of mule deer range in the Eastern Sierra Nevada Round Valley region northwest of Bishop, as well as Crowley Lake, and the higher elevation Sierra Nevada. Sources: CDFW and Kucera 1992.

Important mule deer winter range and habitats along migration corridors in the ESNR Project Area include Great Basin mixed scrub, big sagebrush scrub, Pinyon-Juniper woodlands, and bitterbrush when it is dominant or co-dominant in the shrub layer. Migrating female mule deer "does" in early spring are known to rely on the availability of high-quality bitterbrush to maintain good health and reproductive success (Monteith et al. 2014). Important mortality risks for mule deer in the ESNR Project area are predation by mountain lions and coyotes, and deer-vehicle collisions on Highway 395 (Pierce et al. 2012; Monteith et al. 2014). Optimal summer fawning and foraging habitats are intermediate canopy stages of conifer forest, and high-elevation riparian and montane shrub types (mostly outside the ESNR Project

area). Mule deer migration corridors between summer and winter habitats are fairly narrow due to topographic constraints, and movement corridors are susceptible to blockage from development (e.g., recreational ski facilities at Mammoth Mountain; Kucera and McCarthy 1988). At low elevations, mule deer stage and overwinter in relatively small winter ranges, which supports them for a short period of time because forage is limited. CDFW is working towards critical habitat acquisitions in various areas such as Swall Meadows, Antelope Valley and Slinkard Valley, Sonora Junction area, Conway Summit area, and Crowley Lake area. Both Inyo and Toiyabe National Forest have developed specific standards and guidelines for protection of mule deer habitat in their respective land management plans.

Mountain Lions. Mountain lions are not a SS Species, but the California Department of Fish and Wildlife is tasked with ensuring viable mountain lion populations persist throughout the state where suitable habitat and other environmental conditions allow. Inyo and Mono County have appropriate environmental conditions for this species by virtue of abundant mule deer in the Round Valley portion of the Eastside Riparian Project area (Fig. 9.17, 9.18). In fact, a great deal of what is known about the ecology and population biology of mountain lions in California and the intermountain west derives from long term research on mountain lions in the Round Valley and Eastside Sierra Nevada Region (Pierce et al. 1999; Pierce et al. 2000; Pierce et al. 20212). Mountain lions occur across much of the state (Fig.

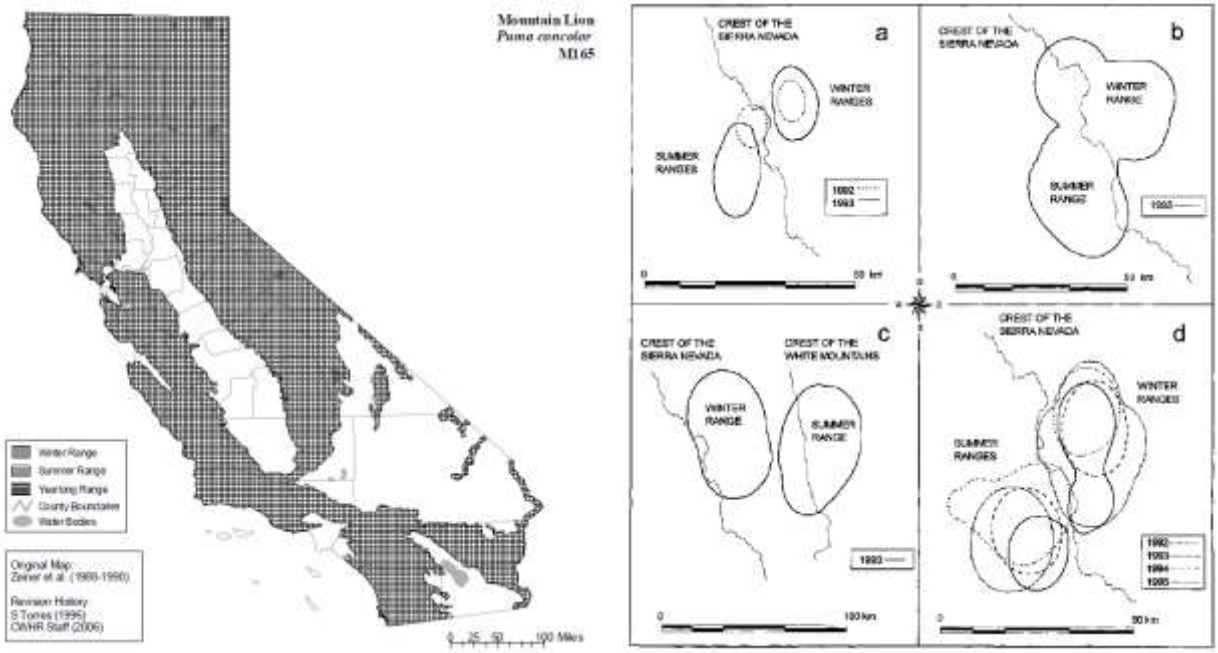


Figure 9.18. Estimated range map for Mountain lions in California from data and records assessed by the California Wildlife Habitats Relationships system (left), and home ranges of female mountain lions in the Round Valley region of Inyo County (Pierce et al. 1999).

9.18), and bring about a wide range of complex conservation and management challenges. In 2014, the mountain lion conservation program was established to coordinate scientific research and population monitoring to inform big game management, species management plans and habitat conservation and protection. The program seeks to develop research and improve understanding on (1) connectivity and gene flow, (2) human-mountain lion interactions, and (3) mountain lion-prey interactions.

Future management actions in the Round Valley and Crowley Lake portion of the ESNR Project area should contact CDFW regarding mule deer and mountain lion presence in the area with regards potential impacts to habitats important for these two CDFW Focal Management Mammals.

10. BIRDS

The Mono and Inyo County area of eastern California supports an extensive network of riparian woodland, lacustrine, freshwater marsh, alkali and mudflat habitats at the eastern base of the Sierra Nevada. Important areas for resident and migratory birds (Audubon Important Bird Areas; IBAs) include Mono Lake basin/Mono Highlands, Adobe Valley/Grass Mountain, Long Valley/Crowley Lake, the Upper and Lower Owens River, Owens Lake, and many miles of riparian habitats along permanent creeks and streams draining the Eastern Sierra Nevada (Fig. 5.2 above).

California Bird Species of Special Concern (BSSC) are defined as those species, subspecies, or distinct populations of native birds that currently satisfy one or more criteria on population size and trend, range size and trend, threats, and population concentration. Table 10.1 includes a comprehensive list of birds identified as SS Species in the Inyo and Mono County region. This list is organized by descending level of conservation concern, and sensitive status level based on agency lists or status designations.

Table 10.1. Special Status bird species of greatest conservation need in the California Desert Provinces Mono and Southeastern Great Basin region. Sources are (1) an official U.S. Fish and Wildlife Service list of threatened and endangered species (IPaC) within the Eastside Riparian Project area polygon, (2) Inyo National Forest Species of Concern (USFS Sensitive), (3) State of California Natural Diversity Database (CNDDB), (4) the 2015 California State Wildlife Plan Focal Species of Conservation Strategies (CA SWP Conservation Focal Species), and (5) the BLM Special Status Animal Species - Bishop Field Office (BLM Sensitive). NOTE: USFS MIS refers to species that currently considered Management Indicator Species for specific habitats in the Inyo National Forest.

Common Name (Scientific name)	Status and Source
California Condor (*Gymnogyps californianus)*	ESA and CESA Endangered (IPaC)
Southwestern Willow Flycatcher (*Empidonax traillii extimus)*	ESA Endangered (IPaC)
Western Yellow-billed Cuckoo (*Coccyzus americanus)*	ESA Threatened (IPaC), CESA Endangered, BLM and USFS Sensitive, USFWS BCC
Western Snowy Plover (*Charadrius nivosus nivosus)*	ESA Threatened (IPaC), BLM Sensitive, USFWS BCC
Least Bell's vireo (*Vireo bellii pusillu*)	ESA and CESA Endangered
Bi-State greater sage-grouse (*Centrocercus urophasianus*)	ESA Candidate, CESA Endangered, CA SWAP CFS, USFS MIS[a]
Bald eagle (*Haliaeetus leucocephalus*)	CESA Endangered, USFS Sensitive, USFWS BCC
Great gray owl (*Strix nebulosa*)	CESA Endangered, USFS Sensitive
Swainson's hawk (*Buteo swainsoni*)	CESA Threatened, BLM Sensitive, USFWS BCC
Inyo California towhee (*Pipilo crissalis eremophilus*)	ESA Threatened, CESA Endangered, CA SWAP CFS
Bank swallow (*Riparia riparia*)	CESA Threatened, BLM Sensitive, CA SWAP CFS
California spotted owl (*Strix occidentalis*)	BLM and USFS Sensitive, USFWS BCC, CA SSC, USFS MIS[a]
Gray vireo (*Vireo vicinior*)	BLM and USFS Sensitive, USFWS BCC, CA SWAP CFS
Northern goshawk (*Accipiter gentilis*)	BLM and USFS Sensitive, CA SSC
Burrowing owl (*Athene cunicularia*)	BLM Sensitive, USFWS BCC CA SSC, CA SWAP CFS
Golden eagle (*Aquila chrysaetos*)	BLM Sensitive, USFWS BCC, CA SWAP CFS
Mountain plover (*Charadrius montanus*)	BLM Sensitive, USFWS BCC, CA SSC
Black-backed woodpecker (*Picoides arcticus*)	USFS Management Indicator Species
Yellow rail (*Coturnicops noveboracensis*)	USFS Sensitive, CA SSC
Willow flycatcher (*Empidonax traillii brewsteri, E. t. adastus*)	USFS Sensitive
Sooty grouse ((*Dendragapus fuliginosus*)	USFS MIS[a]

Mt. Pinos sooty grouse (*Dendragapus fuliginosus howardi*)	USFS Sensitive
Yellow warbler (*Setophaga petechia*)	USFWS BCC, CA SSC, CA SWAP CFS, USFS MIS[a]
Brewer's sparrow (*Spizella brewer*)	USFWS BCC, CA SWAP CFS
Mountain quail (*Oreortyx pictus*)	USFS MIS[a]
Fox sparrow (*Passerella iliaca*)	USFS MIS[a]
Ferruginous hawk (*Buteo regalis*)	USFWS BCC, CA SWAP CFS
Prairie falcon (nesting) (*Falco mexicanus*)	USFWS BCC, CA SWAP CFS
American peregrine falcon (*Falco peregrinus anatum*)	USFWS BCC, CA SWAP CFS
Short-eared owl (*Asio flammeus*)	CA SSC, CA SWAP CFS
Long-eared owl (*Asio otus*)	CA SSC, CA SWAP CFS
Northern harrier (*Circus cyaneus*)	CA SSC, CA SWAP CFS
Yellow-breasted chat (*Icteria virens*)	CA SSC, CA SWAP CFS
Summer tanager (*Piranga rubra*)	CA SSC, CA SWAP CFS
Yellow-headed blackbird (*Xanthocephalus xanthocephalus*)	CA SSC, CA SWAP CFS
Least bittern (*Ixobrychus exilis)*	CA SSC, CA SWAP CFS
Loggerhead shrike (*Lanius ludovicianus*)	CA SWAP CFS
Cooper's hawk (*Accipiter cooperii*); nesting	CA SWAP CFS
Gray-crowned Rosy-Finch (*Leucosticte tephrocotis*)	CA SWAP CFS
Common yellowthroat (*Geothlypis trichas*)	CA SWAP CFS
Savannah sparrow (*Passerculus sandwichensis*)	CA SWAP CFS
Sage sparrow (*Artemisiospiza* spp)	CA SWAP CFS
Chipping sparrow (*Spizella passerina*)	CA SWAP CFS
Vesper sparrow (*Pooecetes gramineus*)	CA SWAP CFS

[a] USFS Management Indicator Species (MIS) birds in the ESNR Project area are: Yellow warbler (Riparian habitats), Sage grouse (sagebrush habitats), Mountain quail (Early to mid-seral conifer forest), California spotted owl (Late seral closed canopy coniferous forest), and Fox sparrow (Shrub and chaparral habitats, west-slope).

USFWS IPaC Birds in the Project Area

California Condor. Historically, California condors were widespread in western North America from British Columbia to Baja California. The species has been fully protected under state statute since 1953. By the early 1980s, CA condors were restricted to mountains and foothills around the San Joaquin Valley, and the population dipped to about 22 birds. A major effort was begun in 1980 to determine causes for the decline and to attempt to reverse it, but that help came too late. In a last-ditch effort to avert extinction, the wild condors were captured. All 27 remaining birds were in captivity by 1987. After a long period of captive breeding, reintroduction efforts beginning in 1992 have reestablished CA condors in the wild in several areas in southern and central California (and in Arizona/southern Utah).

Usual habitat for California Condors is mountainous country at low and moderate elevations, especially rocky and brushy areas with cliffs available for nest sites, with foraging habitat encompassing grasslands, oak savannas, mountain plateaus, ridges, and canyons (AOU 1983). Condors often roost in snags or tall open-branched trees near important foraging grounds (Matthews and Moseley 1990).

Although this Federal and State-listed Endangered Species was identified by USFWS IPaC consultation as present in the ESNR Project area. The CWHR Range Map for the species suggests it is not actually present (Fig. 10.1). In early spring 2020, however, a California condor being monitored by a satellite GPS wing tag briefly visited the Mt. Whitney (Sierra Nevada) and Inyo Mountains near the ESNR Project area. Nevertheless, there are no records suggesting that reintroduced CA Condors have reestablished nesting

or roosting sites in this part of California. Recovery of the California condor is constrained by the current anthropogenic causes of mortality, primarily lead contamination from prey shot with lead ammunition (Finkelstein et al. 2012; Rideout et al. 2012). Further, reproductive success has been hampered by the presence of microtrash in the environment and the effects of DDT/DDE in coastal populations, and exposure to lead in breeding adults may cause nest failure (USFWS 2013). A large proportion of reintroduced condors and condor nestling have died from anthropogenic causes (e.g., collisions with power lines, ingestion of toxins). As of 2012, mortality from lead poisoning continued to be a significant threat. In California, chick mortality resulting from ingestion of anthropogenic material (trash) is a serious concern (Mee et al. 2007).

California condors have NatureServe Global rank G1 (Critically Imperiled) and an S1 (Critically Imperilled) in Califonria; they are an ESA and CESA Endangered Species.

Figure 10.1. Estimated range of the California condor in California, based on data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

Western yellow-billed cuckoo. The western yellow-billed cuckoo is a slender brown bird with white underparts. In flight, its wings show rufous or cinnamon color, and its tail shows black with white spots. The species was once common in the Western states but has been extirpated from much of its previous range. The Yellow-billed cuckoo is present in the ESNR Project area south of Bishop along the Lower Owens River (Fig. 10.2). LADWP has worked to improve habitat for this species along belts of riparian habitat for several permanent creeks between Bishop and Lone Pine (Baker and Hogback Creek).

The western yellow-billed cuckoo requires dense, large tracts of riparian woodlands with well-developed understories for breeding (gallery forests). It occurs in deciduous trees and shrubs, especially willows which are required for roost and nest sites. During the breeding season, the yellow-billed cuckoo is restricted to river bottoms

Figure 10.2. Estimated range of the Yellow-billed cuckoo in California, based on data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

and other moist habitats along slow-moving watercourses where humidity is high. Willows are almost always a dominant component of the vegetation in southern California.

The western yellow-billed cuckoo is threatened by loss and degradation of its habitat due to land clearing, fire, flood control projects, surface water diversions and groundwater pumping, and overgrazing by livestock. Such disturbances often foster the establishment of invasive non-native plants such as tamarisk and Arundo. The resulting fragmentation reduces the size and quality of habitat for the cuckoo. Migration routes can also be lost or fragmented, thus affecting the ability of the cuckoo to recolonize habitat areas. One study showed that cuckoos were excluded from suitable habitat when the riparian stand was less than seven acres in size.

Western yellow-billed cuckoo have a NatureServe Global rank T2 (Imperiled Subspecies), a California rank S1 (Critically Imperiled), they are an ESA Threatened Species, a CESA Endangered Species (since 1971), a UFWS Bird species of Conservation Concern, and a BLM Sensitive Species.

Southwestern willow flycatcher. Willow flycatchers (*Empidonax traillii*) are a riparian obligate passerine that is associated with both riverine and meadow habitat. Willow flycatchers are present along the Lower Owens River within the ESNR Project area (Fig. 10.3). Green et al. (2021) reported that this species nests along the Owens River and Horton Creek in the Owens Valley. Migrating Southwestern willow flycatchers visit these sites as well as many other tributaries to both the Owens River and Mono Lake. Green et al. (2021) estimated that there are approximately 35 southwestern willow flycatcher territories in the Owens valley, representing about 5% of known southwestern willow flycatcher territories in California. There is a large breeding population in northern Inyo County along the Owens River from Pleasant Valley south to just south of Line Street in Bishop, CA (LADWP 2010).

Figure 10.3. Estimated range of the Willow flycatcher in California, based on data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

Habitat for this species includes riparian and wetland thickets, generally of willow, tamarisk, or both, sometimes boxelder or Russian olive (USFWS 2013). Habitat patches comprising mostly native vegetation account for fewer than half (44 percent) of the known southwestern willow flycatcher territories (Durst et al. 2008). Habitat patches as small as 0.5 hectares can support one or two nesting pairs (USFWS 1995). Nests are typically placed in trees where the plant growth is most dense, where trees and shrubs have vegetation near ground level, and where there is a low-density canopy (Theimer et al. 2016). Designated Critical habitat for southwestern willow flycatchers is located on a combination

of federal, state, tribal, and private lands in Inyo, Kern, Los Angeles, Riverside, Santa Barbara, San Bernardino, San Diego, and Ventura counties. Many southwestern willow flycatcher migrants occur in riparian habitats or patches (small areas of riparian vegetation) that would be unsuitable for nest placement (the vegetation structure is too short or sparse, or the patch of vegetation is too small). In these drainages, migrating flycatchers may use a variety of riparian habitats, including ones dominated by native or exotic plant species, or mixtures of both (USFWS 2013).

Although the southwestern subspecies designation has been supported by genetic, morphometric, and behavioral analyses, it is not possible to separate willow flycatcher subspecies from visual observations. All three subspecies (*E. t. extimus*, *E. t. adastus*, and *E. t. brewerii*) may be encountered within Inyo and Mono counties during migration, and the boundary between the breeding distributions of *E. t. extimus* and *E. t. adastus* is not well-defined (Theimer et al. 2016).

Historical decline for this species was due primarily to destruction and degradation of cottonwood-willow and structurally similar riparian habitats. The causes of habitat loss and change are water impoundment, water diversion and groundwater pumping, channelization and bank stabilization, riparian vegetation control, livestock grazing, off-road vehicle and other recreational uses, increased fires, urban and agricultural development, and hydrological changes resulting from these and other land uses. Tamarisk has replaced native riparian vegetation in many areas, with varying effects on flycatcher populations. Native riparian plant communities probably have a greater recovery value for flycatchers, but currently occupied and suitable tamarisk habitat should be maintained (USFWS 2002). Southwestern willow flycatchers have a NatureServe Global rank T2 (Imperiled Subspecies), a California rank S1 (Critically Imperiled), and are an ESA Endangered Species. Within California, all willow flycatcher subspecies were classified as endangered in 1991 and protected under the California Endangered Species Act (CESA), and in 1995, southwestern willow flycatcher was specifically identified as endangered and protected under the Federal Endangered Species Act (USFWS 2002).

Western snowy plover. The western snowy plover is a small shorebird distinguished from other plovers by its small size, pale brown upper parts, dark patches on either side of the upper breast, and dark gray to blackish legs. The CWHR Range Map for western snowy plover suggests this species is present in riparian/wetland/mud flat habitats associated with Owens Lake and Mono Lake, and a few other areas within the ESNR Project area (Fig. 10.4).

In western North America Snowy Plovers nest at interior alkaline lakes, on Pacific beaches, and in man-made evaporation ponds (Ruhlen et al. 2006). After the USFWS designated the Pacific coast population as threatened in 1993, breeding Snowy Plovers were monitored at many coastal sites (Powell et al. 2001; Ruhlen et al. 2003; Neuman et al. 2004) but at few interior ones. One of the few inland sites of regular censuses is Owens Lake, where breeding plovers were regularly observed between 1994 and 2006 (Ruhlen et al. 2006). Fisher (1893) provided the earliest account of the snowy plover at Owens Lake during the breeding season, describing it as “common” in small flocks of 5 to 10 on alkaline flats bordering the lake. A lakewide survey in 1978 documented around 500 breeding snowy plovers (Page et al. 1983), and follow-up surveys in 1988 and 1990 documented 195 and 141 adults, respectively (Page et al. 1995). The Owens lakebed has been subject to major alterations since 2001 resulting from a 1998 agreement between LADWP and the Great Basin Unified Air Pollution Control District to control dust that blows from the lakebed. Dust-control measures, include shallow flooding of sizable portions of the lakebed. The first area to be flooded was inundated in winter 2001–02; three additional ones followed in

winter 2002–03. This addition of water to large areas of formerly dry lakebed has improved availability of breeding habitat for snowy plovers at Owens Lake.

The Western snowy plover was listed by the U.S. Fish and Wildlife Service as threatened in 1993 due to low population and decreased habitat. The western snowy plover has a NatureServe Global rank G3 (Vulnerable), and no status rank in California.

Figure 10.4. Estimated range of the Snowy plover in California, based on data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

Table 10.2. California Natural Diversity Database records for bird species within the ESNR Project Area. All "S" Species Status rankings (S1, S2, S3, etc.) are based on NatureServe Explorer data (NatureServe Explorer; NatureServe 2021).

Organism, Species name	N	Most Recent	County	Elevation Range	Species Status; Notes
Cooper's hawk (*Accipiter cooperii*)	13	1992	Inyo	4480	S4
Northern goshawk (*Accipiter gentilis*)	13	1982	Mono	6640 to 7120	S3, CA SSC
Golden eagle (*Aquila chrysaetos*)	82	1987	Mono	4900	S3, BLM Sensitive, USFWS Protected
Long-eared owl (*Asio otus*)	2	1937	Inyo	3800 to 4000	S3, CA SSC
Burrowing owl (*Athene cunicularia*)	1	1891	Inyo	3930	S3, CA SSC, BLM Sensitive
Swainson's hawk (*Buteo swainsoni*)	114	2009	Both	3670 to 4900	S3, BLM Sensitive
Greater sage-grouse (*Centrocercus urophasianus*)	2	1987	Mono	6775	S2S3, CA SSC, BLM Sensitive
Mountain plover (*Charadrius montanus*)	17	2007	Inyo	3600 to 3880	S2S3, CA SSC, BLM Sensitive
Western snowy plover (*Charadrius nivosus nivosus*)	18	2004	Inyo	3600 to 3860	S3, CA SSC
Northern harrier (*Circus hudsonius*)	14	2003	Both	4500 to 6400	S3, CA SSC
Yellow-billed cuckoo (*Coccyzus americanus occidentalis*)	44	2012	Inyo	3800 to 4500	S1, BLM Sensitive
Yellow rail (*Coturnicops noveboracensis*)	15	1985	Mono	6500	S1S2, CA SSC, USFS Sensitive
	9	2004	Mono	6400 to 6800	S1S2, USFS Sensitive
Southwestern willow flycatcher (*Empidonax traillii extimus*)	32	2006	Inyo	3880 to 4370	S1
Prairie falcon (*Falco mexicanus*)	39	1982	Both	4400 to 7920	S4
Bald eagle (*Haliaeetus leucocephalus*)	3	1997	Inyo	3850	S3, BLM and USFS Sensitive
Yellow-breasted chat (*Icteria virens*)	28	1992	Inyo	3680 to 5100	S3, CA SSC
Least bittern (*Ixobrychus exilis*)	9	1992	Inyo	3560 to 3760	S2,CA SSC
California gull (*Larus californicus*)	2	2005	Mono	6410 to 6500	S4
Osprey (*Pandion haliaetus*)	13	2005	Both	3870 to 6350	S4
Black-backed woodpecker (*Picoides arcticus*)	2	2003	Mono	7300	S2
Summer tanager (*Piranga rubra*)	13	1992	Inyo	4480	S1,CA SSC
Bank swallow (*Riparia riparia*)	32	2013	Both	3920 to 6775	S2, BLM Sensitive
Yellow warbler (*Setophaga petechia*)	16	2003	Mono	6400	S3S4,CA SSC
Brewer's sparrow (*Spizella breweri*)	8	2003	Mono	6400	S4,
Least Bell's vireo (*Vireo bellii pusillus*)	5	1993	Inyo	3600 to 3720	S2,
Yellow-headed blackbird (*Xanthocephalus xanthocephalus*)	8	2003	Mono	6400	S3,CA SSC

Table 10.3. List of Special Status birds that may not be present in the ESNR Project Area based on no records for their presence in CNDDB records for the area. Additional investigation would be necessary, however, before excluding them from consideration or review when preparing planning analyses/documents**.**

Species	Status
American peregrine falcon (*Falco peregrinus anatum*)*	CA SWAP CFS, USFWS BCC
California spotted owl (*Strix occidentalis*)	BLM and USFS Sensitive, USFWS BCC
Chipping sparrow (*Spizella passerina*)	CA SWAP CFS
Common yellowthroat (*Geothlypis trichas*)*	CA SWAP CFS
Ferruginous hawk (*Buteo regalis*)	CA SWAP CFS, USFWS BCC
Great gray owl (*Strix nebulosa*)	CA Endangered, USFS Sensitive
Inyo California towhee (*Pipilo crissalis eremophilus*)	Federal Threatened, CA Endangered
Loggerhead shrike (*Lanius ludovicianus*)*	CA SWAP CFS
Mt. Pinos sooty grouse (*Dendragapus fuliginosus howardi*)	USFS Sensitive
Sage sparrow (*Artemisiospiza* spp)	CA SWAP CFS
Savannah sparrow (*Passerculus sandwichensis*)*	CA SWAP CFS
Short-eared owl (*Asio flammeus*)*	CA SWAP CFS, CA SSC
Vesper sparrow (*Pooecetes gramineus*)	CA SWAP CFS

Review of Special Status Birds in the ESNR Project Area

Review of Among the 41 species identified in Table 10.1 above, 13 are potentially not present in the Project area based on current available CNDDB records (Table 10.2, 10.3). Additional investigation and literature reviews would be needed, however, before concluding that these species are truly absent when preparing future planning documents in the Project Area. For example, recent studies by Heath and Ballard (2003a, b) conducted within the Project area documented presence of chipping sparrow, savannah sparrow, sage sparrow, vesper sparrow, and common yellowthroat.

Bank swallow. The bank swallow is the smallest North American swallow species, with a body length of about 4.75 inches. Bank swallows are a neotropical migrant found primarily in riparian and other lowland habitats in California west of the deserts during the spring-fall period. Bank swallows will have a limited spring to summer presence in the ESNR Project Area primarily along the Lower Owens River, and near both Crowley and Mono Lake (Fig. 10.5). Bank swallows are well known to fly through the Owens River Valley and through Mono Lake during their annual migration. The most popular birding hotspot is Crowley Lake with bank soils popular for nesting. Conservation concern in California is based on loss of their unique and limited breeding habitats; the species requires vertical banks and cliffs with fine-textured or sandy soils near streams, rivers, ponds, lakes, and the ocean for nesting. In summer, they are restricted to riparian, and lacustrine areas with vertical banks, bluffs, and cliffs with fine-textured or sandy soils, into which it digs nesting holes. Range in California is estimated to be reduced 50% since 1900 (CDFW 1989).

Bank swallows feed primarily over grassland, shrubland, savannah, and open riparian areas during breeding season and over grassland, brushland, wetlands, and cropland during migration. The birds build nests within two to three-foot deep burrows that are dug perpendicularly into near vertical earthen banks along streams, coastal bluffs, and sand and gravel pits. The most significant management

issue affecting the bank swallow in California is the direct loss of suitable colony sites through bank protection and flood control projects, particularly on the lower Sacramento and Feather Rivers, where an estimated 75 percent of California's bank swallow population occurs (Garrison et al. 1987; Garrison 1998). These projects destroy suitable nesting habitat by re-sloping the bank and placing riprap rock on the bank. Erosion is stopped and nesting habitat is destroyed. These stabilization actions are cited as the primary cause of the bank swallow's extirpation from southern California, as rivers and streams have been systematically paved and armored until virtually no free-flowing rivers remain. Channelization and stabilization of banks of nesting rivers, and other destruction and disturbance of nesting areas, are factors causing marked decline of bank swallows in California.

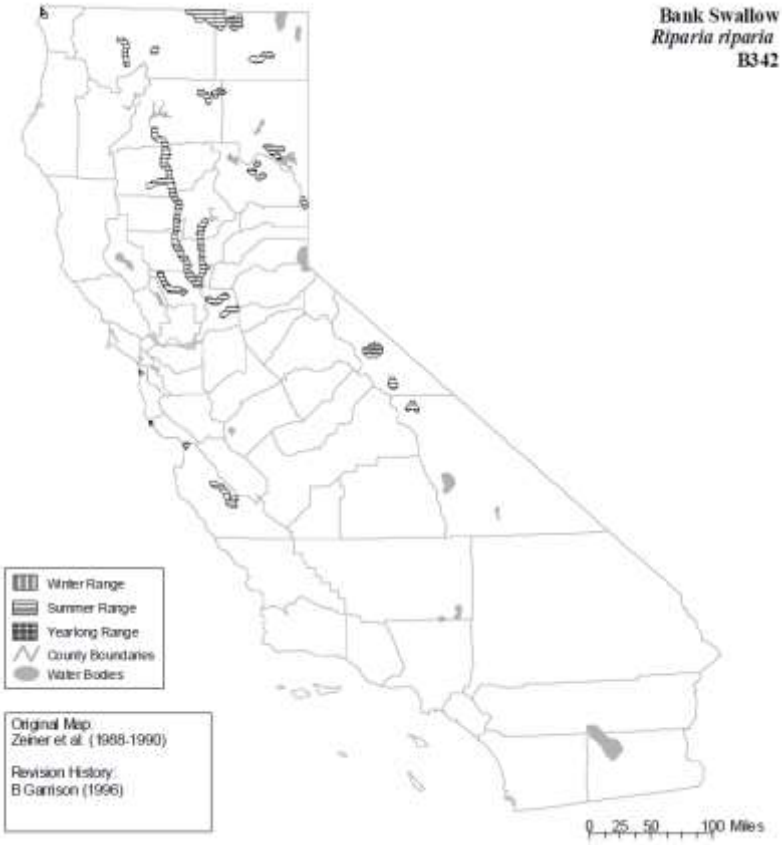


Figure 10.5. Estimated range of the Bank swallow in California, based on data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

The bank swallow has a NatureServe Global ranking of G5 (Secure), a California rank S2 (Imperiled; because of rarity and restricted range), they are listed as CESA Threatened (March 1989), and they are a BLM Sensitive Species and a CA SWAP Conservation Focal Species.

Northern goshawk. The goshawk is a Holarctic species, and the North American subspecies (*Accipiter gentilis atricapillus*) breeds throughout Alaska, Canada, and mountains of the western United States and Mexico, and winters sporadically to the central-eastern United States and northern Mexico (Squires and Reynolds 1997; AOU 1998). The range is relatively contiguous throughout North America. In California, the northern goshawk breeds locally in coniferous and mixed-coniferous forest regions in northwestern California (Del Norte and Humboldt counties) and across both sides of the Sierra Nevada range, generally at elevations of 4,600-10,000 ft, south to Tulare and Mono Counties (Bloom et al. 1985). Northern goshawk are present across most of the ESNR Project Area (Fig. 10.6).

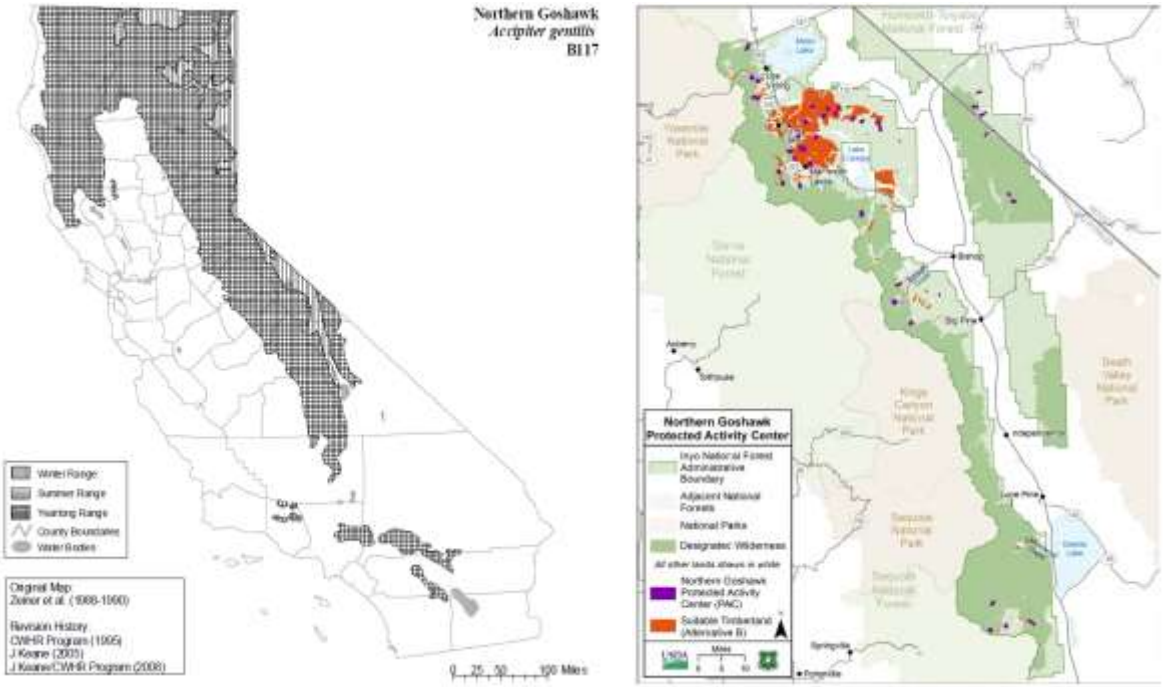


Figure 10.6. Estimated range of the Northern goshawk in California (CWHR data, Left), and observation records/Protected Activity Centers for the species in the Inyo NF (USDA 2018, Right).

Northern goshawk is considered locally uncommon as a breeding and wintering species in California (Bloom et al. 1985; Gaines 1992; Small 1994; Woodbridge and Detrich 1994; Bezener and Fix 2000; Keane 2008). Population size of northern goshawk based on Breeding Bird Survey data from 1998-2007 is estimated at 7,000 individuals in California, with 1,300 in the Sierra Nevada (PIF 2013). Northern goshawk Breeds in North Coast Ranges through Sierra Nevada, Klamath, Cascade, and Warner Mts., in Mt. Pinos and San Jacinto, San Bernardino, and White Mts. Remains yearlong in breeding areas as an uncommon resident. Prefers middle and higher elevations, and mature, dense conifer forests. Casual in winter along north coast, throughout foothills, and in northern deserts, where it may be found in pinyon-juniper and low-elevation riparian habitats. Hunts in wooded areas. Uses snags and dead-topped trees for observation and prey-plucking perches. Feeds mostly on birds, from robin to grouse in size. Small mammals, of squirrel and rabbit size, often taken. In California, northern goshawks typically nest in areas of high canopy cover, with large trees and old forest characteristics. However, results from goshawk nest site studies have shown geographic differences in canopy cover. In eastern California for example, northern goshawks nested in stands that were more open than found in northwestern or northern California (Hargis 1994). Suitable stands occur in a broad range of conifer and conifer-hardwood types, including ponderosa, Jeffrey, and lodgepole pine, mixed conifer, white and red fir, Douglas-fir, mixed redwood–Douglas-fir–hardwood, less common in quaking aspen and in pinyon-juniper (Gaines 1992). Nest areas are often on moderate slopes or benches, and have open understories.

The northern goshawk has a NatureServe Global ranking of G5 (Ssecure), a State rank S3 (Vulnerable), a California Bird Species of Special Concern, and it is a BLM and USFS Sensitive species.

Great gray owl. Nearly all great gray owls are found in or near meadows within forest habitats. Forests surrounding meadows require a high density of large diameter snags for nests and a high canopy closure to provide cover and a cooler sub-canopy microclimate. The range of the Great gray owl is outside and above the elevation range of the ESNR Project area (Fig. 10.7). Great gray owls are mainly distributed in the scattered meadow-mature forest zone on the west slope of the central Sierra Nevada. California Endangered; apparently the rarest owl in California. A rarely seen resident at 4,500 to7,500 ft in the Sierra Nevada from the vicinity of Quincy, Plumas Co. south to the Yosemite region. Most recent records are from the Merced and Tuolumne River drainages of Yosemite National Park. Occasionally reported in northwestern California in winter, and in Warner Mts. in summer (1990). Breeds in old-growth red fir, mixed conifer, or lodgepole pine habitats, always in the vicinity of wet meadows. Recent studies suggest a population decline; there may be fewer than 50 pairs remaining in California (Grinnell and Miller 1944, Winter 1986) Forages in wet meadows and nests and roosts in nearby dense coniferous forest. Both old-growth and second-growth forest used if suitable and available (Winter 1982).

Figure 10.7. Estimated range of the Great gray owl in California, based on data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

Although no yet officially recognized, a new subspecies for the great gray owl has been proposed in the Sierra Nevada based on data that demonstrates genetic distance from other geographic populations. The proposed subspecies is *Strix nebulosa yosemitensis* (Hull et al. 2014). Great gray owls outside the Sierra Nevada are most likely *Strix nebulosa nebulosa*.

Great gray owls nest in conifer dominated habitats including montane hardwood conifer at lower elevations to Sierran mixed-conifer, white fir, red fir and lodgepole pine at higher elevations (Wu et al. 2016). Breeding sites are frequently closely associated with meadows (Winter 1986; Greene 1995; Sears 2006; van Riper and Wagtendonk 2006; Keane 2011), but some have been located up to 750 meters (2,460 feet) from the nearest meadow (Wu et al. 2015). They prefer dense canopy cover (Greene 1995; Wu et al. 2015) and high densities of large snags (Sears 2006; Wu et al. 2015). Great gray owls generally winter at lower elevations and use a variety of habitats including grassland, meadow, riparian areas, hardwood conifer and conifer forested habitats (van Riper and Wagtendonk 2006; Jepsen et al. 2011). They forage almost exclusively on gophers and voles, but take other prey in lesser quantities such as deer mice, moles, shrews, beetles, squirrels, chipmunks and alligator lizards (Winter 1986; Bull et al.

1989). Threats to persistence of great gray owls include small population size, meadow and adjacent forested habitat degradation or loss from fires and management practices (e.g., livestock grazing and timber harvest), vehicle strikes, climate change and disease. The great gray owl population in California is at risk because it is very small (Hull et al. 2010). Small populations are more susceptible to inbreeding, population bottleneck and founder effects. Habitat degradation from livestock grazing and timber harvest are considered significant threats to great gray owl persistence (Wu et al. 2016). Livestock grazing can result in the removal of vegetative cover required by critical prey species (Beck and Winter 2000). Other secondary effects of grazing include lower water tables, lower meadow vegetative diversity and increased soil compaction or erosion (Fleischner 1994; Belskey et al. 1999), which degrade habitat for prey species (Torre 2007; Rickart 2013).

The great gray owl has a NatureServe Global rank of G5 (secure), a California State rank S1 (critically imperiled), is recognized as a California species of greatest conservation concern, and is listed as endangered under the California Endangered Species Act. The great gray owl is also a Region 5 Forest Service sensitive species.

Burrowing owl. Burrowing owl have a widespread distribution in North America and in California (Fig. 10.8). This owl will be present over most of the ESNR Project Area where habitat is suitable (Fig. 10.8). Although burrowing owls occur across most of the Mojave and Colorado deserts of Inyo, eastern Kern, northern Los Angeles, San Bernardino, eastern Riverside, eastern San Diego, and Imperial counties (Gervais et al. 2008), Garrett and Dunn (1981) described the species as "quite scarce" from Inyo County south through the eastern Mojave Desert. Burrowing owls have been observed as high as 5,300 ft in Lassen County in northern California. Burrowing owls area a yearlong resident of open, dry grassland and desert habitats, and in grass, forb and open shrub stages of pinyon-juniper and ponderosa pine habitats. This owl was formerly common in appropriate habitats throughout the state, excluding the humid northwest coastal forests and high mountains. Numbers have been markedly reduced in recent decades; conversion of grassland to agriculture, other habitat destruction, and poisoning of ground squirrels have contributed to the reduction in burrowing owl numbers in recent decades, which was noted in the 1940s, and earlier (Grinnell and Miller 1944; Zarn 1974a; Remsen 1978). Predators include prairie

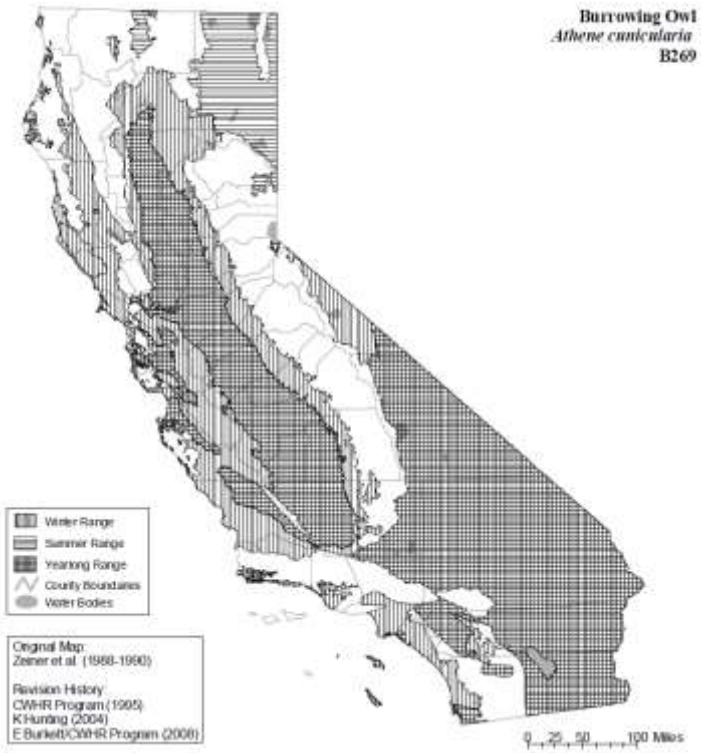


Figure 10.8. Estimated range of the Burrowing owl in California, based on data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

falcons, red-tailed hawks, Swainson's hawks, ferruginous hawks, northern harriers, golden eagles, foxes, coyotes, and domestic dogs and cats (Martin 1973). Fleas, lice, and feather mites are common ectoparasites. Collisions with autos may be a significant cause of mortality.

Burrowing owl declines in western states are due to loss of native grassland and shrub-steppe habitats, and eradication/reduced populations of burrowing mammals such as ground squirrels (*Spermophilus* spp), yellow-bellied marmots (*Marmota flaviventris*), and American badgers (Conway and Pardieck 2006). The primary threat is habitat loss (e.g., due to intensive agriculture, but also urbanization), habitat degradation (e.g., via control of burrowing mammals), and habitat fragmentation (Dundas and Jensen 1995). Burrowing owl has a NatureServe Global rank G4 (Apparently Secure), a State rank S3, is CA Species of Special Concern, and they are a BLM Sensitive Species.

Bald Eagle. Bald eagles occupy various woodland, forest, grassland, and wetland habitats. They winter throughout most of California at lakes, reservoirs, rivers, and some rangelands and coastal wetlands. Current range data indicate that the Bald eagle is either seasonally present or year-round present in the ESNR Project area; the species will most often be present near fish-bearing lakes, streams, and along the Owens River (Fig. 10.9). The breeding range is mainly in mountainous habitats near reservoirs, lakes and rivers. Nesting territories are found mostly in the northern half of the State, and also in the southern Sierra Nevada, Central Coast Range, inland southern California south to Riverside County, and on Santa Catalina Island. Permanent resident, and uncommon winter migrant, now restricted to breeding mostly in Butte, Lake, Lassen, Modoc, Plumas, Shasta, Siskiyou, and Trinity counties. About half of the wintering population is in the Klamath Basin. Bald eagles are more common at lower elevations, and they are not typically found at high elevations in the Sierra Nevada. Fairly common as a local winter migrant at a few favored inland waters in southern California. Largest numbers occur at Big Bear Lake, Cachuma Lake, Lake Mathews, Nacimiento Reservoir, San Antonio Reservoir, and along the Colorado River. Requires large bodies of water, or free flowing rivers with abundant fish, and adjacent snags or other perches. Swoops from hunting perches, or soaring flight, to pluck fish from water. Will wade into shallow water to pursue fish. P Requires large, old-growth trees or snags in remote, mixed stands near water. Territories have been abandoned after disturbance from logging, recreational development, and

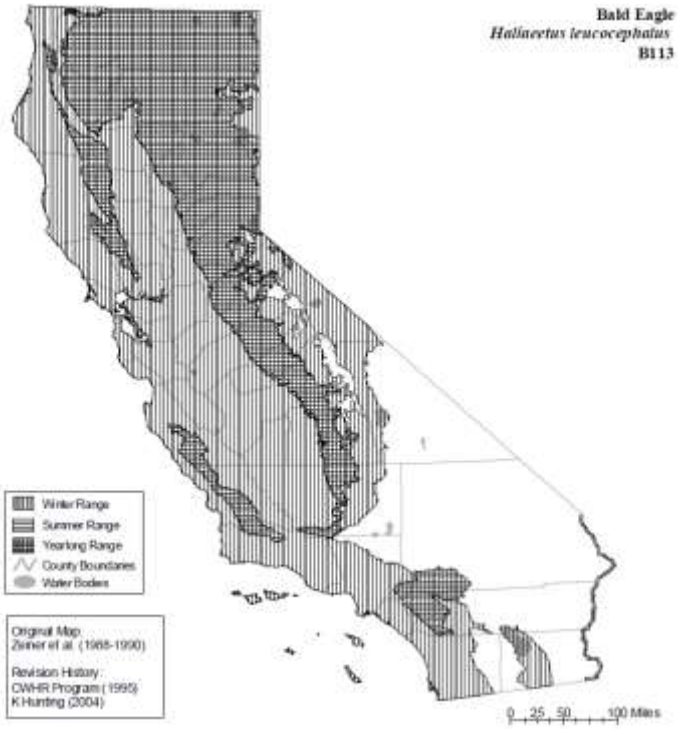


Figure 10.9. Estimated range of the Bald eagle in California, based on data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

other human activities near nests (Thelander 1973). Bald eagles may be present, but nesting is usually not initiated if human disturbance is evident in an area.

The CDFW has coordinated annual, statewide breeding surveys since 1973. The breeding population continues its long-term increase in numbers and in range, although adequate documentation of these changes has not been made since 1999. Efforts by DFG to obtain statewide data declined after 1997, and have been replaced mainly with voluntary reporting by local observers. Status: Increasing number of territories and an expansion in the range in the state.

Threats to habitat include any source of extensive tree mortality within suitable nesting and perching habitat adjacent to large lakes and rivers that support bald eagle food supplies. High-severity fire can eliminate large tree nesting and perching habitat. Extensive tree mortality caused by insects and diseases also removes suitable habitat. Additional threats to habitat include degradation of aquatic habitats that affect fish populations that serve as the bald eagle's primary food source. Exceptional drought conditions can increase tree mortality as well as reduce reservoir levels and prey availability. Climate change could potentially accelerate the rate at which habitat is lost. A variety of human activities can potentially interfere with bald eagles, affecting their ability to forage, nest, roost, breed or raise young. Territories have been abandoned after disturbance from logging, recreational developments and other human activities near nests (Zeiner et al. 1990a).

The bald eagle has a NatureServe Global ranking of G5 (Secure), a State rank S3 (Vulnerable). The bald eagle was listed as Endangered by the USFWS on March 11, 1967 and down-listed to Threatened on July 12, 1995. The bald eagle was federally de-listed on August 8, 2007. The bald eagle is currently protected under the Bald and Golden Eagle Protection Act of 1940, and remains listed as CESA Endangered in California.

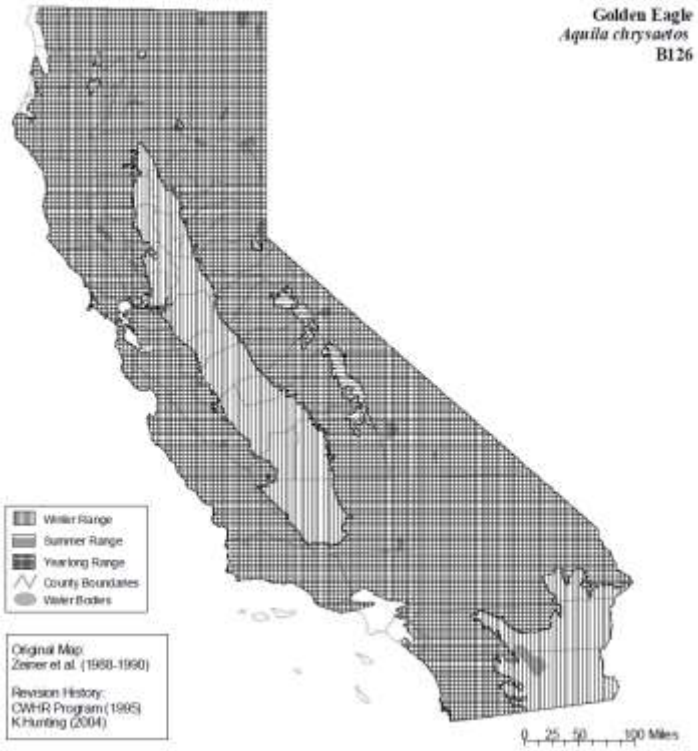


Figure 10.10. Estimated range of the Golden eagle in California, based on data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

Golden Eagle. The golden eagle is an uncommon permanent resident and migrant throughout California, except in the Central Valley. Current range data indicate that the Golden eagle is either seasonally present or year-round present in the ESNR Project area, where they will be most common in upland habitats (Fig. 10.10). Golden eagles range from sea level up to 11,500 ft (Grinnell and Miller 1944). Habitat is typically rolling foothills, mountain areas, sage-juniper flats, and desert. Some

golden eagles migrate into California for winter. This eagle occasionally preys on domestic calves and lambs, and may compete with ferruginous hawks for small mammals, and with California condors for carrion. May desert nest in early incubation if disturbed by humans (Thelander 1974).

Population declines for golden eagles in the early 1900s was primarily due to eradication campaigns that were encouraged by the use of bounties (recall that this eagle will occasionally prey on livestock). Golden eagles are extremely susceptible to powerline electrocution because the wings can span phase-to-phase or phase-to-ground wires (Biosystems Analysis 1989); modifications have been made in problem areas. Other threats include ingestion of poison intended for coyotes; ingestion of toxic water from mining activities; occasional shootings; habitat loss to agriculture, suburban land uses, and energy development; loss of potential food resources as a result of habitat degradation or rodent/rabbit control; mortality in inappropriately designed stock tanks, and collisions with structures and with vehicles on roadways. Human disturbance or activity may cause nest abandonment, render a nest site less productive, or prevent a suitable nest site from being utilized, but direct disturbance of nests appears to be infrequent (GBBO 2010).

The Golden eagle has a NatureServe Global rank G5 (Secure), a State rank (S3 (Vulnerable), and is a BLM Sensitive Species and a CA SWAP Conservation Focal Species.

Inyo California towhee. The range of the California towhee does not overlap with the Eastside Sierra Nevada Project area (Fig. 10.11). The Inyo California towhee is a medium-sized dull gray-brown bird with a moderately long, dark tail and a short, thick, and pointed bill. It is an isolated subspecies of the California towhee in the southern Argus Mountains of Inyo County. The species is restricted to dense riparian vegetation composed of willow, Fremont cottonwood, and desert olive in the southern Argus Mountains of Inyo County. This subspecies requires areas of dense riparian habitat to provide nesting substrate, protection from predators, and shade from the desert sun. Adjacent creosote bush habitat is their principal foraging ground and also provides nesting habitat. Its nearest relative is the California towhee whose range extends into the Sierra Nevada. Differences in wing and tail length, bill length, and length of the middle toe separate the Inyo California towhee from related subspecies. The

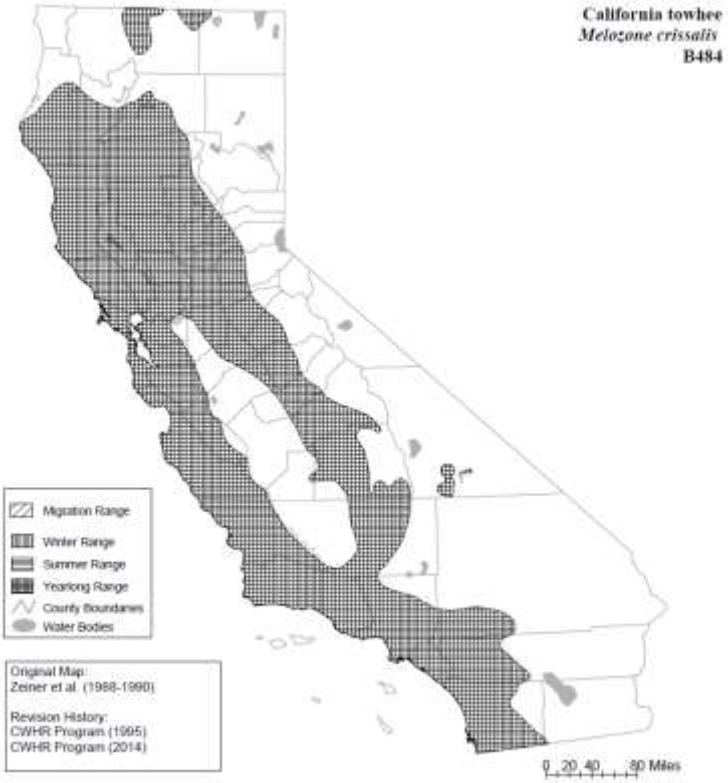


Figure 10.11. Estimated range of the California towhee in California, based on data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

spotted towhee also occurs with the Inyo California towhee. The reasons for the historical population decline were habitat loss and degradation from animal grazing, recreational use, water diversion, and mining. Conservation measures by NAWS China Lake and BLM have reduced or eliminated grazing, recreational use, water diversions, and mining throughout most of the towhee's range. The towhee and its habitat are expected to continue to be protected through ongoing conservation measures and existing regulations; and protection of riparian corridors (USFWS 1987; CDFW 1990).

The Inyo California towhee is threatened by loss and degradation of its habitat due to water diversions at springs, OHV activity, recreational use of its riparian habitat, grazing by feral burros, military activities, rural development, and mining. For example, willows were routinely burned around springs as recently as the 1970s to improve access for bighorn sheep. Habitat degradation further creates conditions favorable to colonization by species, such as carrizo and tamarisk, which are not used by the towhee. Critical habitat was designated for this species in 1987. It consists of several springs, associated riparian corridors, and adjacent creosote bush scrub habitat. Approximately 68 percent of its habitat occurs within the China Lake Naval Air Weapons Station (NAWS). The remaining habitat is on lands managed by BLM and DFG.

The Inyo California Towhee has a NatureServe Global rank T2 (Imperiled Subspecies), State rank S2 (Imperiled), is ESA Threatened, CESA Endangered, and is a CA SWAP Conservation Focal Species.

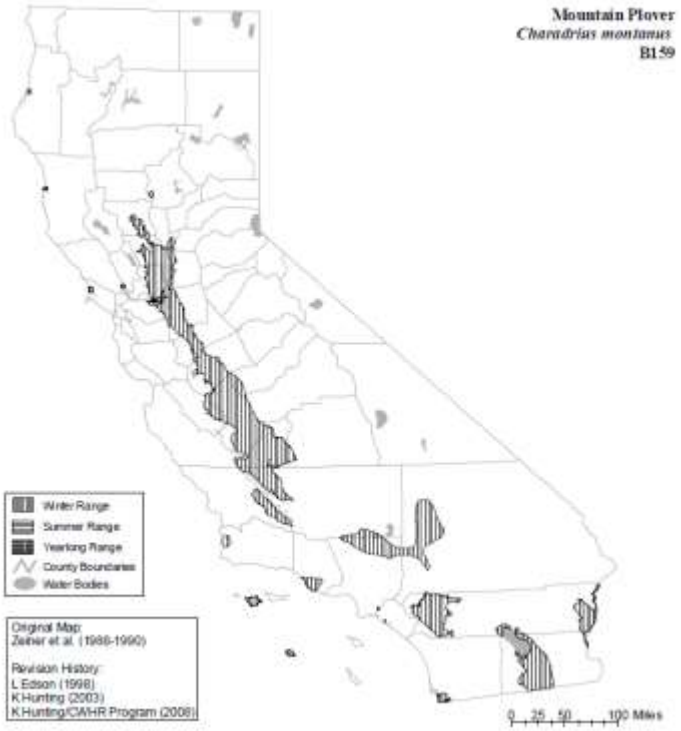


Figure 10.12. Estimated range of the Mountain plover in California, based on data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

Mountain Plover. The Mountain Plover is a medium-sized, plain buffy plover that favors flat open areas with little or no vegetation; plain whitish underparts with no breast band. The estimated range of the Mountain plover does not indicate significant overlap with the ESNR Project area (Fig. 10.12). The mountain plover is a key species for conservation. Due to a number of factors, including habitat loss, the bird's numbers have been dropping precipitously in recent years. A survey conducted by Audubon California and the USFWS in 2020 suggested a steep decline. This species is a California winter resident from September through March; found on short grasslands and plowed fields of the Central Valley from Sutter and Yuba counties southward. Winters below 3200 ft. Mountain plover avoids high and dense cover, uses open grasslands, plowed fields with little vegetation, and open sagebrush areas. Often roosts in depressions such as ungulate hoof prints and plow furrows (Knopf and Rupert 1995). In southern California, wintering birds preferred heavily grazed native rangelands; they used burned fields primarily

for night roosting. Alkali flats were the most favored habitat, where available. At all seasons, mountain plovers are strongly associated with short-grass prairie habitats, or their equivalents, that are flat and nearly devoid of vegetation (Graul and Webster 1976; Knopf and Rupert 1995).

Mountain plover has a NatureServe Global rank G3, a California State rank S2? (Imperiled, but uncertain), and it is a California Special Status Species.

Bell's Vireo. Bell's vireo was formerly a common and widespread summer resident below about 2000 ft in the western Sierra Nevada, but its current range will not overlap with the ESNR Project area (Fig. 10.13). Bell's vireo has declined drastically or vanished entirely throughout California range in recent decades, apparently from cowbird parasitism and habitat destruction and degradation (Goldwasser et al. 1980). Bell's vireo is a summer resident below about 2000 ft in willows and other low, dense valley foothill riparian habitat and lower portions of canyons and along the western edge of the deserts in desert riparian habitat. Bell's vireo (race uncertain) also breeds in at least 2 sites along Amargosa River near Tecopa, Inyo County (Gaines 1977c; Garrett and Dunn 1981). This bird is usually found near water, but also inhabits thickets along dry, intermittent streams. Inhabits low, dense riparian growth along water or along dry parts of intermittent streams. Typically associated with willow, cottonwood, baccharis, wild blackberry, or mesquite in desert localities. As a seasonal migrant, Bell's vireo usually arrives to California from Mexican wintering areas by end of March, and departs by the end of August.

Bell's vireo has a NatureServe Global rank T5 (Imperiled subspecies), a State rank S2 (Imperiled), and is ESA and CESA Endangered in California.

Gray Vireo. Gray vireo is an uncommon, local, summer resident in arid pinyon-juniper, juniper, and chamise-redshank chaparral habitats from 2,000 to 6,500 ft in the mountains of Southern California. Gray vireo will not have a presence within the ESNR Project Area (Fig. 10.13). The species was formerly more widespread, breeding west to Walker Pass, Kern County in northern and the western foothills of the San Gabriel Mountains, and at many additional localities in San Bernardino, Riverside and San Diego countiue. (Grinnell and Miller 1944; Garrett and Dunn 1981). Field work is needed to document the extent and causes of the decline of this

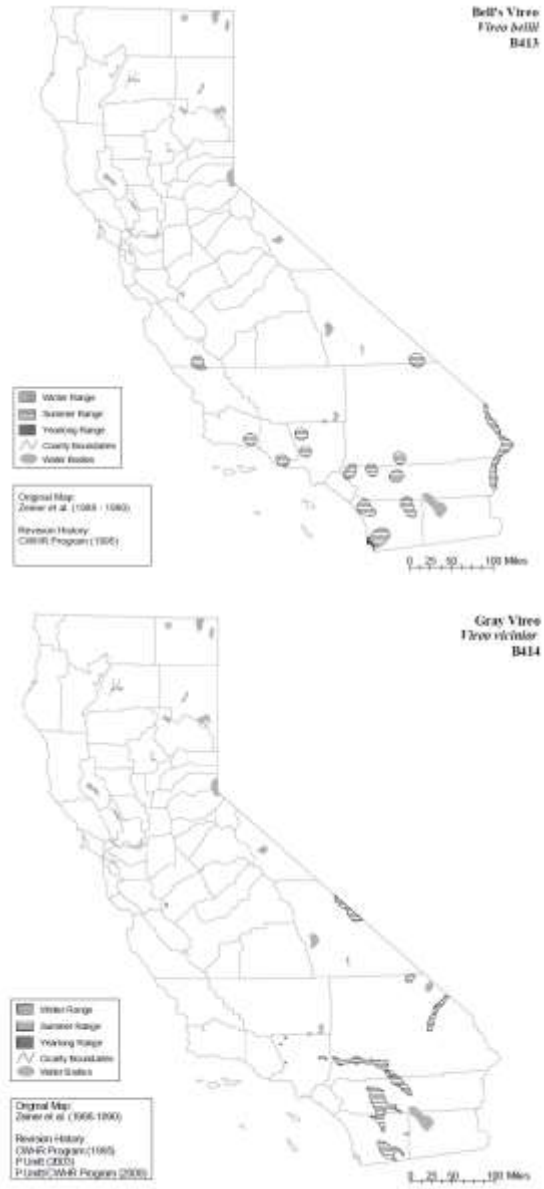


Figure 10.13. Estimated ranges of the Bell's vireo (top), and Gray vireo (bottom) in California, based on data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

species (Garrett and Dunn 1981). Breeding gray vireo frequent arid, shrub-covered slopes with sparse to moderate cover and scattered small trees. In San Diego County, gray vireo usually used oaks; elsewhere commonly junipers, pinyon pines, chamise, and other chaparral. Study of habitat requirements for the species is needed, and it appears absent from many areas of seemingly suitable habitat. Reasons for population decline in recent decades in California unclear. A frequent host to brown-headed cowbirds (Friedmann 1963), which may be a major cause of the decline (Remsen 1978).

Gray vireo has a NatureServe Global rank G5 (secure), a State rank S2 (Imperiled), is a BLM and USFS Sensitive Species, and is a CA SWAP Conservation Focal Species.

Prairie Falcon. This accipter is an uncommon permanent resident that ranges from southeastern deserts northwest throughout the Central Valley and along the inner Coast Ranges and Sierra Nevada. Prairie falcons will occupy most parts of the ESNR Project area year-round (Fig. 10.14). Distributed from annual grasslands to alpine meadows, but associated primarily with perennial grasslands, savannahs, rangeland, some agricultural fields, and desert scrub areas. Prairie falcon is not found in upper elevations of the Sierra Nevada. Denton (1975) reported that 76% of prairie falcon eyries had water within 0.25 miles (0.4 km). Prairie falcon uses open terrain for foraging, and nests in open terrain with canyons, cliffs, escarpments, and rock outcrops. Migrants from the north winter in California. Some residents wander upslope in summer and downslope for winter. The prairie falcon has a NatureServe Global rank G5 (Secure), a State rank S4 (Apparently Secure), and is both a USFWS Bird of Conservation Concern and a CA SWAP Conservation Focal Species.

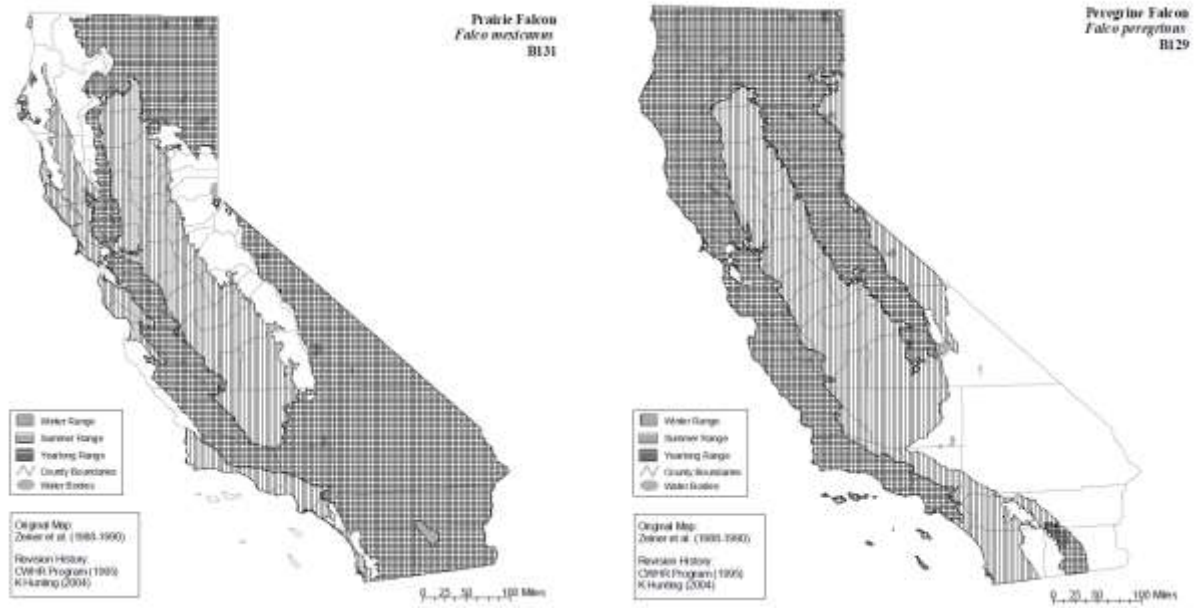


Figure 10.14. Estimated ranges of the Prairie falcon (left) and Peregrine falcon (right) in California, based on data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

Peregrine Falcon. Peregrine Falcons breed throughout North America and the world (White et al. 2002). Three subspecies occur in California. Peregrine falcons are most likely to be present in the Project area only in winter (Fig. 10.14). Two subspecies migrate through or winter in California: Peale's

peregrine falcon (*F. p. pealei*) breeds along the Pacific Northwestern coast from Alaska to Washington and winters south to Baja California, and the Arctic peregrine falcon (*F.p. tundrius*) breeds in the Arctic tundra and winters from Mexico to South America (White et al. 2002). The American peregrine falcon, while mainly a California resident, may also experience short-range migrations and dispersal in response to seasonal availability of prey resources (primarily waterfowl and other waterbirds (Earnheart-Gold and Pyle 2001; White et al. 2002).

Peregrine falcons breed and forage across a wide range of habitats in California, including hardwood or conifer forests, chaparral or other shrublands, grasslands, and urban areas, though no habitat type appears to be preferred (White et al. 2002). Active nesting sites are known along the coast north of Santa Barbara, in the Sierra Nevada, and in other mountains of northern California. Riparian areas and coastal and inland wetlands are important habitats yearlong, especially in nonbreeding seasons. Requires protected cliffs and ledges for cover. Usually breeds and feeds near water; frequents bodies of water in open areas with cliffs and canyons nearby for cover and nesting. There are currently relatively few threats to peregrine falcons or their habitats. The opportunistic use of widespread habitats for nesting helps mitigate against effects of disturbance or anthropogenic changes to remote nesting sites, although low-level disturbance from rock-climbing activities has been documented (White et al. 2002). The peregrine falcon has a NatureServe Global ranking of G4 (Apparently Secure), a California State ranking of S3S4 indicates uncertainty about its status in the California (Vulnerable or Apparently Secure), and it is both a USFWS Bird of Conservation Concern and a CA SWAP Conservation Focal Species.

Long-eared owl. Long-eared owl is an uncommon yearlong resident throughout the state except the Central Valley and Southern California deserts where it is an uncommon winter visitor. ESNR will occupy most parts of the ESNR Project Area but a low density (Fig. 10.15). This owl frequents dense, riparian and live oak thickets near meadow edges, and nearby woodland and forest habitats, and is also found in dense conifer stands at higher elevations. Resident populations in the state have been declining since the 1940s, especially in southern California (Grinnell and Miller 1944, Remsen 1978). Shuford and Fitton (1998) suggested populations of are still abundant in the Great Basin regions of California. All reasons for decline not known, but destruction and fragmentation of riparian habitat and live oak groves have been major factors (Remsen 1978). Eats mostly voles and other rodents, occasionally birds, including smaller owls, and other vertebrates. Usually hunts in open areas, occasionally in woodland and forested habitats. Cover habitats for long-eared owl are riparian or other thickets with small, densely canopied trees needed for roosting and nesting. Breeds from valley foothill hardwood up to ponderosa pine habitats.

Long-eared owl has a NatureServe Global ranking of G5 (Secure), a California State rank S3 (Vulnerable), and it is a CA SWAP Conservation Focal Species.

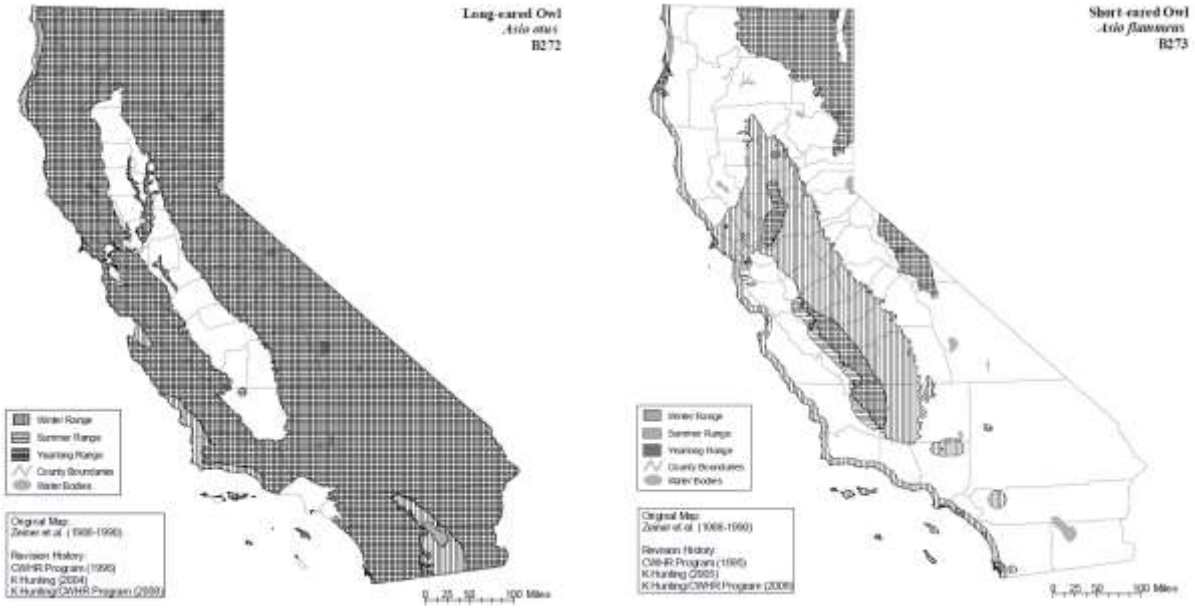


Figure 10.15. Estimated ranges of the Long eared owl (left) and Short-eared owl (right) in California, based on data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

Short-eared owl. Short-eared owls will occur in the northern portion of the Project area around Crowley Lake, Glass Mountain, and Mono Lake (Fig. 10.15). These owls are a winter migrant, found primarily in the Central Valley, in the western Sierra Nevada foothills, and along the coastline. Habitat patterns; usually occurs in open areas with few trees, but with elevated sites for perches (fence posts, mounds, rock outcroppings), and dense vegetation is needed for cover when roosting and nesting such as annual and perennial grasslands, prairies, dunes, meadows, irrigated lands, and saline and fresh emergent wetlands (Grinnell and Miller 1944). Occasionally still breeds in northern California (McCaskie et al. 1988). Breeding range includes the east side of the Sierra Nevada from Lake Tahoe south to Inyo County, and the San Joaquin valley. Numbers have declined over most of the range in recent decades because of destruction and fragmentation of grassland and wetland habitats, and grazing (Remsen 1978). Feeds primarily on voles and other small mammals (Bent 1938; Earhart and Johnson 1970). Other birds are an important food source in coastal wintering areas, and in nesting season. Also eats reptiles, amphibians, and arthropods.

Short-eared owl has a NatureServe Global ranking of G5 (Secure), a California State rank S3 (Vulnerable), and it is a CA SWAP Conservation Focal Species.

Brewer's sparrow. A common summer resident and breeder east of the Cascade-Sierra Nevada crest, in mountains and higher valleys of Mojave Desert, and will likely be present in the ESNR Project area during summer only (Fig. 10.16). Breeds in treeless shrub habitats with moderate canopy, especially in sagebrush. Now mostly absent from former breeding grounds in southwestern California (Garrett and Dunn 1981). Breeds locally above pinyon-juniper belt (McCaskie et al. 1979), and apparently on western slope of Sierra Nevada (Verner and Boss 1980). Common in winter in open desert scrub and cropland habitats of southern Mojave and Colorado deserts, usually in areas with some herbaceous understory. Occurs as a rare fall transient west of Sierra Nevada, and as an uncommon fall transient and rare spring

transient in southern coastal districts (Grinnell and Miller 1944; McCaskie et al. 1979; Garrett and Dunn 1981). In summer, Brewer's sparrow often finds cover in sagebrush in extensive stands with moderate canopy unbroken by trees, usually 1.5-4.0 ft in height. Similar shrub habitats, such as bitterbrush, are used to a lesser extent. Breeds in extensive shrub stands with moderate canopy, especially sagebrush. Winters in open desert scrub and similar habitats, plains, and fields.

Brewer's sparrow has a NatureServe Global ranking of G5 (Secure), a California State rank S3 (Vulnerable), and it is both a USFWS Bird of Conservation Concern and a CA SWAP Conservation Focal Species.

Figure 10.16. Estimated range of the Brewer's sparrow in California, based on data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

Yellow-breasted chat. Yellow-breasted chat (YB chat) is an uncommon summer resident and migrant in coastal California and in foothills of the Sierra Nevada, and will likely be present in the Lower Owens River region of the ESNR Project area during summer only (Fig. 10.17). Found up to about 4800 ft in valley foothill riparian, and up to 6500 ft east of the Sierra Nevada in desert riparian habitats (Gaines 1977b, DeSante and Ainley 1980, Garrett and Dunn 1981). In southern California, YB chat breeds locally on the coast and very locally inland (Garrett and Dunn 1981). In migration, this bird may be found in lower elevations of mountains in riparian habitat (McCaskie et al. 1979). YB chat numbers have been much reduced in recent decades (Remsen 1978). As a seasonal migrant, this species usually arrives in April and departs by late September for wintering grounds in Mexico and Guatemala. Habitats include dense, brushy thickets and tangles near water, and thick understory in

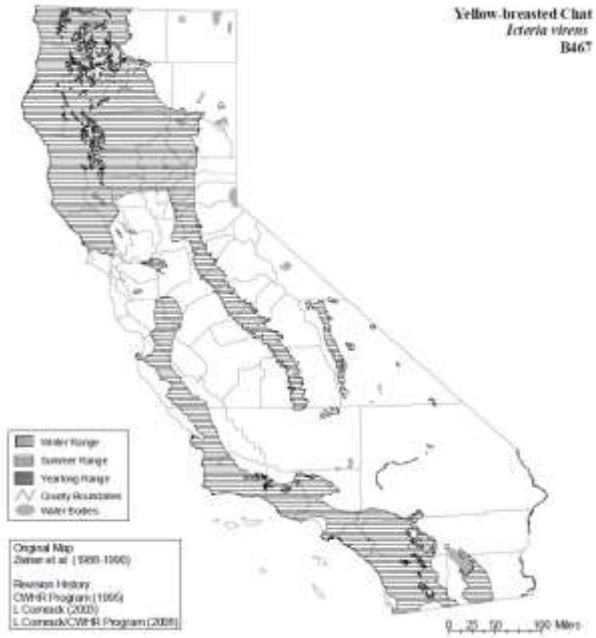


Figure 10.17. Estimated range of the Yellow-breasted chat in California, based on data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

riparian woodland. Yellow-breasted chat has a NatureServe Global rank G5, and State rank S3, and is a CDFW Species of Special Concern.

Summer tanager. Summer tanager will be very uncommon or absent from the Project area in all seasons (Fig. 10.18). The summer tanager has three recognized subspecies occurring in central and eastern North America, east-central Arizona, and elsewhere in southwestern North America (Robinson 1996). The southwestern subspecies (*P. r. cooperi*) breeds locally in California and southern Nevada, primarily along the Colorado River but also in very isolated riparian patches west and north to Santa Barbara, Kern, and Inyo counties (Grinnell and Miller 1944, Hargrove et al. 2014). Summer tanagers in California breed primarily in riparian forests and river bottoms dominated by cottonwoods (*Populus fremontii*), non-native salt-cedar (*Tamarix)*, and other riparian tree species (Rosenberg et al. 1991; Robinson 1996, Unitt 2008). Summer tanager is currently regarded as a rare to locally uncommon species in California (Small 1994). Extensive surveys for breeding summer tanagers during the 1980s-2000s estimated a total known breeding population of only about 100 pairs for the state of California (Unitt 2008).

Figure 10.18. Estimated range of the Summer tanager in California, based on data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

Summer tanagers are much less common now than in the 1940s, primarily because of loss and fragmentation of mature cottonwood and willow stands, especially along the Colorado River (Grinnell and Miller 1944; Remsen 1978). The greatest threat to the persistence of summer tanagers in California is the removal, degradation, or loss of riparian forest. The heat-moderating qualities of cottonwoods and willows are critical for nesting success. The summer tanager has a NatureServe Global rank of G5, a State rank of S1 (Critically imperiled; California State rank is driven by the population decline along the Colorado River, their historic breeding range), and is also recognized as a CDFW Species of Special Concern and a CA SWAP Conservation Focal Species.

Ferruginous hawk. This hawk is a common winter resident and migrant at lower elevations and open grasslands in the Modoc Plateau, Central Valley, and Coast Ranges. Ferruginous hawks will occur across all of the ESNR Project area during the winter season (Fig. 10.19). Ferruginous hawks occur at lower elevations around the Sierra Nevada periphery in annual grasslands and pastures and may be fairly common locally in valley locations south to Owens Valley, principally in winter. Frequents open grasslands, sagebrush flats, desert scrub, low foothills surrounding valleys, and fringes of pinyon-juniper habitats. Ferruginous hawks typically occur where there are large, open tracts of grasslands, sparse shrub, or desert habitats with elevated structures for nesting. Seasonally, ferruginous hawks generally arrive in California in September and departs by mid-April. Competes with the numerous avian and mammal species that prey upon small mammals. Urban development may contribute to loss of suitable

wintering habitat in California. Ferruginous hawks have a Global G4 (Secure), a State rank S3S4 (Vulnerable but Apparently secure), and they are a USFWS Bird Species of Conservation Concern and a CA SWAP Conservation Focal Species.

Northern harrier. Northern harriers occur from annual grassland up to lodgepole pine and alpine meadow habitats, as high as 10,000 ft. Breeds from sea level to 5,700 ft in the Central Valley and Sierra Nevada, and this species is likely to be present in the ESNR Project Area in all seasons of the year (Fig. 10.20). Northern harriers frequent meadows, grasslands, open rangelands, desert sinks, fresh and saltwater emergent wetlands; seldom found in wooded areas. Permanent resident of the northeastern plateau and coastal areas; less common resident of the Central Valley. Widespread winter resident and migrant in suitable habitat. The California population of this species has decreased in recent decades (Grinnell and Miller 1944; Remsen 1978), but can be locally abundant where suitable habitat remains free of disturbance, especially from intensive agriculture.

Habitats include tall grasses and forbs in wetland, or at wetland/field border. Frequents marshes and aquatic habitats mostly in flat, or hummocky, open areas of tall, dense grasses, moist or dry shrubs. Harriers nest on the ground in shrubby vegetation, emergent wetlands at the marsh edge, or along rivers or lakes, (Brown and Amadon 1968). Population may increase with some agricultural practices (e.g., grain crops), provided that cover and nesting habitat is preserved or enhanced.

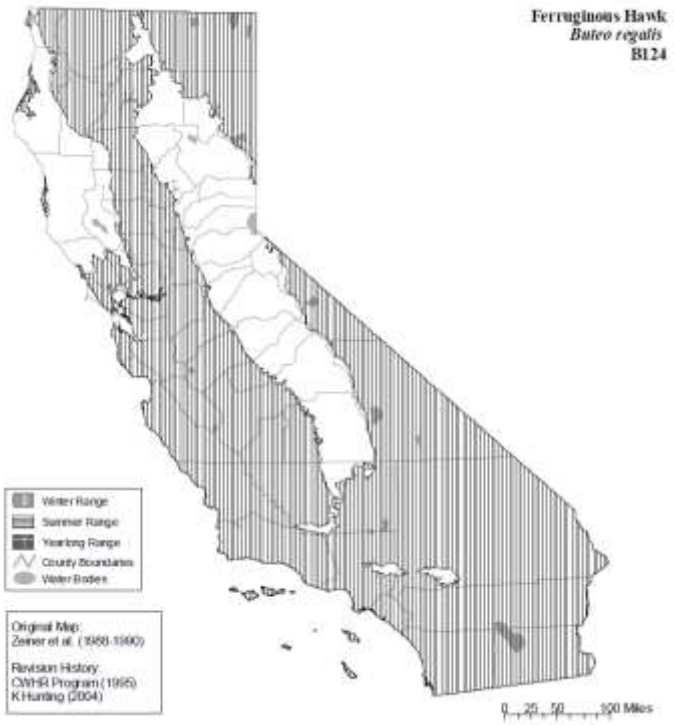


Figure 10.19. Estimated range of the Ferruginous hawk in California, based on data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

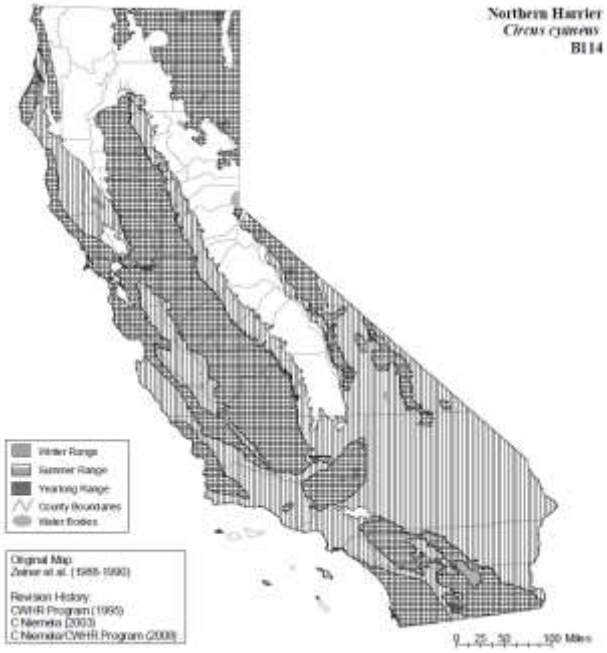


Figure 10.20. Estimated ranges of the Northern harrier in California, based on data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

Northern Harrier has a NatureServe Global rank G5, a State rank S3, and is a CA SWP Conservation Focal Species. Destruction of wetland habitat, native grassland, and moist meadows, and burning and plowing of nesting areas during early stages of breeding cycle are threats to Northern harrier (Remsen 1978).

Loggerhead shrike. The loggerhead shrike is present year-round throughout most of California, and will be present in the ESNR Project Area throughout the year (Fig. 10.21). Although the overall range appears stable, numbers have declined in California where threats responsible for declines are poorly understood. Loggerhead shrikes are a common resident and winter visitor in lowlands and foothills throughout California, where they frequent open habitats with sparse shrubs and trees, other suitable perches, bare ground, and low or sparse herbaceous cover, and uses trees, posts, fences, and utility line for perches. Highest density occurs in open-canopied valley foothill hardwood, valley foothill hardwood-conifer, valley foothill riparian, pinyon-juniper, juniper, desert riparian, and Joshua tree habitats. In the Great Basin, from Inyo County north, population declines markedly from November through March. Loggerhead shrike can often be found in open cropland, and often uses edges of denser habitats (Grinnell and Miller 1944; McCaskie et al. 1979; Garrett and Dunn 1981). Seasonal Movements/Migration: A large portion of the loggerhead shrike population in the Great Basin, south to Inyo County departs for winter. Although loggerhead shrike populations have declined elsewhere, they have remained fairly stable in the Pacific states (Morrison 1981). Loggerhead shrike have a NatureServe Global and State rank G4 and S4 (Apparently secure), is a USFWS Bird of Conservation Concern, and a CDFW Species of Special concern. The San Clemente loggerhead shrike (*L. I. mearnsi*) is Federal Endangered (CDFW 1989).

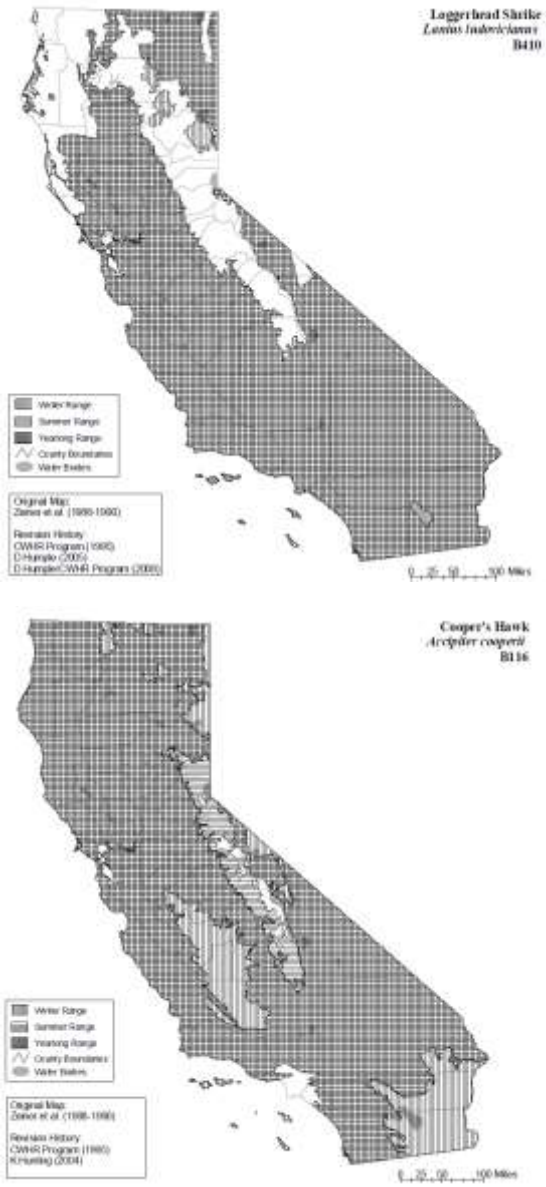


Figure 10.21. Estimated ranges of the Loggerhead shrike (top) and Cooper's hawk (bottom) in California, based on data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

Cooper's hawk. The Cooper's hawk is a resident throughout most of the wooded portion of the state, and will be widespread and present in the ESNR Project Area in all seasons (Fig. 10.21). Cooper's hawks breed in the southern Sierra Nevada foothills, Owens Valley, and other local areas in southern California. Range is from sea level to above 9,000 ft. Will be found among dense stands of live oak, riparian deciduous, or other forest habitats near water.

Nesting and foraging usually occur near open water or riparian vegetation. Frequents landscapes where wooded areas occur in patches and groves (Beebe 1974), and often uses patchy woodlands and edges with snags for perching. Mostly a yearlong resident. Some from more northern areas migrate into California. Cooper's hawks also move downslope and south from areas of heavy snow in autumn and returns in spring. Cooper's hawks are an important predator of small birds, but nestlings and immatures may be killed by ravens, northern goshawks, and great horned owls. Breeding numbers appear reduced in recent decades.

Cooper's hawk has a NatureServe Global rank G5 (Secure), a State rank G4 (Apparently secure), and is a CA SWAP Conservation Focal Species.

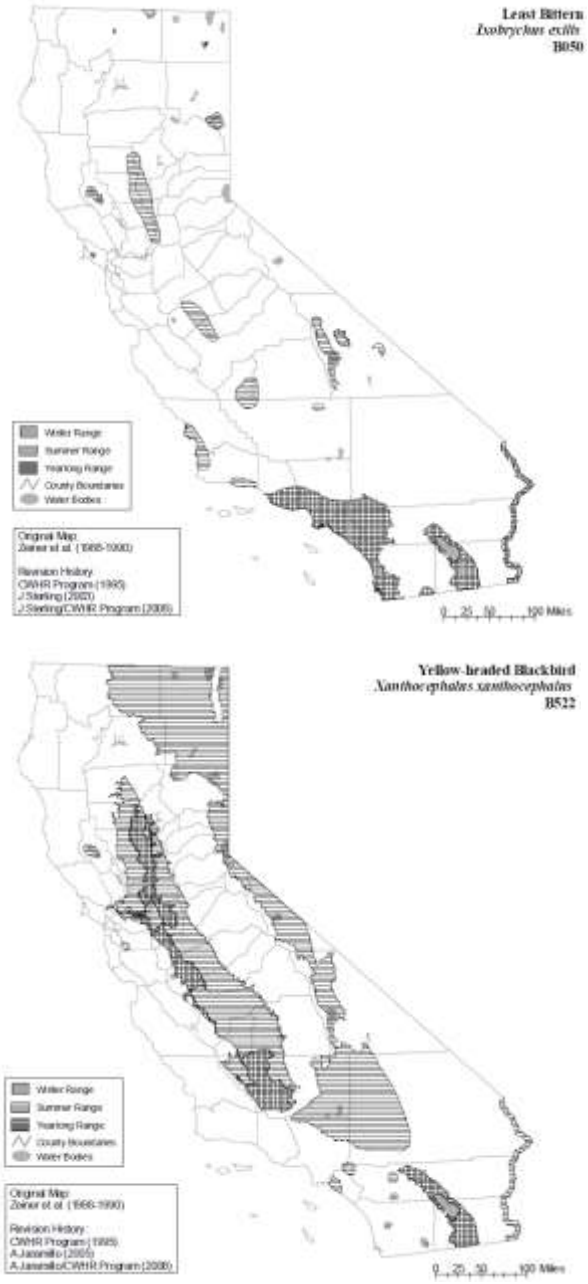


Figure 10.22. Estimated ranges of the Least bittern and Yellow-headed blackbird in California, based on data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

Least bittern. In southern California Least bitterns are a common summer resident (especially April to September), at Salton Sea and Colorado River, in dense emergent wetlands near sources of freshwater, and in desert riparian habitats (tamarisk scrub). Least bittern will likely be present during the summer season, but restricted primarily to the lower Owens River and Owens Lake portion of the ESNR Project area (Fig. 10.22). Least bitterns often feed along the edge of emergent vegetation, on the open-water side, and probably nests only in emergent wetlands. In deserts and coastal lowlands, the species is quite rare, but breeds locally in the Owens Valley and Mojave Desert. Cover habitat is dense, emergent vegetation and in adjacent thickets of saltcedar (tamarisk) in desert riparian habitat. Uses dense, emergent vegetation for cover and nesting, and feeds in such vegetation, as well as in small openings. Most of California's least bitterns migrate south to Mexico for winter. Populations of Least bitterns have declined in California from marsh drainage, human disturbance, and pesticides (Palmer 1962, Arbib 1979). Least bittern has a NatureServe Global rank G4 (Apparently secure), a State rank G2 (Imperiled), and is a CDFW Species of Special Concern and a CA SWAP Conservation Focal Species.

Yellow-headed blackbird. Breeds commonly, but locally, east of Cascade Range and Sierra Nevada, in Imperial and Colorado River valleys, in the Central Valley, and at selected locations in the Coast Ranges west of the Central Valley. Yellow-headed blackbirds will be well distributed in the Project area, but primarily during winter (Fig. 10.22). These blackbirds nest in fresh emergent wetland with dense vegetation and deep water, often along borders of lakes or ponds. Forages in emergent wetland and moist, open areas, especially cropland and muddy shores of lacustrine habitat. Cover habitat is dense emergent riparian vegetation. Nests, roosts, and does much foraging in fresh emergent wetland. Also feeds along shorelines and in nearby open fields, preferably on moist ground. Seasonal Movements/Migration: Much of California breeding population migrates south to winter. Uncommon as a winter resident in Central Valley, occurring mostly in southern portion; fairly common in Imperial Valley. Migrants can occur outside breeding range in April, early May, and September, particularly in southern California deserts. Yellow-headed blackbird has a NatureServe Global rank G5 (Secure), a State rank S3, and is a CDFW Species of Special Concern and a CA SWAP Conservation Focal Species.

Gray-crowned rosy finch. Gray-crowned rosy finch (GC rosy finch) is a fairly common resident of high elevation Sierra Nevada, but is uncommon on Mt. Shasta, Mt. Lassen, and Sweetwater and White Mountains in Mono County. GC rosy finch will be present in the ESNR Project Area during winter, but in higher elevations in the Sierra Nevada, the White Mtns and Inyo Mtns in other seasons (Fig. 10.23). GC rosy finch occurs primarily in alpine dwarf-shrub habitat and barren areas above treeline. GC rosy finch breed primarily at 9,500-14,000 ft elevation in the Sierra Nevada from Lake Tahoe south to Olancha Peak. Rocks and ground vegetation provide cover. In winter, this bird will use mine shafts, cliff swallow nests, bridge supports, buildings, other similar areas for communal roosts (Gaines 1977). GC rosy finch are most numerous above treeline where there are steep, typically glacier-carved cliffs or large talus slopes providing nesting sites; alpine meadows, fell-fields, tarns, and lakes providing seed-producing alpine vegetation and insects; and perennial snowfields. In California the GC rosy finch is apparently nomadic rather than migratory; moving downslope or elsewhere in response to weather and food conditions.

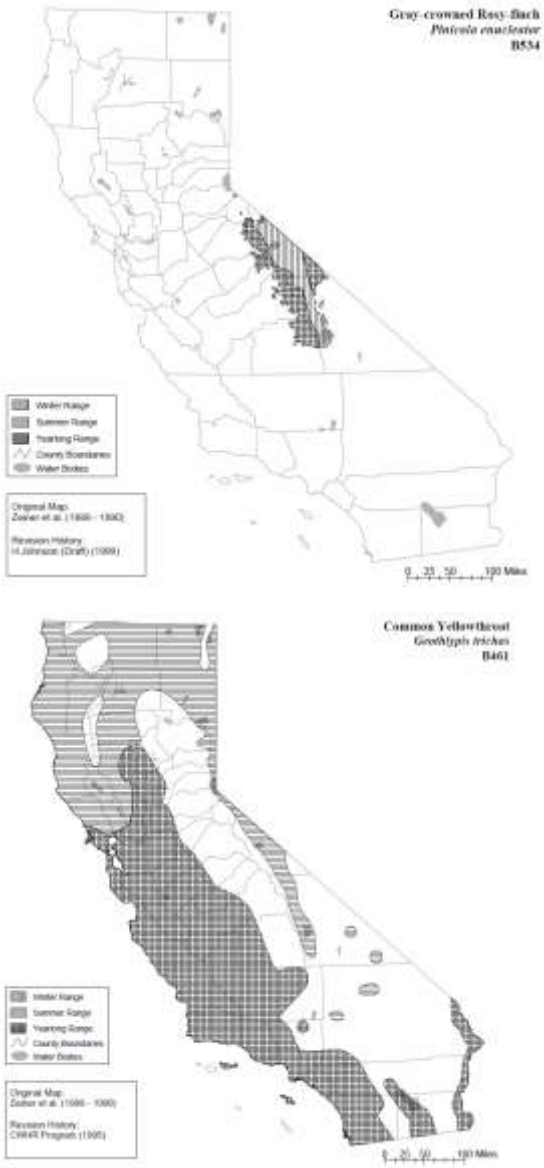


Figure 10.23. Estimated ranges of the Gray-crowned Rosy finch (top) and Common yellowthroat (bottom) in California, based on data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

Many GC rosy finches that winter in the Great Basin breed are present in California from October to April. This species has a NatureServe Global rank G5, no State rank, and is a CA SWAP Conservation Focal Species.

Common yellowthroat. This species is a common summer resident, and fairly common winter resident. Common yellowthroat will be present in the ESNR Project Area during summer from Mono Lake down past Owens Lake (Fig. 10.23). Common yellowthroat mostly breeds and winters in wet meadow, fresh low, dense, emergent wetland, and saline emergent wetland habitats. This species will also occasionally breed in desert riparian, annual grassland, and perennial grassland habitats. In migration, common yellowthroat are found in other moist habitats with low, dense cover. Seeks cover in thick tangles in fresh and brackish wetlands. Resident in southern California (Garrett and Dunn 1981) and San Francisco Bay area. Common yellowthroat has a NatureServe Global rank G5, no State rank, and is a CA SWAP Conservation Focal Species.

Chipping sparrow. This sparrow is a common migrant and summer visitor throughout most of California, excluding the Central Valley, southern deserts, and alpine areas. Chipping sparrow will be present and widespread in the ESNR Project Area during summer (Fig. 10.24). This bird prefers open wooded habitats with a sparse or low herbaceous layer and few shrubs. Apparently requires trees for resting and singing, and prefers trees for nesting, but forages in nearby herbaceous and open shrub habitats, including dry margins of wet meadows. Chipping sparrows mostly use trees for nesting, resting, and singing, and forages in adjacent/nearby herbaceous or open shrub habitats (Grinnell and Miller 1944). As a seasonal migrant, chipping sparrows mostly leave California in September-early October and return in April or May. Chipping sparrow has a NatureServe Global rank G5, a State rank S4 (Apparently secure), and is a CA SWAP Conservation Focal Species.

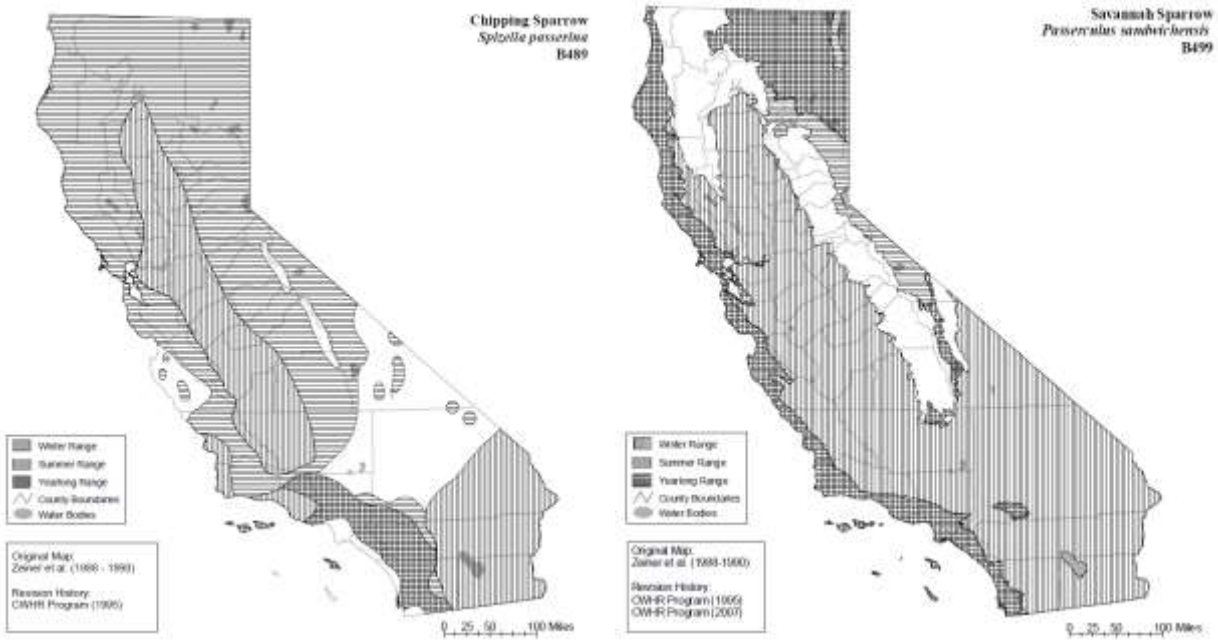


Figure 10.24. Estimated ranges of the Chipping sparrow (left) and Savannah sparrow (right) in California, based on data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

Savannah sparrow. The savannah sparrow commonly breeds east of the Cascade-Sierra Nevada crest and along the entire California coast. Savannah sparrow will be present in the ESNR Project Area during summer seasons (Fig. 10.24); occuring primarily in grassland, saline emergent wetland, and wet meadow habitats. This sparrow breeds/nests mostly in dense, moist grasslands, wet meadows, and salicornia wetlands, with or without scattered shrubs or clumps of tall shrubs. Montane valleys are occupied locally, as are hay fields. On the eastside Sierra Nevada, savannah sparrows winter locally north through the Owens Valley. In winter, savannah sparrow occupies moist and dry grasslands, but prefers dense, short ground cover, but may also occur in low vegetation in croplands. Seasonally, wintering savannah sparrow arrive from August to October, depending upon the subspecies, and depart in April or May. Montane breeding populations mostly move downslope to winter. Savannah sparrow has a NatureServe Global rank G5, no State rank S4, and is a CA SWAP Conservation Focal Species.

Vesper sparrow. Vesper sparrow is a common summer resident east of the Cascade-Sierra Nevada crest, occurring in sparse or open stands of sagebrush, low sagebrush, and similar habitats. The vesper sparrow will be present in the ESNR Project area in the Long Valley area (summer), and in the lower Owens River area during winter (Fig. 10.25). Vesper sparrow breed south to the White and Inyo Mountains and at Baldwin Lake in the San Bernardino Mountains. Formerly bred in high mountain meadows in Sequoia National Park and vicinity (Grinnell and Miller 1944). Vesper sparrow occur in grasslands, croplands, and open brushlands in winter. This species is common in winter on the Colorado River and Salton Sea, but occurs very locally north to Owens Valley, Carrizo Plain, and Antelope Valley. Uses scattered shrubs and patches of tall herbs for cover and breeds in sagebrush and other shrub habitats with sparse vegetation. As a seasonal migrant, vesper sparrow arrives on breeding grounds in April and departs by October. Wintering individuals often arrive in September and depart in March or April. Decline in vesper sparrow populations in areas of former abundance in Mono County have been attributed to overgrazing, which has decreased herbage cover and increased sagebrush density (Gaines 1977). Vesper sparrow has a NatureServe Global rank G5, no State rank S4, and is a CA SWAP Conservation Focal Species.

Figure 10.25. Estimated range of the Vesper sparrow in California, based on data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

USFS Management Indicator Species Birds in the ESNR Project Area

There are six Sierra Nevada and Inyo National Forest MIS Birds that will be important for new projects in the ESNR Project Area when those actions occur within the Inyo NF portion of the Project area. USFS Inyo NF MIS Birds are the Yellow warbler, Greater sage grouse, Mountain quail, Sooty grouse (formerly

Blue grouse), Fox sparrow, and the California spotted owl (all reviewed below), Among these MIS Birds, the three most important for habitats in the ESNR Project area are the Greater sage grouse (MIS for Sagebrush habitats; most common habitat in the Project area), the yellow warbler (MIS for Riparian habitats), and the Fox sparrow (MIS for Shrub and chaparral habitat; sagebrush can be considered a type of chaparral). Mountain quail are the MIS for Early to mid-seral conifer forest (a habitat with limited presence in the Project area), Sooty grouse are the MIS for Late seral open canopy coniferous forests (uncommon habitat in the Project area). California spotted owl are one of three MIS species for Late seral closed canopy coniferous forest, which is a habitat type mostly absent below 6,500 ft in the eastern Sierra Nevada. Two mammal species are the other MIS' for Late seral closed canopy forest; Northern flying squirrel and Sierra marten.

Black-backed woodpecker. This species is a USFS Management Indicator Species for snags in burned forest in the Sierra Nevada. Black-backed woodpeckers are endemic to North America and occur in boreal regions from south-central Alaska across Canada to Newfoundland and Nova Scotia, and south in the western United States in Montana and Washington through east-central California (Dixon and Saab 2000). Occasional irruptions occur in eastern North America (Dixon and Saab 2000). There are no described subspecies of the black-backed woodpecker, and their morphology does not notably vary throughout their range (Dixon and Saab 2000). However, populations of black-backed woodpeckers in the Cascade and Sierra Nevada Mountains are found to be genetically distinct from those in the Rocky Mountains, Black Hills of South Dakota, and boreal regions of North America (Pierson et al. 2010).

In California black-backed woodpeckers are an uncommon, yearlong resident from about 6,000 to 9,500 ft) predominantly in fir and lodgepole pine forest from the Siskiyou Mts., Mt. Shasta, and Warner Mts. south through the Cascade Range and Sierra Nevada to Inyo County (Grinnell and Miller 1944). BB woodpeckers will not have a significant presence in the ESNR Project Area (Fig. 10.26) In the Sierra Nevada this species frequents montane conifer forests, especially with lodgepole pine, firs, snags, windfalls, and burns. Present in areas some years, absent others.

In California, the species is found at middle to higher elevations in inland mountains from the Oregon border to the southern Sierra Nevada (Bond et al. 2012). Black-backed woodpecker occur at lower abundance in most unburned forest types and is also found in beetle-killed forests, but reaches its greatest abundance in

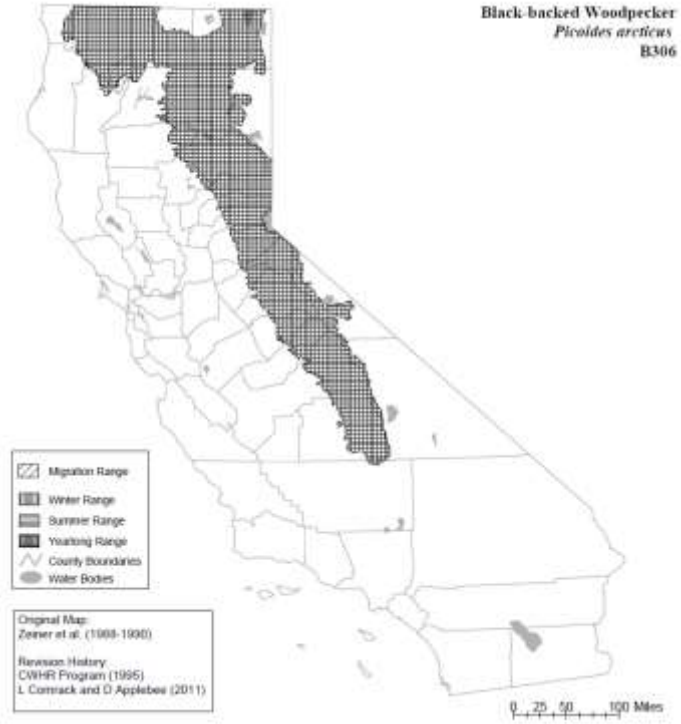


Figure 10.26. Estimated range of the Black-backed woodpecker in California, based on data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

recently (1-8 year-old) burned forests with fire killed trees (Bond et al. 2012). Black-backed woodpeckers occur at low densities in unburned forests, but because these areas are far more widespread than recently burned forests (e.g. less than 10 year-old burns), woodpeckers in 'green' forest likely account for a substantial portion of the total population size (Bond et al. 2012). Fogg et al (2014) estimated black-backed woodpecker occupancy in green forest and found occupancy was higher than previously understood. Also, black-backed woodpeckers have been documented to forage in green forest (Siegel et al. 2018, Tingley et al. 2020) and sometimes nest in live trees or excavate cavities in dead portions of live trees (Bull et al. 1986, Goggans et al. 1989, Fogg et al. 2014, Bond et al. 2012). Population trends of black-backed woodpeckers are poorly known (Bond et al. 2012).

Monitoring of the black-backed woodpecker across the 10 national forests in the Sierra Nevada has been conducted in partnership with the Institute for Bird Populations (IBP) in burned forest habitat. Collectively the monitoring data from burned forests and from unburned, green forest show that black-backed woodpeckers are not undergoing significant population declines. Potential threats to the black-backed woodpecker include habitat removal (including post-fire timber harvest), climate change, and lack of habitat due to changing fire regimes or fire suppression (California Fish and Game Commission 2013). The black-backed woodpecker has a NatureServe Global rank of G5 (Secure), a California State rank of S2 (Imperiled) (see additional information below regarding the California State rank), and a Nevada State rank of S1 (ranked for Douglas and Washoe Counties and not on the Inyo National Forest).

Yellow warbler. This bird species is a USFS Management Indicator Species for Riparian habitats in the Sierra Nevada. The yellow warbler is the most common warbler species in North America, it remains common in most of California, and will have a significant range presence in the ESNR Project Area (Fig. 10.27). Yellow warblers occur on every national forest in California, but population declines have been reported in southern California, the Central Valley and coastal California where riparian habitats have been most impacted by development (Heath 2008). Yellow warbler frequent open to medium-density woodlands and forests (montane chaparral, open ponderosa pine and mixed conifer forests) with a heavy brush understory. Seasonally, yellow warblers typically arrive in California in April, and are mostly gone by October. Yellow warblers typically breed in riparian woodland habitats

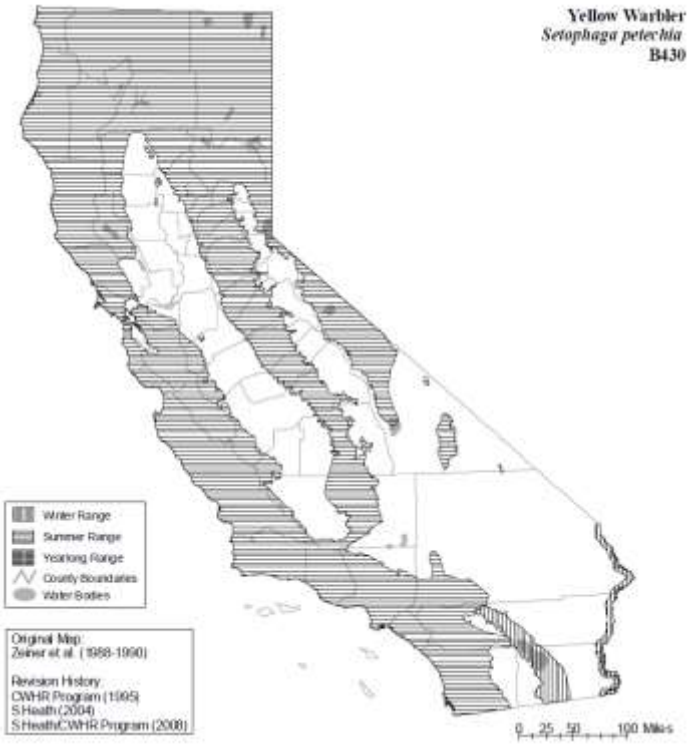


Figure 10.27. Estimated range of the Yellow warbler in California, based on data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

near streams and wet meadows (Grinnell and Miller 1944; Lowther et al. 1999), and they can occur in coastal areas from sea level to 8,000 ft in the Sierra Nevada.

Numbers of breeding pairs of yellow warbler have declined dramatically in recent decades in many lowland areas of California, and are rare to uncommon in many lowland areas where the species was formerly common (McCaskie et al. 1979, Garrett and Dunn 1981). Yellow warblers are primarily threatened by anthropogenic factors. Loss and degradation of riparian habitats on both breeding and wintering grounds is a continuing threat to this species. Human activities such as urban and agricultural development, livestock overgrazing, introduction of exotic plants, and water diversion are all major threats to riparian habitats (Katibah 1984; DeSante and George 1994; Heath 2008). The yellow warbler has a NatureServe Global ranking of G5 (Secure) a State ranking of S3S4 (Vulnerable/Apparently Secure), and it is a USFWS Bird of Conservation Concern a CDFW Species of Special Concern and a CA SWAP Conservation Focal Species.

Greater or Bi-State Sage grouse.

The bird species is a USFS Management Indicator Species for Sagebrush Habitats in the Sierra Nevada. The Greater Sage Grouse is an uncommon permanent resident in northeastern California, ranging from the Oregon border along the east side of the Cascade Range and Sierra Nevada to northern Inyo County (Fig. 10.28). Mono County appears to have a stable population. Bi-state sage grouse will have a significant presence in the ESNR Project area in the Mono Basin, and Crowley Lake/Long Valley, and Glass Mountain areas (Fig. 10.28). Greater sage-grouse in California are dependent on sagebrush habitats that include a diversity of sagebrush mixed with native forbs and grasses (Schroeder et al. 1999; Hall et al. 2008). Lekking, nesting, molting and wintering all require different configurations of sagebrush habitat, which increases the species' vulnerability (Hall et al. 2008) and warrant area specific habitat guidelines (Stringham and Snyder 2017). Sage grouse are found in greatest abundance in a combination of sagebrush, perennial grassland or wet meadow, and water. Bitterbrush and alkali desert scrub also commonly present. Males from several square miles gather at traditional strutting areas (leks) in late winter and early spring. These leks are located on patches of bare ground surrounded by sagebrush stands of moderate canopy.

Figure 10.28. Estimated range for the Bi-State greater sage grouse in California, based on data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

The species is often found where sagebrush shrublands are near water. Numbers have declined in recent decades from habitat loss and over-grazing.

As a sagebrush obligate, this species is threatened by actions and processes that reduce the extent and integrity of this habitat (Hall et al. 2008). Western juniper expansion is a major threat to sage grouse occupation in northeastern California and to a lesser extent in Mono and Inyo counties. Encroaching juniper displaces sagebrush and other shrubs (Crawford et al. 2004). Juniper also provides additional perches for aerial predators and cover for terrestrial predators. Sage-grouse avoid areas with abundant juniper (SGCT 2004; Hall et al. 2008). Both prescribed fires and wildfires have the capacity to degrade sage-grouse habitat significantly. Sagebrush is typically slow to reestablish following fire, has poor seed dispersal, and has little ability to naturally reestablish in sites dominated by annual grassland (Shaw et al. 2005). Fire also facilitates the invasion of cheatgrass, which commonly occupies sites following disturbance, especially burning (Connelly et al. 2000). Frequent (less than 20-30 year interval) or late-summer burning favors cheatgrass invasion and may be a major cause of cheatgrass expansion in sagebrush habitats.

The Bi-state greater sage-grouse has a NatureServe Global ranking of G3G4 (Vulnerable but considerable uncertainty), and a California State ranking of S2S3 (Imperiled/Vulnerable). This bird species is an ESA Candidate species, a CESA Endangered bird, a BLM sensitive species, and a CA SWP Conservation Focal Species.

Fox sparrow. This species is a USFS Sierra Nevada Management Indicator Species for Shrub and Chaparral habitats. The fox sparrow breeds commonly in mountains of California, in dense montane chaparral and brushy understory of other wooded, montane habitats. Fox sparrow will be seasonally present in the ESNR Project Area (Fig. 10.29). Although absent from desert ranges, fox sparrow breeds in Great Basin ranges south through the White Mountains. Less common in winter east of Cascade Range and Sierra Nevada than elsewhere in state. Fox sparrow mostly moves downslope from the mountains in winter to lower elevation brush habitats, including understories of open forests, throughout foothills and lowlands. Fox sparrow prefer montane chaparral for breeding, dominated by manzanita, ceanothus, chinkapin, and riparian thickets of low willow, aspen, alder, wild rose. Suitable habitats include brushfields and thickets

Figure 10.29. Estimated ranges of the Fox sparrow in California based on data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

scattered in forest stands (Grinnell and Miller 1944; McCaskie et al. 1979; Garrett and Dunn 1981). Breeding fox sparrow are apparently parasitized frequently where brown-headed cowbirds are abundant in the Sierra Nevada (Airola 1986). The primary management issue for Fox Sparrows is fire suppression. Hehl (1994) stated that the exclusion of fire has been the most significant factor affecting today's western forests. As a result of fire suppression, the structure of western forests has changed dramatically over the past 50-100 years. Fire suppression and logging appear to have reduced the number of large trees and increased the density of smaller and understory trees, particularly white fir (Beaty and Taylor 2007). The primary results have been decreases in structural diversity, species diversity, and shrub cover. This has resulted in very dense homogenous forests with closed canopies and little shrub cover. This has had negative impacts on Fox Sparrows, and other species, require openings in coniferous forest with high shrub cover or relatively open canopy forest with a shrub understory. Fox sparrow has a NatureServe Global rank G5 (Secure), no State rank, and is a USFS MIS bird species.

Mountain quail. The mountain quail is a USFS Management Indicator Species for Shrub and Chaparral Habitats in the Sierra Nevada. Mountain quail are a common to uncommon resident, found typically in most major montane habitats of the state. The CDFW estimated range indicates mountain quail will be present within the ESNR Project Area (Fig 10.30). Found seasonally in open, brushy stands of conifer and deciduous forest and woodland, and chaparral. Mountain quail require brushy vegetation interspersed with grass/forb areas; steep slopes and thickets for cover. This bird species usually breeds at higher elevations, and moves downslope for winter, following snowline. Mountain quail require drinking water in dry weather, and may gather at water sources in summer. Mountain quail has a NatureServe Global rank G5 (Secure), no State rank, and is a USFS MIS bird species.

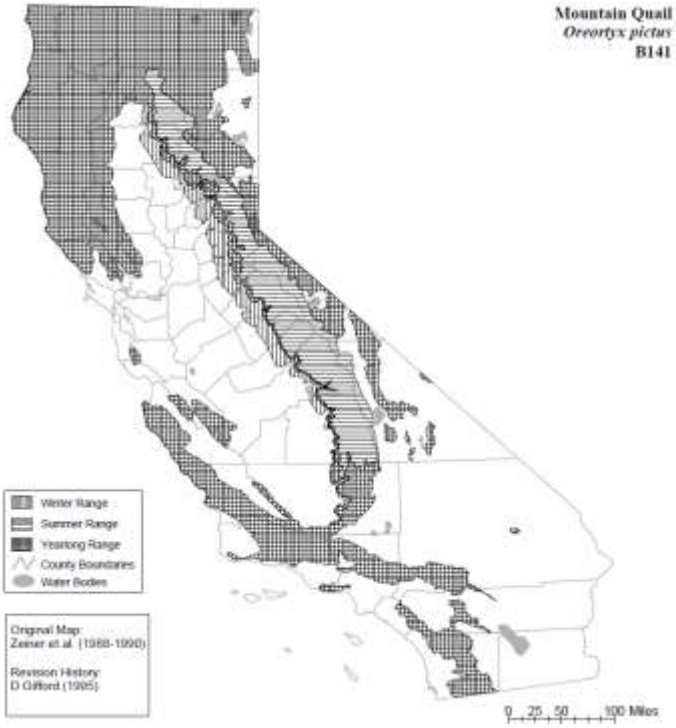


Figure 10.30. Estimated range for the Mountain quail in California, based on data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

California spotted owl. This owl is a USFS Management Indicator Species for late seral closed canopy coniferous forest in the Sierra Nevada. California spotted owls primarily occupy coniferous and mixed pine-oak forests that have late stage characteristics with canopy cover and tree size being the most important predictors of California spotted owl presence. California spotted owl is outside the ESNR Project area (Fig. 10.31), which does not include late seral closed canopy coniferous forest habitats. California spotted owls choose roosts and nest sites in microhabitats within areas of dense vegetation, dense canopy cover and complex, multi-story forest structure. Being cavity nesters, they require snags

or decadent trees that have cavities or mistletoe platforms, such as black oaks, multi-forked firs or broken top incense cedars. Snags and large downed woody debris are required as they provide habitat for important prey species including northern flying squirrels and mice.

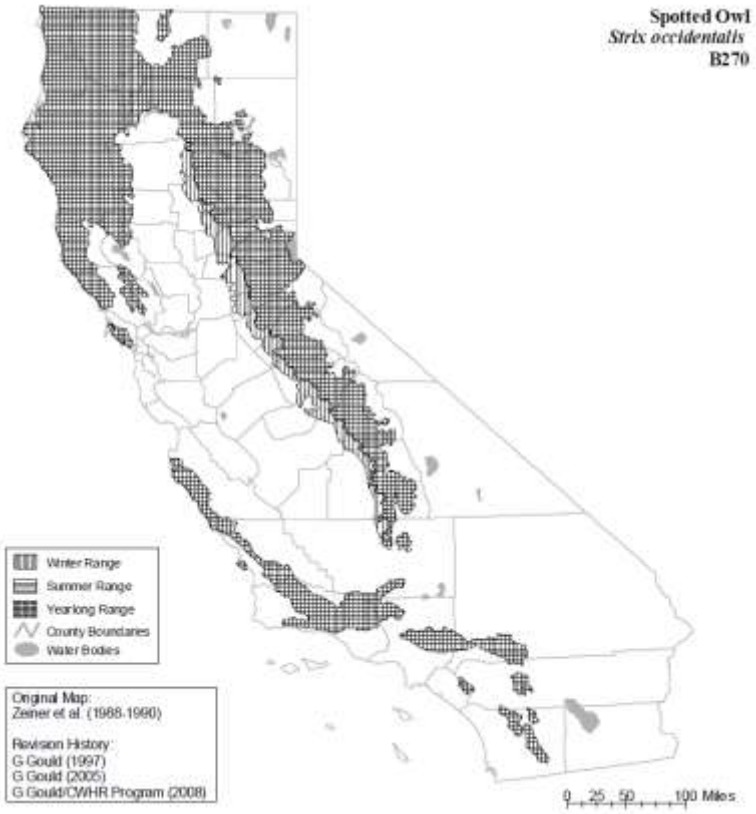


Figure 10.31. Estimated ranges for Spotted owls in California; CA Spotted owl is the USFS MIS for Late seral closed canopy coniferous forest habitats in the Sierra Nevada.

Threats to persistence of California spotted owls include habitat loss, degradation, or loss of connectivity from high-severity wildfire and management activities, such as timber harvest, expansion of barred owls, climate change, rodenticides and noise disturbance (Gutierrez et al. 2016). Timber harvest has been identified as one of the most significant threats to spotted owl persistence (Gutierrez et al. 2016). Effects of vegetation treatments on persistence of spotted owl across its range are complex and not well understood. Treatments that result in a reduction of: canopy cover to greater than or equal to 40 percent, surface and ladder fuels, and vertical and horizontal stand structure, with an increase in regularly spaced trees may have negative impacts on spotted owls (Stephens et al. 2014, Tempel et al. 2014, Tempel et al. 2014). (Seamans and Gutierrez 2007) and (Tempel et al. 2014) found the availability and amount of late seral forest (canopy cover greater than greater than70 percent and dominance of medium and large trees greater than greater than 30 cm and greater than greater than 60.9 cm) were positively correlated with territory occupancy, survival and population growth. Habitat edge is considered beneficial to spotted owls, perhaps increasing prey populations and access to prey by foraging owls. Recent changes in silviculture prescriptions that are designed to retain the stand structure and heterogeneity predicted based on historic vegetative patterns and also selected for by spotted owls (Keane 2014). Effects of these prescriptions on spotted owl populations are unknown. Climate change may have negative effects on spotted owls. Increasing temperatures may affect spotted owl survival, reproduction, recruitment and population growth (Gutierrez et al. 2016). Climate change may also result in geographic shifts in habitat distribution, abundance, and quality, increase the amount of high-severity wildfire, increase large tree mortality caused by insects and disease, and change prey distribution and abundance (Gutierrez et al. 2016). Poisoning by rodenticides is considered a significant emerging threat, but there is little information available on the effects of and appropriate mitigations of this threat. Disturbance associated with human recreation and management activities is considered a threat to spotted owls and are considered localized in space and time. Protecting birds from noise disturbance

during the breeding season, March 1 through August 15, can effectively mitigate acute noise and activity disturbance (Gutierrez et al. 2016). The California spotted owl has a NatureServe Global rank of T3 (vulnerable), a California State rank of S3 (vulnerable), is a USFS sensitive species and a California Species of Special Concern.

Sooty grouse. This bird species is a USFS Management Indicator Species for Late seral open canopy coniferous forest habitats in the Sierra Nevada. Sooty grouse are present in the ESNR Project Area (Fig. 10.32), and are associated with upper elevation fir forests that may be affected by vegetation management and climate change. Late seral coniferous forests are very uncommon in the ESNR Project Area. In early spring, sooty grouse congregate in open mature stands of conifers near the crests of ridges. These "hooting sites," or "spring activity centers," are traditional and are returned to year after year, generation after generation. Loss of large trees from these areas are detrimental to sooty grouse. In late spring and summer through fall, females and their young are associated with meadows and other mesic areas. In winter, sooty grouse seek dense conifer stands at high elevations where they subsist almost entirely on fir needles. Sooty grouse is hunted in Fresno and Tulare counties. Threats include hunting, incompatible timber harvest, fire suppression and altered fire regime, livestock grazing, land development, recreational use of habitat and climate change. California Department of Fish and Wildlife allow hunting of sooty grouse within both Inyo and Mono counties with a daily take of two birds, and a maximum possession of six birds (California DFW 2017 Regulations). Sooty grouse has a NatureServe Global rank G5 (Secure), no State rank, and is a USFS MIS.

Mt. Pinos Sooty Grouse. The Mt. Pinos sooty grouse, *Dendragapus fuliginosus howardi*, is considered one of three subspecies of sooty

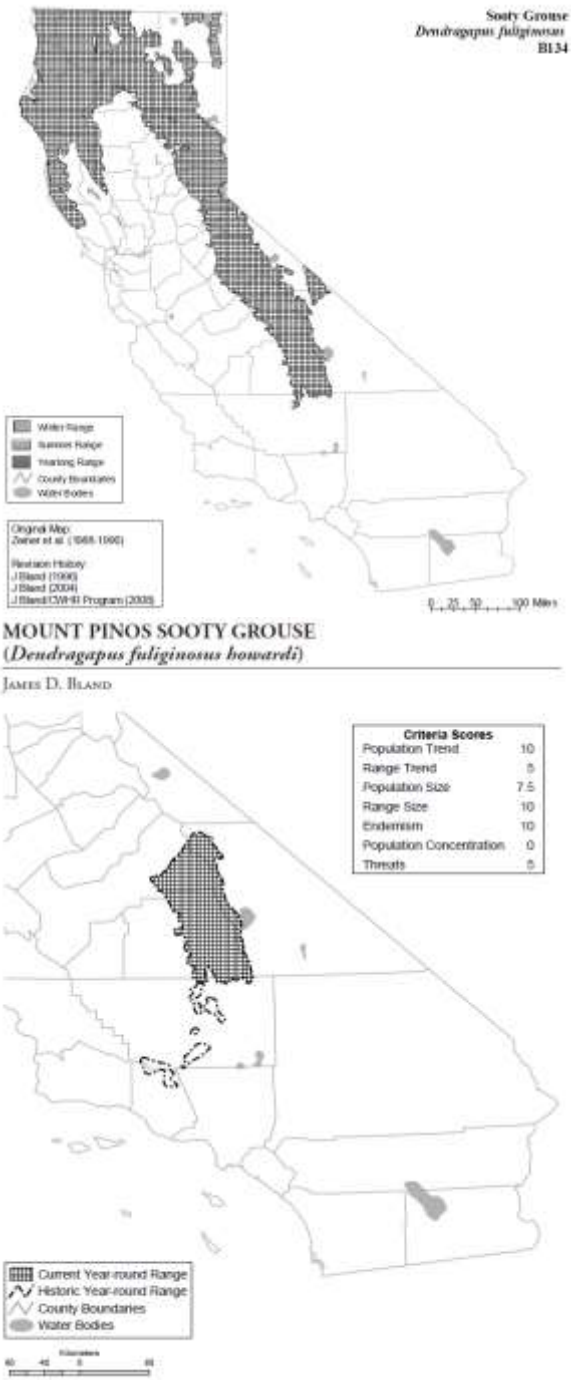


Figure 10.32. Estimated ranges for Sooty grouse (USFS MIS for Late seral open canopy coniferous forest habitats in the Sierra Nevada; top), and the Mt. Pinos Sooty grouse (bottom). Range maps created based on data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

grouse in California. The historical range of *D. f. howardi* is believed to have included parts of the Los Padres, Inyo and Sequoia National Forests; distributed in the southern Sierra Nevada south of Kings Canyon, Piute Mountains, Tehachapi Mountains, Mount Pinos/Mount Able (Cerro Noroestre) area, and Frazier Mountain in southern California (Willet 1933; Grinnell and Miller 1944). The Mt. Pinos sooty grouse is likely present in the Project area along the Sierra Nevada foothills to the west of the Lower Owens River (Fig. 10.32). The CNDDB database contains two records for the subspecies: four birds found on the Los Padres National Forest in 1931; and six birds on Sequoia National Forest in May 2004. Surveys over the past century indicate the range of Mt. Pinos Sooty Grouse receded roughly 100 miles and recent data suggest that the northward decline is continuing (Bland 2013). Sooty grouse have not been found in the southern portion of this range (i.e., isolated mountain habitats) since the early 1990s, with rare reports from south of the Tulare-Kern county line (Bland 2008). Bland (2008) suggests that sooty grouse observed south of Tulare County in recent decades may have been birds dispersing from a Sierra Nevada source, rather than members of a resident breeding population. Currently, the southernmost known breeding locations are at Sunday Peak in southcentral Tulare County and Sherman Peak in southeastern Tulare County (Bland 2008). Records for the White Mountains, Mono County, were once provisionally presumed to be *D. f. howardi*, but have since been considered *D. f. sierrae*. However, recent unpublished studies suggest Mt. Pinos sooty grouse may be restricted to a smaller area and represent a distinct (and extinct) species. Mt. Pinos Sooty Grouse has a NatureServe Global rank G5, and T Rank T1T2. A California State rank S2S3, and it is a CDFW Species of Special Concern.

Migratory Birds

Certain birds are protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures (Appendix II). The migratory birds listed in the Table 10.4 are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list, or because they warrant special attention in the ESNR Project Area. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in the project area.

Migratory Birds are a Service Trust Resource. Based on the USFWS's conservation responsibilities and management authority for migratory birds under the Migratory Bird Treaty Act of 1918, as amended (MBTA; 16 U.S.C. 703 et seq.), USFWS recommends that any land clearing or other surface disturbance associated with proposed actions within the project area be timed to avoid potential destruction of bird nests or young, or birds that breed in the area. Such destruction may be in violation of the MBTA. Under the MBTA, nests with eggs or young of migratory birds may not be harmed, nor may migratory birds be killed. Therefore, any land clearing should be conducted outside the avian breeding season. If this is not feasible, a qualified biologist should survey the area prior to land clearing. If nests are located, or if other evidence of nesting (i.e., mated pairs, territorial defense, carrying nesting material, transporting food) is observed, a protective buffer (size depending on the habitat requirements of the species) should be delineated and the entire area avoided to prevent destruction or disturbance to nests until they are no longer active. If wetlands, springs, or streams are known to occur in a proposed new project area or are present in the vicinity of the project area, USFWS asks that managers be aware of the potential impacts that project activities may have on these habitats. Discharge of fill material into

wetlands or waters of the United States is regulated by the U.S. Army Corps of Engineers (ACOE) pursuant to section 404 of the Clean Water Act of 1972, as amended. We recommend you contact the ACOE's Regulatory Section regarding the possible need for a permit. For projects located in northern Nevada (Carson City, Churchill, Douglas, Elko, Esmeralda, Eureka, Humboldt, Lander, Lyon, Mineral, Pershing, Storey, and Washoe Counties) contact the Reno Regulatory Office at 300 Booth Street, Room 3060, Reno, Nevada 89509, (775) 784-5304; in southern Nevada (Clark, Lincoln, Nye, and White Pine Counties) contact the St. George Regulatory Office at 321 North Mall Drive, Suite L-101, St. George, Utah 84790-7314, (435) 986-3979; or in California along the eastern Sierra contact the Sacramento Regulatory Office at 650 Capitol Mall, Suite 5-200, Sacramento, California 95814, (916) 557-5250.

Table 10.4. Official USFWS IPaC List of Migratory Birds of Conservation Interest within the ESNR Project Area.

Common name; Species name	Status	Breeding period
Bald Eagle (*Haliaeetus leucocephalus)*	Non-BCC Vulnerable	Breeds Jan 1 to Aug 31
Black Swift (*Cypseloides niger)*	BCC Rangewide (CON)	Breeds Jun 15 to Sep 10
Black Tern (*Chlidonias niger)*	BCC Rangewide (CON)	Breeds May 15 to Aug 20
Black-chinned Sparrow (*Spizella atrogularis)*	BCC Rangewide (CON)	Breeds Apr 15 to Jul 31
Black-throated Gray Warbler (*Dendroica nigrescens)*	BCC - BCR	Breeds May 1 to Jul 20
Bobolink (*Dolichonyx oryzivorus)*	BCC Rangewide (CON)	Breeds May 20 to Jul 31
Cassin's Finch (*Carpodacus cassinii)*	BCC Rangewide (CON)	Breeds May 15 to Jul 15
Clark's Grebe (*Aechmophorus clarkia)*	BCC Rangewide (CON)	Breeds Jun 1 to Aug 31
Costa's Hummingbird (*Calypte costae)*	BCC - BCR	Breeds Jan 15 to Jun 10
Evening Grosbeak (*Coccothraustes vespertinus)*	BCC Rangewide (CON)	Breeds May 15 to Aug 10
Franklin's Gull (*Leucophaeus pipixcan)*	BCC Rangewide (CON)	Breeds May 1 to Jul 31
Golden Eagle (*Aquila chrysaetos)*	Non-BCC Vulnerable	Breeds Dec 1 to Aug 31
Lawrence's Goldfinch (*Carduelis lawrencei)*	BCC Rangewide (CON)	Breeds Mar 20 to Sep 20
Le Conte's Thrasher (*Toxostoma lecontei)*	BCC Rangewide (CON)	Breeds Feb 15 to Jun 20
Lesser Yellowlegs (*Tringa flavipes)*	BCC Rangewide (CON)	Breeds elsewhere
Lewis's Woodpecker (*Melanerpes lewis)*	BCC Rangewide (CON)	Breeds Apr 20 to Sep 30
Long-eared Owl (*Asio otus)*	BCC Rangewide (CON)	Breeds Mar 1 to Jul 15
Marbled Godwit (*Limosa fedoa)*	BCC Rangewide (CON)	Breeds elsewhere
Mountain Plover (*Charadrius montanus)*	BCC Rangewide (CON)	Breeds elsewhere
Olive-sided Flycatcher (*Contopus cooperi)*	BCC Rangewide (CON)	Breeds May 20 to Aug 31
Pinyon Jay (*Gymnorhinus cyanocephalus)*	BCC Rangewide (CON)	Breeds Feb 15 to Jul 15
Rufous Hummingbird (*Selasphorus rufus)*	BCC Rangewide (CON)	Breeds Apr 15 to Jul 15
Sage Thrasher (*Oreoscoptes montanus)*	BCC – BCR	Breeds Apr 15 to Aug 10
Tricolored Blackbird (*Agelaius tricolor)*	BCC Rangewide (CON)	Breeds Mar 15 to Aug 10
Virginia's Warbler (*Vermivora virginiae)*	BCC Rangewide (CON)	Breeds May 1 to Jul 31
Willet (*Tringa semipalmata)*	BCC Rangewide (CON)	Breeds Apr 20 to Aug 5
Wrentit (*Chamaea fasciata)*	BCC Rangewide (CON)	Breeds Mar 15 to Aug 10

Audobon Important Bird Areas in the ESNR Project Area

There is a diversity of resident and breeding avifauna in the ESNR Project area, which is complemented by winter migrants. Approximately 240 bird species potentially breed in or near the ESNR Project area during spring. Waterfowl and shorebirds comprise the bulk of the winter migrants and are mainly concentrated around Mono Lake and Crowley Lake (USFS 1980). Typical bird species of forest habitats are the Clark's nutcracker (*Nucifraga Columbiana*), sooty grouse, hermit thrush (*Catharus guttatus*), and white-breasted nuthatch (*Sitta carolinensis)*, among others. The drier sagebrush habitats contain sage grouse, sage thrasher (*Oreoscoptes montanus*), and vesper sparrow. The important avian predators of the area are the American kestrel (*Falco sparverius*), red-tailed hawk (*Buteo jamaicensis)*, Cooper's hawk, northern goshawk, northern harrier, great horned owl (*Bubo virginianus)*, and golden eagle. Bald eagles move through during fall migration, following the Owens River, and occasionally a nesting pair remains in the area. Bi-state sage grouse will be present in the Project area in the hills to the south and east of Mono Lake. One of the principle challenges to conserving birds within this region relates to their management on LADWP managed lands. Fortunately, recent changes within the LADWP have resulted in a major shift in management philosophy of their holdings, which hold the lion's share of sensitive bird species in the Owens Valley. The "Lower Owens River Project", which began in 2003 (Lower Owens River Project (inyowater.org), has restored flow to the lowermost 60 miles of river (and fenced large areas from cattle), including 300 acres of wetlands at the delta of Owens Lake. LADWPs recent efforts to increase surface water flows along the Owens River and to protect riparian resources from cattle grazing (the main economic force here aside from tourism) have been important and significant for Special Status Birds. (Source: California Important Bird Areas | Audubon). Riparian, wetland, and other habitats found in six Audubon Important Bird Areas in the Project area (Table 10.5) support most (and possibly all) of the Special Status and Migratory bird species identified in Tables 10.1 and 10.4.

Table 10.5. Information on six Important Bird Areas (IBA) located within the ESNR Project Area, including notes on Special Status bird species known present in each IBA (may not exhaustive).

IBA Name	County	Special Status Birds Known Present
Mono Highlands[a]; *north of Mono Lake*	Mono	Golden eagle, greater sage grouse, loggerhead shrike, long-eared owl, northern goshawk, prairie falcon, yellow warbler
Mono Lake Basin	Mono	Willow flycatcher, yellow warbler, yellow-headed blackbird, redhead, snowy plover, northern goshawk, northern harrier, golden eagle, greater sage-grouse, loggerhead shrike, prairie falcon
Adobe Valley; *southeast of Mono Lake basin*	Mono	Greater sage-Grouse, loggerhead shrike, long-eared owl, snowy plover, northern harrier, prairie falcon, redhead, yellow-headed blackbird
Long Valley/Crowley Lake; *east/northeast of Mammoth Lakes*	Mono	Swainson's Hawk, Yellow Warbler, Yellow-headed Blackbird, Greater Sage-Grouse, Loggerhead Shrike, Long-eared Owl, Bank Swallow, Ferruginous Hawk, Golden Eagle, Northern Harrier, Peregrine Falcon, Prairie Falcon

Owens River; *Pleasant Valley Reservoir south to Lone Pine*	Mono/Inyo	Swainson's Hawk, Willow Flycatcher, Bank swallow, Bell's Vireo, Yellow Warbler, Yellow-headed Blackbird, Burrowing Owl, Ferruginous Hawk, Le Conte's Thrasher, Least Bittern, Yellow-billed Cuckoo, Yellow-breasted Chat, Bank Swallow, Loggerhead Shrike, Long-eared Owl, Northern Harrier, Prairie Falcon, Summer Tanager
Owens Lake; *east and south of Lone Pine*	Inyo	LeConte's Thrasher, Least Bittern, Loggerhead Shrike, Snowy Plover, Swainson's Hawk, Northern Harrier, Prairie Falcon, Short-eared Owl, Yellow Warbler, Yellow-headed Blackbird, burrowing owl, ferruginous hawk, Snowy plover

11. REPTILES AND AMPHIBIANS

California has a rich herpetofauna (reptiles+amphibians), including over 120 native species. Riparian systems, like those in the ESNR Project area, provide habitat for over 80% and 40% of the state's amphibians and reptiles, respectively. The Owens Valley, its bordering mountain ranges, and diversity of geologic features include a number of transition zones between biological communities and varying habitat for at least 33 different species of reptiles. Moreover, at least five species of frogs and toads eke out livings at lower elevations in Owens Valley. Several more species of amphibians, including at least three salamander species, live on the east side of the Sierra Nevada or on the west side of the White and Inyo mountains that define the west and east sides of the valley, respectively. These include Pacific treefrogs (*Pseudacris regilla*), northern leopard frogs (*Rana pipiens*), bullfrogs (*R. catesbeiana*), Great Basin spadefoot toads (*Spea intermontana*), and western toads (*Anaxyrus boreas*) on the valley floor and at higher elevations; the Owens Valley web-toed salamander (*Hydromantes platycephalus*), the Kern Plateau slender salamander (*Batrachoseps robustus*), southern mountain yellow-legged frogs (*R. muscosa*), Sierra Nevada yellow-legged frogs (*R. sierrae*), and Yosemite toads (*A. canorus*) in the Sierra Nevada; and the Inyo Mountains slender salamander (*B. campi*) in the Inyo Mountains.

High-altitude environments host a surprising number of amphibians, given a short growing season engendered by freezing temperatures. Mountain yellow-legged frogs and Sierra Nevada yellow-legged frogs, both endangered, have undergone major population crashes in recent decades due to pesticide drift, non-native trout introduction, and the spread of a non-endemic fungus.

Basic natural history and ecology information is the foundation for effective management, and for most amphibian and reptile Species of Special Concern, it is either fragmentary or completely lacking. Home range sizes, habitat suitability analyses, food habits, the effects of invasive plants and animals, compatibility with grazing and agriculture, the effects of human activities including forestry, recreation, and water diversions are unknown for many reptiles and amphibians. For some questions and species, this probably is not a pressing problem, but in other cases, filling in at least some of this basic ecology is necessary. For example, of the 19 species of pond/stream breeding Species of Special Concern amphibians, CDFW does not have a well-tested, clearly understood model of terrestrial habitat use for a single taxon. Filling in these fundamental information gaps, hopefully across a range of habitat types, constitutes the highest priority conservation-related research need for amphibian and reptile SS species and CNDDB Species of Special Concern.

Table 11.1. Special Status amphibian and reptile species of greatest conservation need in the California Desert Provinces Mono and Southeastern Great Basin Ecoregions. Sources are (1) an official U.S. Fish and Wildlife Service list of threatened and endangered species (IPaC) within the Eastside Riparian Project area polygon, (2) Inyo National Forest Species of Concern (USFS Sensitive), (3) State of California Natural Diversity Database (CNDDB), (4) the 2015 California State Wildlife Plan Focal Species of Conservation Strategies (CA SWP Conservation Focal Species), and (5) the BLM Special Status Animal Species - Bishop Field Office (BLM Sensitive).

Type, Common Name (Scientific name)	Status and Source
Amphibians	
Mountain Yellow-legged Frog (*Rana muscosa)*	Federal Endangered (IPaC)
Sierra Nevada Yellow-legged Frog (*Rana sierrae)*	Federal Endangered (IPaC), CA Threatened
Yosemite Toad (*Anaxyrus canorus)*	Federal Threatened (IPaC)
Black toad (*Anaxyrus exsul*)	CA Threatened, CA SWAP CFS, BLM and USFS Sensitive
Inyo Mountains slender salamander (*Batrachoseps campi*)	Inyo NF SOC; CA SWAP CFS
Kern Plateau salamander (*Batrachoseps robustus*)	Inyo NF SOC
Northern leopard frog (*Lithobates pipiens)*	CA SWAP CFS
Reptiles	
Mohave desert tortoise (*Gopherus agassizii*)	Federal and CA Threatened, CA SWAP CFS
Panamint alligator lizard (*Elgaria panamintina*)	CA SWAP CFS, BLM and USFS Sensitive
Northern sagebrush lizard (*Sceloporus graciosus graciosus*)	BLM Sensitive

USFWS IPaC Reptiles and Amphibians in the Project Area

Sierra Nevada yellow-legged frog. The Sierra Nevada yellow-legged frog occurs in the Sierra Nevada from Plumas County south to Fresno County. This frog is unlikely to present in significant numbers in the ESNR Project Area (Fig. 11.1). What was once known as the mountain yellow-legged frog, with a range including the Sierra Nevada and mountains in southern California, is now recognized as two species. Populations north of a ridge dividing the middle and south forks of the Kings River and those east of the Sierra Nevada crest are considered to be the Sierra Nevada yellow-legged frog (Vredenburg et al. 2007; Schoville et al. 2011). Elevation range in the Sierra Nevda Yellow-legged frog extends from 4500 ft to over 11,980 ft (Jennnings and Hayes 1994). This species is associated with streams, lakes and ponds in montane riparian, lodgepole pine, subalpine conifer, and wet meadow habitats. Terrestrial individuals are primarily diurnal. During winter, adults apparently hibernate beneath ice-covered streams, lakes, and ponds. Terrestrial hibernation has not been reported. In southern California, some individuals aestivate during especially dry periods of late summer (Mullally 1959). One of the few high-elevation amphibians of the Sierra Nevada. Tadpoles of this species may compete for food or space with those of the Yosemite toad and the Pacific treefrog. Adults may also feed on tadpoles of the Yosemite toad and the Pacific treefrog (Mullally 1953). Adults and tadpoles are commonly preyed on by garter snakes and nonnative trout (Cory 1963; Zweifel 1968).

Sierra Nevada Yellow-legged frog has a NatureServe Global rank G2 (Imperiled), a State rank S1 (Critically imperiled), and is ESA Endangered and CESA Threatened.

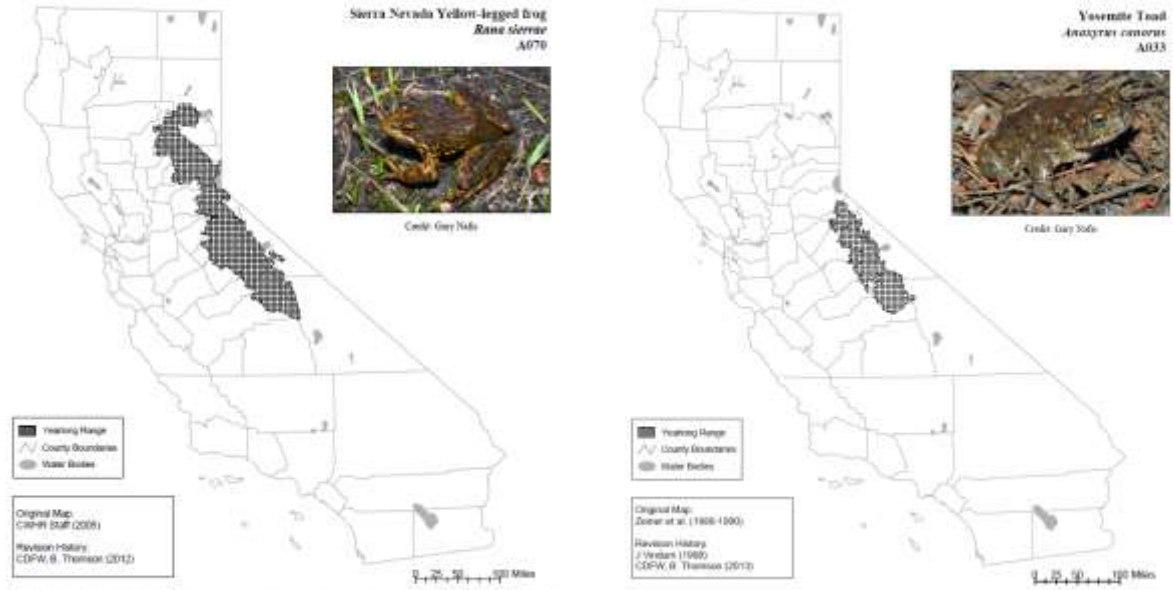


Figure 11.1. Estimated ranges for the Sierra Nevada yellow-legged frog (left) and the Yosemite toad (right), based on CNDDB data assessed by the CDFW California Wildlife Habitat Relationships system (California's Wildlife).

Yosemite Toad. The Yosemite toad is restricted to the vicinities of wet meadows in the central high Sierra, and the species will not be present in the ESNR Project Area (Fig. 11.1). Yosemite toad distribution ranges from El Dorado County south to near Kaiser Pass, Fresno County. It occurs at elevations of about 6400 ft to 11,320 ft (Jennings and Hayes 1994). This toad primarily frequents montane wet meadows, but also occurs in seasonal ponds associated with lodgepole pine and subalpine conifer forests. Yosemite toad remains widepsread within small range in the Sierra Nevada, but has declined in area of occupancy and abundance in recent decades (NatureServe 2021). Cause of decline is uncertain but primarily may be related to interacting factors including habitat degradation (e.g., such as caused by livestock grazing), disease, and climate change (NatureServe 2021). Relative to habitat loss/ degradation, USFWS (2013) concluded that climate change is a current threat of high magnitude, whereas livestock grazing and fire management regime are threats of moderate magnitude roads, and timber harvest, dams and water diversions, and recreational land uses are low magnitude threats.

USFWS (2013) reviewed available information and concluded that disease has a moderate, ongoing effect on populations of the species rangewide. The threat most specifically includes chytridiomycosis, caused by the amphibian pathogen, Bd. Although definitive empirical data quantifying the contribution of disease to Yosemite toad population declines are not currently available, the concurrence of population declines with the prevalence and spread of Bd across the Sierra Nevada support the assertion that disease has played a role in the observed trend (USFWS 2013). Yosemite toad has a NatureServe Global rank G2 (Imperiled), a State rank S2 (Imperiled), and is ESA Threatened.

Table 11.2. California Natural Diversity Database records for amphibian and reptile species within the ESNR Project Area. All "S" Species Status rankings (S1, S2, S3, etc.) are based on NatureServe Explorer data (NatureServe Explorer; NatureServe 2021).

Organism, Species name	N	Most recent	County	Elevation range	Species Status, Notes
Amphibians					
Kern Plateau salamander (*Batrachoseps robustus*)	2	2007	Inyo	6703	S3
Mount Lyell salamander (*Hydromantes platycephalus*)	13	2007	Inyo	3950 to 7800	S4
Northern leopard frog (*Lithobates pipiens*)	49	1994	Both	4160 to 5160	S2, CA SSC
Sierra Nevada yellow-legged frog (*Rana sierrae*)	17	2013	Both	3700 to 7850	S1, Federal Endangered
Reptiles					
Mohave desert tortoise (*Gopherus agassizii*)	2	2009	Inyo	3745 to 5266	S2, Federal Threatened

Among the ten species of Special Status amphibians and reptiles in the Desert Province area (Table 11.1), there were CNDDB records in the ESNR Project area for four of them (Table 11.2). A range map for the black toad developed by CDFW suggests that this species may have a very limited distribution in the Project area to the northeast of Bishop (Fig. 11.2). The Inyo Mountains slender salamander will not be present in the ESNR Project area (Fig. 11.2). Northern leopard frogs are likely present in the middle portion of the Project area including in wet meadows around Crowley Lake (Fig. 11.3), whereas the Sierra Nevada yellow-legged frog will likely be present in suitable riparian habitats along the western boundary of the Project area from Mono Lake south to near Lone Pine (Fig. 11.1)

Review of Special Status Amphibians and Reptiles in the ESNR Project Area

Black Toad. The black toad is a common, but highly restricted species, occurring only in Deep Springs Valley between the White and Inyo Mountains in Inyo County (not present in the ESNR Project Area; 8.43). Black toad was formerly called Deep Springs toad, and considered a subspecies of *B. boreas.* Elevations of occurrence are from 5,000 ft to 5,200 ft. The species occurs in or near springs, water courses, marshes and wet meadows. When active, terrestrial individuals seek cover under and between clumps of vegetation and under surface objects near watercourses and in marshy situations. Such individuals often attempt to escape capture by hopping into the water and seeking the shelter of undercut banks of watercourses. In winter individuals appear to seek shelter in rodent burrows or in depressions under surface objects.

Black toad has a NatureServe Global rank G1 (Critically Imperiled), a State rank S1 (Critically Imperiled), is CESA Threatened, and is a BLM and USFS sensitive species.

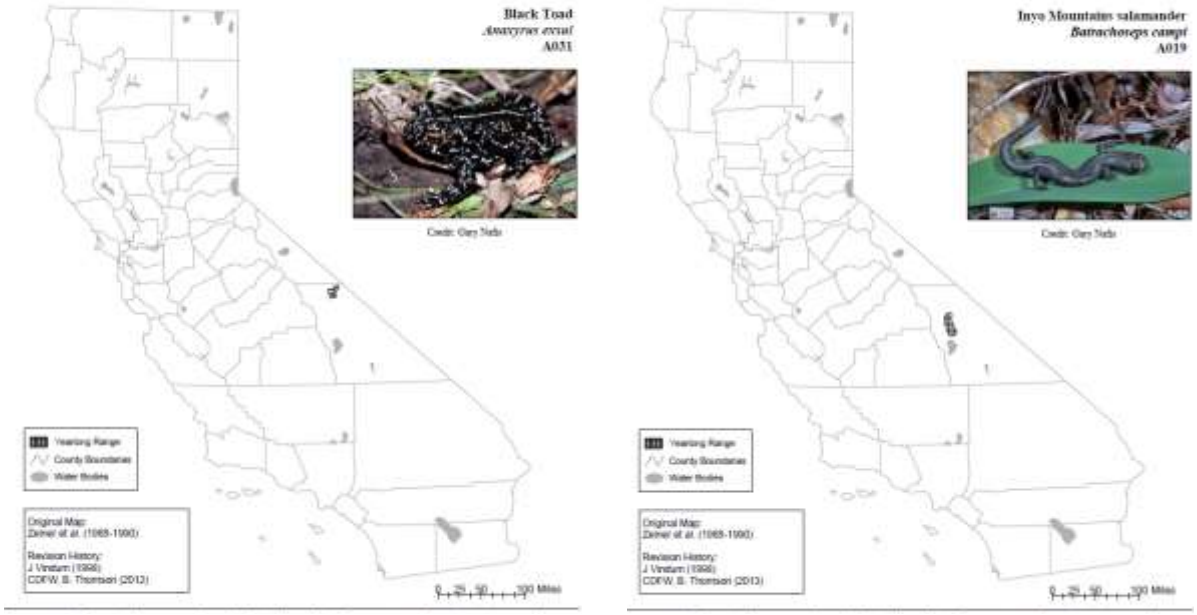


Figure 11.2. Range maps for the Black toad (left), and the Inyo Mountains salamander (right) in or near the ESNR Project area. Maps prepared by CDFW staff/contract scientists for the California Wildlife Habitat Relationship System (B. Thompson 2012; Zeiner et al. 1990; B. Thompson 2013).

Inyo Mountains salamander. This species is not present in the ESNR Project Area (Fig. 11.1). This salamander is a distinct species distinguished from all other species of *Batrachoseps* based on its large size, short tail, broad head, and distinctive coloration without a dorsal stripe (Marlow et al. 1979, Yanev and Wake 1981). This California endemic is known only from 16 localities (Morrison and Hall 1999) extending 20 miles along the Inyo Mountains (Inyo County) between Waucoba Mountain and New York Butte, and 6.5 to 8.4 miles east to west across the mountain range. Yanev and Wake (1981) report the known elevational range of this species as extending from 1,800 to 1,970 ft (Hunter Canyon) to 8500-8600 ft (Upper Lead Canyon). Currently, only the gross habitat requirements of *B. campi* are known. The original two known localities where this species was discovered each have permanent seepage springs with limited vegetation associated with talus rubble (Marlow et al. 1979). Fissured limestone likely provides shelter for *B. campi* in the canyons where it is known to occur (Morrison and Hall 1999). Each of the sites where this species is known to occur has a narrow strip of riparian vegetation. Where habitat is suitable, cliffs, outcrops, or talus are in contact with spring flow and the flow passes through dense riparian vegetation (Papenfuss and Macey 1986; Macey and Papenfuss 2021). The area estimated to be ideal habitat at each locality where this species is known to occur is very small, ranging from 0.42 to 10.7 acres (Macey and Papenfus 1991; Macey and Papenfuss 2021). Threatened; the relatively restricted distribution of this California endemic to limited habitat in the Inyo Mountains and the very small area of estimated ideal habitat may make this species especially vulnerable to habitat alteration. Much of its known habitat is associated with springs that can attract significant human, horse, and burro (*E. asinus*) activity that is likely to imperil its survival. Its restricted geographic range also makes it particular susceptible to extinction from catastrophic climatic or geomorphologic events of regional scale.

Inyo Mountains salamander has a NatureServe Global rank G3 (Vulnerable), a State rank S3 (Vulnerable), is CESA Threatened, and is a CA SWAP Conservation Focal Species.

Northern Leopard Frog. The northern leopard frog is widely distributed in North America, but uncommon and localized in California. Northern leopard frog will be present in the ESNR Project Area in around Long Valley/Crowley Lake (Fig. 11.3). Highly aquatic, leopard frogs occur in or near quiet, permanent and semi-permanent water in many habitats. This species occurs near permanent or semi-permanent water in many habitat types. The origins of the state's populations are uncertain, but many appear to be introduced. In the southern part of the state, this species occurs along the Colorado River, and in irrigated portions of Imperial, Tulare and Kern cos. The status of introduced populations in the Tahoe Basin is unknown. Elevation range extends from sea level to 7,000 ft.

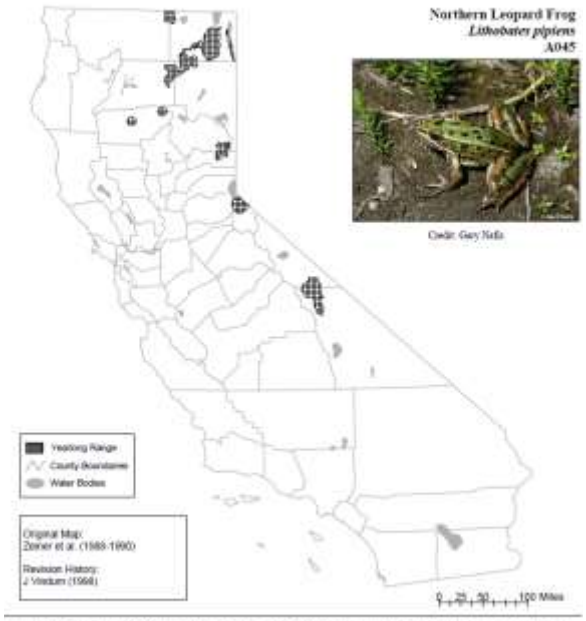


Figure 11.3. Range map for the Northern Leopard Frog within or near the project area. Maps prepared by CDFW staff/contractor scientists for the California Wildlife Habitat Relationship System.

Northern Leopard frog has a NatureServe Global rank G5 (Secure), a State rank S2 (Imperiled), and is a CA SWAP Conservation Focal Species.

Kern Plateau salamander. This species will not be present in the ESNR Project Area (no figure presented). It is found in Kern County on the Kern Plateau of the southeastern Sierra Nevada, and in the Scodie Mountains, with an elevation range of 5,298 - 9,199 ft (Stebbins, 2003). Occurs in moist areas among a variety of montane conifer, hardwood and shrub species, including Jeffrey pine and red fir in the northern and more humid parts of its range, and lodgepole pine, pinyon pine, black oak canyon oak, big sagebrush and rabbitbrush in the drier areas (Wake et al. 2002; Stebbins, 2003).

Kern Plateau salamander has a NatureServe Global rank G3 (Vulnerable), a State rank S3 (Vulnerable), and is an Inyo NF Species of Concern.

Panamint alligator lizard. The Panamint alligator lizard occurs only in Inyo and southeastern Mono counties, but not within the ESNR Project Area (Fig. 11.4). The distribution is on the east side of the Owens River Valley in the foothills of the Inyo and Panamint Mountains. This alligator lizard has been found in the White and Inyo mountains to the north and west and in the Panamints to the south and east. Anecdotal accounts of uncertain origin suggest this lizard, or another like it, may inhabit other desert mountain ranges south and east of this present distribution. Elevations range from 2,500 to 8,000 ft (Banta et al. 1996). Few specimens are available, mostly incidental captures in pitfall traps. Abundance and other aspects of the biology are poorly known. All specimens have been taken near permanent water in canyons or in talus near dense vegetation. This species appears to occupy a habitat that is relictual from former wetter times. As the desert has dried out it has been restricted to a few moist mountain localities. Its distribution and secretive habits may preclude its being well known.

Panamint Alligator lizard has a NatureServe Global rank G3 (Vulnerable), a State rank S3 (Vulnerable), is a BLM and USFS sensitive species, and a CA SWAP Conservation Focal Species.

Figure 11.4. Range map for the Panamint alligator lizard within or near the project area. Map prepared by CDFW staff/contractor scientists for the California Wildlife Habitat Relationship System (Zeiner et al. 1990). Source: CDFW California's Wildlife.

Northern sagebrush lizard. The sagebrush lizard is widely distributed in montane chaparral, hardwood and conifer habitats, eastside pine and juniper habitats, and Great Basin shrub habitats of the Cascades

and Sierra Nevada, and also east of the Sierra-Cascade crest in northern California. Isolated populations exist at Sutter Buttes in the Sacramento Valley, in the Coast Ranges along the entire length of the state, in the mountains of southern California, and in the desert mountains of Inyo County from 3,000-10,400 ft. This species will be common and widespread in the ESNR Project Area (Fig. 11.5). The sagebrush lizard occurs in a wide variety of open forest and shrub habitat types, chiefly above 3,000 ft. When disturbed these lizards most often take cover in dense, low growing bushes or shrubs. They also hide in mammal burrows, rock crevices, and under surface objects. Individuals bask on the ground, on low branches of bushes, on low boulders. Mammal burrows and rock crevices may serve as hibernation sites during cold periods. Sagebrush lizards are important prey items for a variety of vertebrate species, including snakes (especially striped whipsnakes and night snakes) and predatory birds.

Northern sagebrush lizard has a NatureServe Global rank T5 (Secure Subspecies), a State rank S3 (Vulnerable), and is a BLM sensitive species.

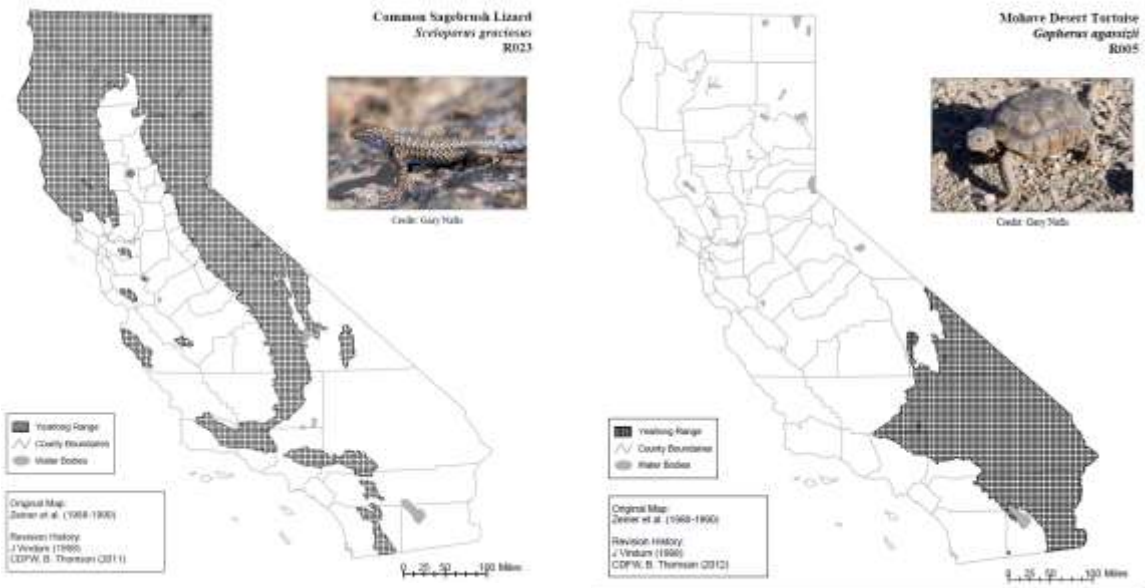


Figure 11.5. Range maps for the Sagebrush lizard (left) and the Mojave Desert tortoise (right) within or near the project area. Maps prepared by CDFW staff/contract scientists for the California Wildlife Habitat Relationship System (Zeiner et al. 1990, J. Vindum 1998, B. Thompson 2012). Source: CDFW California's Wildlife.

Desert tortoise. This species is widely distributed in the Mojave, Sonoran and Colorado deserts from below sea level in Death Valley to 7,220 ft (Grover and DeFalco 1995). The only area of possible presence of the Mohave desert tortoise in the ESNR Project area would be around Owens Lake, otherwise not present (Fig. 11.5). This tortoise is most common in desert scrub, desert wash, and Joshua tree habitats, but occurs in almost every desert habitat except those on the most precipitous slopes. Desert tortoises occur in a wide variety of habitats in arid and semiarid regions. They require friable soil for burrow and nest construction. Highest densities are achieved in creosote bush communities with extensive annual wildflower blooms, such as occur in the western Mojave. However, tortoises can be found in areas of extensive lava formations, alkali flats and most other desert habitats.
Mojave Desert tortoise has a NatureServe Global rank G3 (Vulnerable), a State rank S2 (Imperiled), and is ESA and CESA Threatened.

12. FISHES

Eastern Sierra Nevada native and naturalized fishes occupy a variety of habitats including thermal springs, small streams, rivers and large lakes. The Sierra Nevada Ecosystem Project (SNEP) attributes native fish population declines to changes in the amount and timing of stream flows, changes in water quality, reduction in habitat structural complexity from from loss of riparian tree habitats and channelization, siltation, and invasions of non-native species (1996; Vol II, Ch 32, p 945). The waters of California are managed by the CDFW. Several creeks in Mono County are managed for the maintenance or reintroduction of SS threatened or endangered species, including the Paiute cutthroat trout (Cottonwood and Cabin creeks), and the Lahontan cutthroat trout (Slinkard, Mill, Silver, Wolf, By-Day, O'Harrel and Glass creeks). Other important management areas for sensitive species include Hot Creek Springs, Owens River Gorge, Fish Slough, and Crowley Lake. The CDFW also manages "special waters," which may include specific fishing restrictions or requirements on certain waters. For a complete list of fishing regulations, see the CDFW website at http://www.dfg.ca.gov/fish/Fishing/. Other aquatic and fish-related issues stream, river and lake water quality, water diversions, and grazing impacts on riparian vegetation. Many of streams, creeks, and natural springs in the ESNR Project Area experience some level of water diversion; as much as 88% of the stream mileage of the Owens River drainage from the Mono Lake Basin has been affected by water diversions, with nearly 38% experiencing a ≥50% diversion level. Water diversions occur year-round, and create a particular hardship on trout species from November through March. Overwinter losses of all sizes of brown trout ranged from 26% to 85% and averaged 60% over four years in Convict Creek. Winter losses of the larger trout (≥ four inches) were higher, ranging from 48% to 91% and averaging 80% over four years. Decreased water levels from winter diversions reduce the availability of aquatic food organisms and increase the amount of ice formation.

Mono County fisheries are comprised of two components. The widely known introduced sport fishes such as rainbow, brown, and brook trout, and native Lahontan cutthroat trout, and other native fishes. With the exception of cutthroat, the sport fishes are not native to the ESNR Region, and although populations often have high winter mortality rates, they are self-sustaining. CDFW stocks many of the higher order, permanent streams, small and large lakes, and the Middle Owens River with rainbow trout (*Oncorhynchus mykiss*) to support a recreational fishery in the region. The Middle Owens River also supports a healthy population of brown trout (*Salmo trutta*). The Middle Owens River contains a variety of unique fish species such as the endangered Owens pupfish (*Cyprinodon radiosus*) and Owens tui chub (*Siphateles bicolor snyderi*), which were extirpated from most river reaches as a result of the introduction of non-native species and other factors. Tui chub are present along eight miles of the Owens River below Long Valley Dam/Crowley Reservoir). Other native species, Owens sucker (*Catostomus fumeiventris*) and Owens speckled dace (*Rhinichthys osculus* spp) may be able to persist in very shallow, backwater areas around Tinemaha Reservoir and in tule beds as well as in tributaries. In 2002 the CDFG conducted fish surveys in two sections of Horton Creek. The lower section was immediately below the Pleasant Valley Dam road crossing in a shallow beaver pond heavily shaded with willow and wild rose on overhanging streambanks. The upper section flows as a set of swift runs and two small pools bordered by dense willow, rabbitbrush, and wild rose. A single sucker measuring 210 millimeters (mm) in length was found in the upper section and one in the lower section measured 185 mm. Combined sampling in both upper and lower reaches resulted in 17 speckled dace. This indicates that these two native fish species are able to persist in habitat that provides good cover and protection

from brown trout; thus, it can be assumed that Owens sucker and speckled dace probably occupy other tributaries to the Owens River.

Historical records indicate that the decline of native fish assemblages occurred during the period from 1930 to 1970. The rapid decline of native fish species is attributed to introductions of exotic predatory fishes and loss of habitat. While pupfish are rare, they have been kept in a relatively stable condition in small refuge sites in the Owens Valley. Extirpation of native species occurred before biological surveys of their populations were performed, thus quantitative descriptions of their historical natural distribution and abundance is not possible. It has been suggested that Owens dace would have historically been the dominant fish in the headwaters of the Owens system and the riffles of the lower sections. Pupfish are thought to have originally inhabited springs and marsh areas, while suckers and tui chub dominated the slow-flowing lower sections of the river. In recent years Lahontan tui chub (*Siphateles bicolor obesa*) have been introduced into the Owens River Basin; hybridization with the Owens tui chub is threatening the genetic purity of Owens tui chub populations in the system. Owens pupfish and the Owens tui chub are both listed as threatened and endangered species by federal and state governments. Owens speckled dace is a California species of special concern and has been listed as a species of concern in the draft federal species recovery plan for the Owens Basin. Owens sucker is a species of special concern in the State of California. Introduction of exotic fish species into the Owens Valley is well documented. Western mosquito fish (*Gambusia affinis*) were introduced in recent years as a control mechanism for mosquitoes. Other nonnative fish species present in the LORP area include Largemouth bass (*Micropterus salmoides*), smallmouth bass (*M. dolomieu*), catfish (*Ictalurus punctatus*), bluegill and sunfish (*Lepomis macrochirus*), carp (*Cyprinus carpio*), and brown trout. Although detailed surveys have not been conducted by river reach, it can be assumed that most of the exotic species will occur to one degree or another throughout ESNR Project Area. In Table 12.1 we provide a comprehensive listing of Special Status fish species known or likely present in the ESNR Project Area.

Table 12.1 Special Status fish species of greatest conservation need in the California Desert Provinces Mono and Southeastern Great Basin Ecoregions. Sources are (1) an official U.S. Fish and Wildlife Service list of threatened and endangered species (IPaC) within the Eastside Riparian Project area polygon, (2) Inyo National Forest Species of Concern (USFS Sensitive), (3) State of California Natural Diversity Database (CNDDB), (4) the 2015 California State Wildlife Plan Focal Species of Conservation Strategies (CA SWP Conservation Focal Species), and (5) the BLM Special Status Animal Species - Bishop Field Office (BLM Sensitive).

Common Name (Scientific name)	Status and Source
Owens Tui Chub (*Gila bicolor ssp. Snyderi)*	Federal Endangered (IPaC), CESA Endangered
Owens River Pupfish (*Cyprinodon radiosus)*	Federal Endangered (IPaC), CESA Endangered
Owens sucker (*Catostomus fumeiventris*)	CA SSC
Owens speckled dace (*Rhinichthys osculus* ssp. 2)	BLM Sensitive
California golden trout (*Oncorhynchus mykiss aguabonita*)	USFS Sensitive
Amargosa River pupfish (*Cyprinodon nevadensis amargosae*)	BLM Sensitive

USFWS IPaC Fishes in the Project Area

Both the Owens River pupfish and Owens Tui chub have extant ranges that are within the ESNR Project area (Fig. 12.1, 12.2).

Owens River Pupfish. The Owens pupfish is a small (<2.5 in length), deep-bodied, laterally compressed fish. Males are larger and deeper bodied than females. Breeding males are bright blue with broad vertical bars on the side. Females are generally brownish above and silvery below, with several irregular brownish vertical bars. Non-breeding males resemble females. Owens pupfish congregate in small schools and feed mostly on aquatic insects. Reproduction occurs from January through September. Spawning occurs in male-defended territories. Females may spawn daily, laying a few eggs at a time.

Habitat for the Owens pupfish consists of spring pools, sloughs, irrigation ditches, swamps, and flooded pastures in the Owens Valley from Fish Slough in Mono County to Lone Pine in Inyo County (Fig. 12.1). Currently, this fish is confined to five populations in the Owens Valley.

Distribution/Status. Historically, Owens pupfish occurred in the Owens River and spring pools, sloughs, irrigation ditches, swamps, and flooded pastures in the Owens Valley from Fish Slough in Mono County to Lone Pine in Inyo County. Habitat alteration associated with the introduction of non-native trout and bass, along with historic water resources development reduced the distribution and abundance of this species.

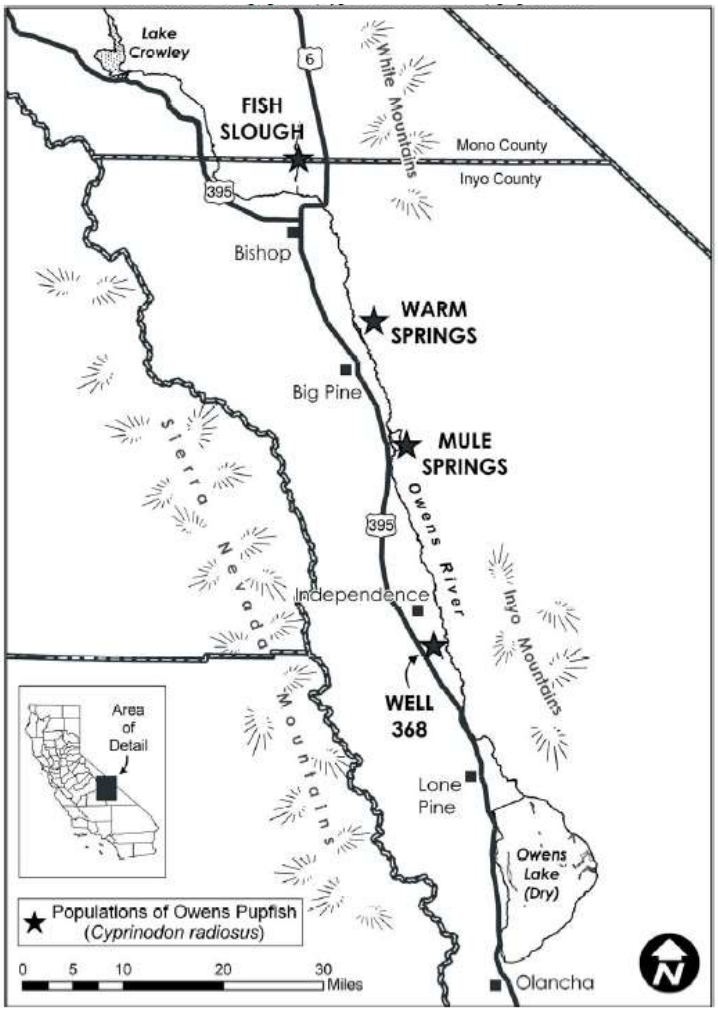


Figure 12.1. Estimated current range of the Owens pupfish in the Eastside Sierra Nevada region. Source: USFWS 5-year Status Review (January 2009).

The Owens River pupfish is present in the ESNR Project area, but with a limited distribution that appears entirely within State or LADWP managed lands. The population at Fish Slough would be under the management purview of CDFW, whereas those along the Lower Owens River would be managed by LADWP.

The Fish Slough ACEC is a system of springs and marshes cooperatively managed by the Department, BLM, LADWP, University of California Natural Reserve System, and USFWS. Two sites within Fish Slough, 'BLM Spring' and the Owens Valley Native Fishes Sanctuary, have lost pupfish populations following

illegal introductions of largemouth bass. BLM Spring was restored in 2002, and reintroduction of pupfish occurred in 2003. Two additional populations tenuously persist in marshy areas of Fish Slough. Pupfish also occur in Inyo County at Mule Spring on BLM land, at Warm Springs and below an artesian well on LADWP land. Owens River pupfish has a NatureServe Global rank G1 (Critically Imperiled), a State rank S1 (Critically Imperiled), and is an ESA and CESA Endangered Species.

Owens Tui Chub. The Owens tui chub is similar in appearance to the closely related Mohave tui chub. Owens tui chub are large-scaled, small, chunky fish. They are olive colored on the dorsal surface and bluish or creamy white below. To distinguish the Owens tui chub from other tui chub requires microscopic examination of scales and cranial bones, although DNA techniques are under development. The maximum body length is approximately eight inches. Owens tui chub spawn from March through September. Females lay adhesive eggs on vegetation or other available substrates, such as rocks and gravel. Owens tui chub eat insect larvae and, to a lesser degree, algae and detritus.

The historic distribution of the Owens tui chub was throughout the standing waters and low gradient reaches of the Owens River and its larger tributaries extending from the river's source springs to its terminus at Owens Lake (Fig. 12.2).

Owens Tui Chub are known present in the ESNR Project Area, and as with the Owens River Pupfish, most of the populations of Owens Tui Chub in the Project area will be under the management purview of LADWP.

Distribution/Status. There are three existing natural Owens tui chub populations. These are at the Owens River Gorge, source springs of the Department's Hot Creek Hatchery, and a pond and ditches at Cabin Bar Ranch near Owens Dry Lake (Fig. 12.2). Additional populations of Owens tui chub have been established in cooperation with land owners at BLM's Mule Spring, Little Hot Creek in

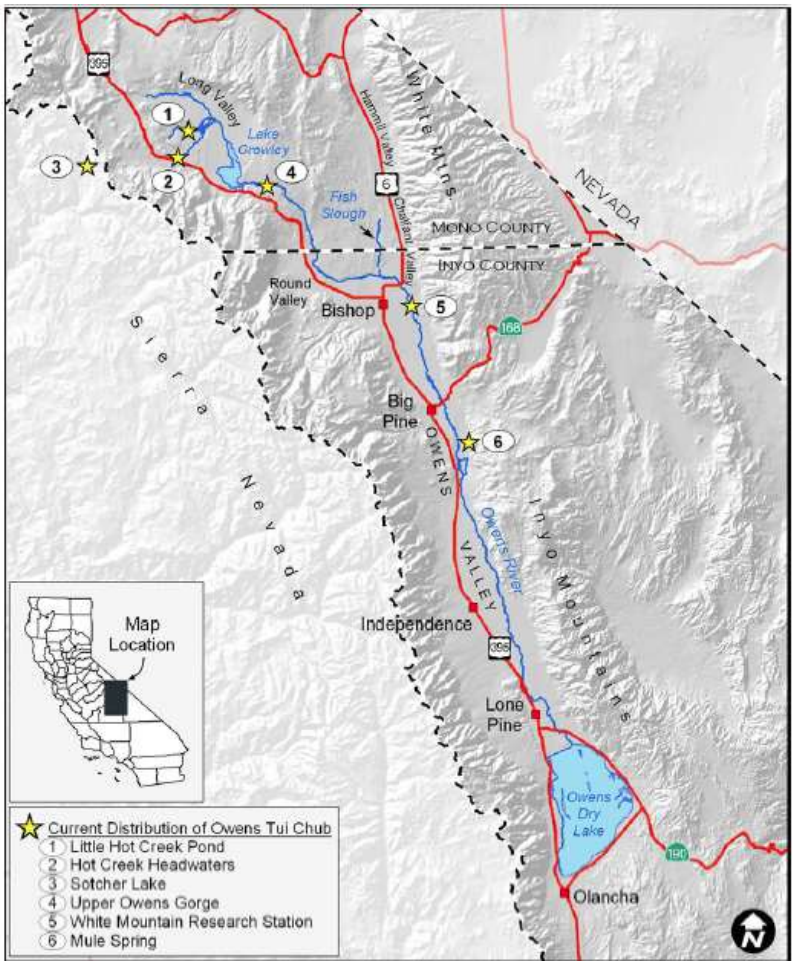


Figure 12.2. Current distribution of Owens Tui Chub populations in the Eastside Sierra Nevada region. Source: USFWS Owens Tui Chub 5-Year Review (USFWS 2009).

Inyo National Forest, and at the University of California White Mountain Research Station owned by LADWP (Fig. 12.2).

The major threats to the Owens tui chub are the presence of numerous, introduced Lahontan tui chub with which the natives readily hybridize, the introduction of predatory fish species, and lack of suitable habitats for reestablishment. The New Zealand mud snail (*Potamopyrgus antipodarum*) is a tiny, alien species that is invading some California waters and threatening wild trout populations. The snail has already been found in both the upper and lower portions of the Owens River. Its potential impacts on the Owens tui chub are not known. Competition with and predation by trout in the Owens Gorge, geothermal and water supply development in the Hot Creek watershed, and vegetation encroachment at Cabin Bar potentially threaten existing populations. The Department has contracted with UC Davis to verify the genetic purity of tui chub populations in the Owens Valley and make genetic management recommendations.

Review of Special Status Fish Species in the ESNR Project Area

Owens Speckled Dace. The speckled dace historically occupied most small streams and springs in the Owens River Valley (Fig. 12.3). The Mojave River is the only river system in the Deserts Province that has not been occupied at some time by speckled dace. Owens speckled dace was extirpated from a majority of its historic range by the 1980s, however, and small, isolated populations remain in Long Valley, the East Fork Owens River near Benton, Fish Slough, Round Valley, North Fork Bishop Creek, Horton Creek, Pine Creek, in the Owens River and in irrigation canals between Bishop and Big Pine. Where they persist, speckled dace populations are scattered, mostly small and fluctuate widely in size.

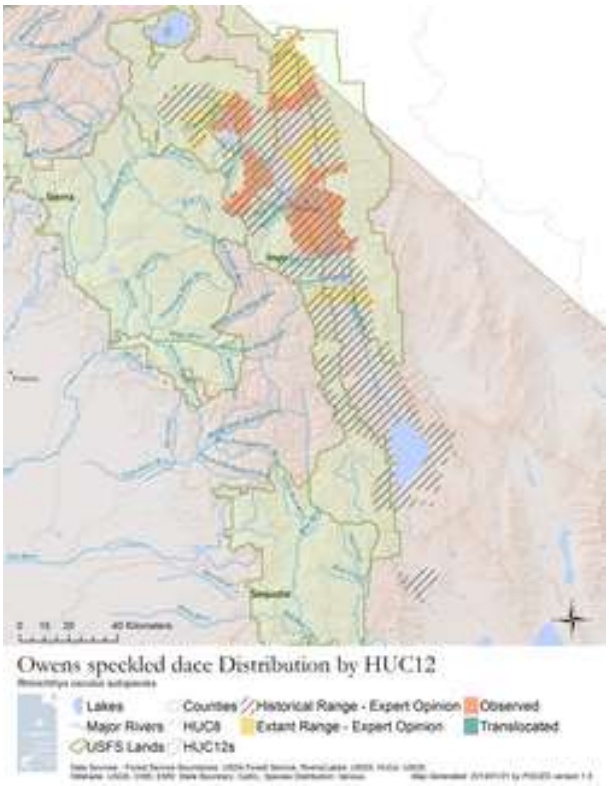


Figure 12.3. Estimated range of the Owens speckled dace in the Eastside Sierra Nevada region.

Speckled dace are small cyprinids with a total length of up to 90 mm. Their coloration is highly variable, but consists of a series of dark blotches on a lighter background. In reproductive individuals of both sexes, the bases of the fins become orange to red and males may develop tubercles on the pectoral tins. They are omnivorous. Their diet includes aquatic and terrestrial insects, other invertebrates such as snails and microcrustaceans and filamentous algae.

The taxonomy of this species or species complex is poorly understood and highly confusing because the species is naturally variable. There has not been a taxonomic analysis of the speckled dace over its entire range. Owens speckled dace are closely related to speckled dace found in the Amargosa River (*R. o.*

nevadensis) of Death Valley, and probably should be placed within the same subspecies, but each isolated population should be recognized as a distinct population segment for management purposes.

Speckled dace from the Owens Basin are known to occupy a variety of habitats ranging from small coldwater streams to hot-spring systems, but they are rarely found in water exceeding 29° C. They also are present in irrigation canals/ditches near Bishop. Despite the large variety of habitats apparently suitable to speckled dace of the Owens Basin, their disappearance from numerous localities after the 1940s suggests the species is vulnerable to habitat modifications or to invasion by exotic fishes. For example, in the southern Owens Valley speckled dace have been collected only from periodically disturbed human-created habitats, and areas where exotic predatory fishes are excluded by poor water quality or shallow water (S. Parmenter professional observation). Owens Speckled dace has a NatureServe Global rank G5 (Secure), no State status rank, and is a BLM Sensitive Species.

Amargosa River Pupfish. The Amagrosa River pupfish does not occur within the ESNP Project area (Fig. 12.4). *C. n. amargosae* is the most widely distributed subspecies of C. nevadensis, inhabiting two perennial sections of the lower Amargosa River and Tecopa Bore, in southern/southeastern Inyo County. The upper section begins upstream of Tecopa and flows through Amargosa Canyon for about 6.8 miles until it approaches Sperry, where it dries, except after rare periods of heavy rainfall upstream. The second, lower, section flows through Death Valley northwest of Saratoga Springs, approximately 20 miles downstream of Sperry, and continues for about 2 miles. Differences in meristic characteristics between the two populations suggest that they are effectively isolated from each other (Scoppettone et al. 2011), except, perhaps, in times of floods. In 1940, R. R. Miller planted 350 Amargosa pupfish in River Springs, Adobe Valley, Mono County. This population was extant and flourishing; however,

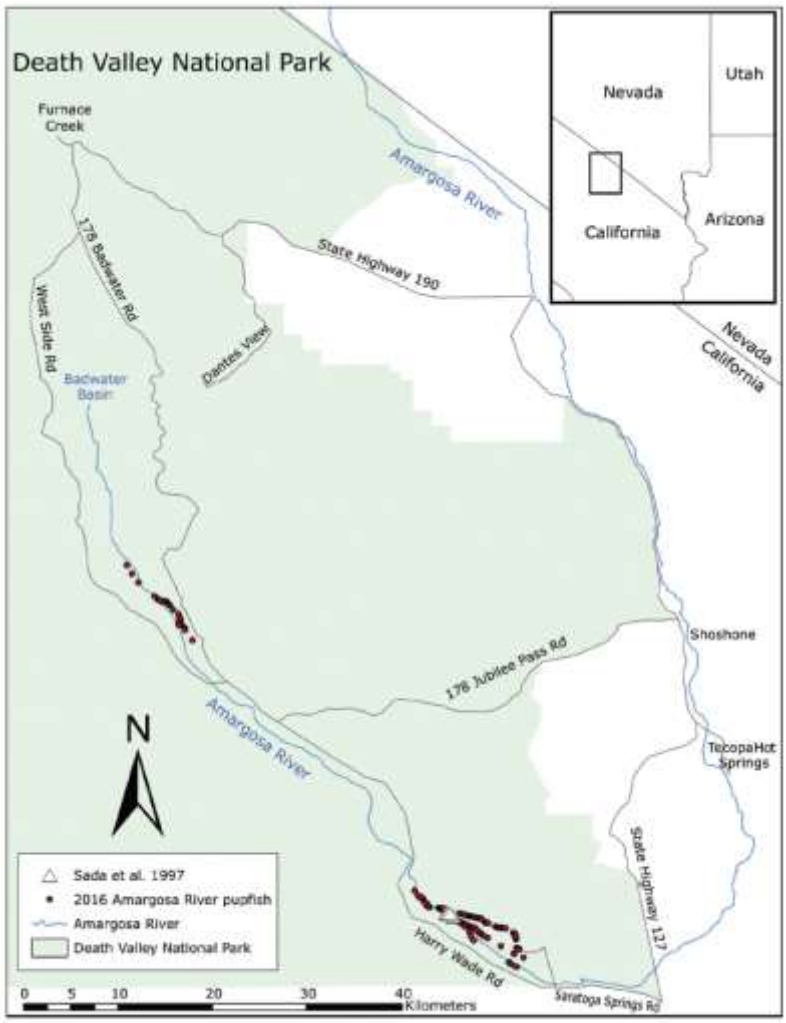


Figure 12.4. Map of the Amargosa River and drainages with wetted and ephemeral sites, including known occurrence records for the Amargosa River pupfish in Death Valley National Park in fall 2016 (source: Sada et al. 1997).

because *C. s. salinus* was planted at the same time, studies are needed to determine whether, and to what extent, hybridization between the two taxa may have occurred (E. Pister, CDFW).

The major threat to Amargosa River pupfish is potential dewatering of its unique habitats, the Amargosa River and tributaries, by a combination of local surface water diversions and groundwater withdrawals. The Amargosa Aquifer, which supplies springs in Ash Meadows, Nevada and the Amargosa River, receives much of its recharge flow from areas on the northern and northeastern slopes of nearby Spring Mountains (Riggs and Deacon 2002), but is also dependent on regional groundwater movement through large, ancient aquifers that extend into western Utah and central Nevada (Dettinger 1995; Riggs and Deacon 2007; Zdon 2014). Amargosa River pupfish has a NatureServe Global rank G2 (Imperiled), no State status rank, and is a BLM Sensitive Species.

California golden trout. The California golden trout does not occur in the ESNR Project area (Fig. 12.5). California golden trout are endemic to the South Fork of the Kern River, which flows into Isabella Reservoir, and to Golden Trout Creek (including its tributary, Volcano Creek), which flows into the Kern River (Berg 1987). Initially (1909 and earlier), California golden trout were collected from Golden Trout Creek and transported north by pack train, extending their range by some 160 km by 1914 (Fisk 1969).

Figure 12.5. Estimated range of the California golden trout in the Sierra Nevada. Source: CDFW California Golden Trout).

This native trout appears relatively secure from a conservation perspective. Historically, California golden trout populations suffered major declines during the 19th and first half of the 20th Century from overfishing and heavy grazing. Invading brown trout displaced California golden trout, including hybrids, from all reaches below artificial barriers, so golden trout are now confined to a few kilometers of stream in the Golden Trout Creek watershed and in the South Fork Kern watershed. Although California golden trout were widely introduced outside their native range during the 19th and 20th century, the introduced populations are not regarded as contributing to golden trout conservation because most have hybridized with coastal rainbow trout.

Table 12.2. California Natural Diversity Database species records for fishes within the ESNR Project Area. All "S" Species Status rankings (S1, S2, S3, etc.) are based on NatureServe Explorer data (NatureServe Explorer; NatureServe 2021).

Organism, Species name	N Records	Most Recent	County	Elevation Range	Species Status; Notes
Owens sucker (*Catostomus fumeiventris*)	144	2011	Both	3850 to 6960	S3, CA SSC
Amargosa pupfish (*Cyprinodon nevadensis amargosae*)	8	1986	Mono	6480	S1S2, CA SSC, BLM Sensitive
Owens pupfish (*Cyprinodon radiosus*)	758	2008	Both	3120 to 4400	S1
Lahontan cutthroat trout (*Oncorhynchus clarkii henshawi*)	1	1986	Mono	7200	S1
Owens speckled dace (*Rhinichthys osculus*)	148	2002	Both	3800 to 7000	S1S2, CA SSC, BLM Sensitive
Long Valley speckled dace (*Rhinichthys osculus*)	7	2009	Mono	6850 to 6960	S1, CA SSC
Owens tui chub (*Siphateles bicolor snyderi*)	125	2002	Both	3120 to 7000	S1

13. INVERTEBRATES

Mono and Inyo County have a high degree of endemic insects due to isolation by the Sierra escarpment to the west and the White Mountains to the southeast. Inyo County is identified by the Sierra Nevada Ecosystem Project (SNEP 1996; Vol II, Ch 26, p 739) as having the "highest endemicity of terrestrial insects in the Sierra Nevada region" due to these same evolutionary factors. The SNEP (1996; Vol II, Ch 27, p 743- 746) also identifies the middle elevation of the Sierra Nevada as one of the richest butterfly faunas in temperate North America. The species listed in the CNDDB do not have special protection status, but are rare and included in the CDFW RareFind database (Table 13.1).

Table 13.1 Special Status invertebrate species of greatest conservation need in the California Desert Provinces Mono and Southeastern Great Basin Ecoregions. Sources are (1) an official U.S. Fish and Wildlife Service list of threatened and endangered species (IPaC) within the Eastside Riparian Project area polygon, (2) Inyo National Forest Species of Concern (USFS Sensitive), (3) State of California Natural Diversity Database (CNDDB), (4) the 2015 California State Wildlife Plan Focal Species of Conservation Strategies (CA SWP Conservation Focal Species), and (5) the BLM Special Status Animal Species - Bishop Field Office (BLM Sensitive).

Type, Common Name (Scientific name)	Status and Source
Terrestrial Invertebrates	
Monarch Butterfly (*Danaus plexippus)*	ESA Candidate Species (IPaC)
Sierra sulphur (*Colias behrii*)	USFS Sensitive
Square dotted blue (*Euphilotes battoides mazourka*)	USFS Sensitive
Mono Lake checkerspot (*Euphydryas editha monoensis*)	USFS Sensitive
Boisduval's blue (*Plebejus icarioides inyo*)	USFS Sensitive
San Emigdio blue (*Plebulina emigdionis*)	USFS Sensitive
Apache fritillary (*Speyeria nokomis apacheana*)	USFS Sensitive
A cave obligate pseudoscorpion (*Tuberochernes aalbui*)	USFS Sensitive
Aquatic Invertebrates	
Western pearlshell mussel (*Margaritifera falcata*)	USFS Sensitive
Wong's springsnail (*Pyrgulopsis wongi*)	USFS Sensitive
Owens Valley springsnail (*Pyrgulopsis owensensis)*	USFS Sensitive

14. WILDLIFE USE AREAS IN THE ESNR PROJECT AREA

Wildlife use areas exist throughout the ESNR Project area and are important habitat for breeding birds and mammals, raising young, wintering, summering, and migrating. The ESNR Project Area includes important mule deer migratory routes, mule summer and winter ranges, and holding areas; sage grouse use areas, lek locations; pronghorn antelope and bighorn sheep use area (winter range for Sierra Nevada bighorn sheep); general use areas by water-fowl and raptors; and non-native feral goat (*Caprus hircus*), wild horse (*Equus caballus*) and burro (*Equus asinus*) areas. The BLMs Lee Flat and Waucoba-Hunter Mountain Wild Horse Management Areas are near the southeastern margin of the ESNR Project Area, but are non-overlapping. Non-native species have the potential to adversely impact native species in the struggle to meet food and habitat requirements. In addition, Mono Lake is an important area for migrating birds. In 1991, Mono Lake was designated as an International Reserve in the Western Hemisphere Shorebird Reserve Network, primarily for its role in the annual migration of the Wilson's

phalarope (*Phalaropus tricolor*). The Inyo and Toiyabe National Forest Land and Resource Management plans designate specific management areas that emphasize wildlife use and enhancement.

Important Bird Areas in the ESNR Riparian Project Area

Mono Lake Highlands IBA. This Important Bird Area encompasses two ranges near the Nevada border in Mono County, the Bodie Hills in the north and Glass Mountain in the south. The Bodie Hills (located well outside the ESNR Project area) form a vast area of rolling, high-elevation (>8000 ft) sagebrush tracts and stringers of riparian woodland extending from the Mono Lake Basin north to the Bridgeport Valley. Glass Mountain (within the ESNR Project area) separates Adobe Valley from the Crowley Lake area to the south, and also features extensive tracts of sagebrush, along with mixed conifer forest (Jeffrey pine with lodgepole pine at highest elevations) isolated from similar conifer habitats in Sierra Nevada. The Glass Mountain area was the subject of an intensive breeding bird atlas effort (D. Shuford, unpubl. data).

Mono Lake Highlands IBA is notable for its large population of greater sage-grouse, part of the Mono County metapopulation that appears to be genetically distinct from other groups in the Great Basin. vesper sparrows breed in abundance, as do white-crowned sparrows (*Zonotrichia leucophrys*), occurring in isolated population islands. Glass Mountain supports some of the highest densities of nesting long-eared owl in the state, as well as an unusual, high-elevation nesting population of northern harrier. Songbirds are concentrated in riparian thickets, which are filled with fruiting currants (*Ribes* spp) in fall that attract large numbers of migratory songbirds.

Ownership/Management: Inyo National Forest, BLM, CA Historic Area.
Habitats: Woody Wetlands/High Elevation Riparian Woodland, Forested Upland/Evergreen Forest/Jeffrey Pine, Forested Upland/Evergreen Forest/Lodgepole Pine, Sagebrush shrubland, grassland-Herbaceous.

Mono Lake Basin IBA. This Important Bird Area is on the boundary between the Great Basin and the eastern Sierra Nevada, which rises 6,000 ft above the lake's surface to the west. Hundreds of thousands of years of evaporation have concentrated salts and other minerals within the lake. Algae in Mono Lake supports brine shrimp as well as alkali flies that carpet the shore. The Mono Lake ecosystem feeds millions of migratory birds each year, which also utilize the marsh and alkali meadows that ring the lake. Upslope, the basin is dominated by sagebrush steppe, with pinyon-juniper forests on the higher elevations. To the south lies an expansive Jeffrey pine forest, with mountain mahogany (*Cercocarpus*) on the ridges. The lake's tributary stream support cottonwood-willow riparian forests with dense understory and wet meadows. Also, the Mono Basin area includes irrigated pasture and a few freshwater ponds that provide habitat for resident and migratory waterfowl.

Islands within Mono Lake itself support 50% of California's nesting population of California gull (*Larus californicus*), and Mono Lake remains the second-largest rookery in the world after Utah's Great Salt Lake (Shuford and Ryan 2000). California gulls are joined by Caspian tern (*Hydroprogne caspia*) and snowy plover, the latter maintaining one of its largest California breeding areas (Page et al. 1983). In summer, over a hundred thousand phalaropes (Wilson's and Red-necked phalaropes; *Phalaropus tricolor*, *P. lobatus*) descend upon Mono Lake, where they complete their molt before continuing on to wintering grounds in South America. Mono Lake is one of the key interior shorebird sites in the state. Over 20,000 Least and Western sandpipers (*Calidris minutilla, C. mauri*) have been recorded on single-day surveys in spring and fall counts of American Avocet (*Recurvirostra americana*) have exceeded

10,000 (Shuford and Gardali 2008). Also, in fall, migrating eared grebe (*Podiceps nigricollis*) are common/abundant. Willow Flycatchers breed in the streams on the west side of the basin along Rush Creek, and Virginia's Warbler (*Leiothlypis virginae*) maintains small breeding groups on ridges. Mono Lake Basin and creeks within the basin support the highest indices of breeding songbird diversity and species richness known for the eastern Sierra Nevada.

Ownership/Management: most of the Mono Basin is managed by the USFS, the State of California or the BLM, with many other California resources agencies involved in protecting this unique ecosystem.
Habitats: Diverse forested evergreen uplands, Pinyon-Juniper, open water, barren playa/sand, lakeshore beaches, sagebrush shrublands, and riparian woodlands

Adobe Valley IBA. This Important Bird Area is southeast of Mono Lake near the Nevada border, resembles a smaller version of Long Valley near Crowley Lake, and is characterized by spring-fed, ephemeral lakes and ponds rimmed by moist alkali meadows and sagebrush, with open juniper woodland on the surrounding hills. Consistent bodies of water include (north to south): Adobe Lake, River Spring Lakes, Adobe Lake and Black Lake. Glass Mountain separates Adobe Valley from the Crowley Lake area to the south.

Adobe Lake is notable for small numbers of breeding Snowy Plovers, and Black Lake represents an outpost of Great Basin breeding species, including Willet phalarope (*Catoptrophorus semipalmata*) and Wilson's phalarope. Very isolated within a dry, mountainous area, Adobe Valley is a locally important stopover site for migrant waterbirds, with several hundred shorebirds occurring, particularly in spring when water levels peak. A distinct, isolated sub-population of Greater Sage-Grouse also occurs in Adobe Valley.

Ownership/Management: entire IBA is a patchwork of public and private lands, with areas managed by both BLM and CDFW.
Habitats: Water/open water lakes/ponds, sagebrush shrubland, forested evergreen uplands, juniper, herbaceous/grass uplands.

Long Valley and Crowley Lake IBA. This Important Bird Area is located north of the head of the Owens Valley in the eastern Sierra (about 1 mile north of the Owens River Gorge). Fed by several streams from the Eastern Sierra Nevada (Convict Creek, Upper Owens River), this broad alkali meadow is surrounded by sagebrush scrub, ringed by higher elevation PJ woodland and Ponderosa/Jeffrey Pine forests. Though it originally filled with water seasonally, it supports both seasonal wetlands as well as Crowley Lake/Reservoir. Crowley Lake is 6,500 acres in surface area: it is one of the largest bodies of water in California east of the Sierran axis, and its shallow edges remain marshy year-round, providing habitat for wildlife. Cattle graze much of Long Valley, though a project to fence critical stream banks and lakeshore beginning the late 1990s resulted in a partial recovery of the meadow system, including dense rush and sedge marshes and willow thickets.

The Long Valley-Crowley Lake IBA supports one of the largest populations of Greater Sage-Grouse in California. Greater sage-grouse depend on the area's low level of development for seasonal elevational migrations (e.g. upslope in summer following nesting). Bank swallow maintains its southernmost colony left in California on the banks of Crowley Lake, and snowy plover nest in small numbers at the north end of the reservoir and on the alkali lakes scattered across the valley floor. Prairie Falcons breed in nearby rock outcroppings, and up to 24 peregrine falcon chicks have been successfully hacked out of a tower installed by LADWP. Migratory and resident waterfowl are very abundant in this IBA, and several species of ducks and grebes have large breeding populations here. Like other interior wetlands, Crowley

supports large numbers of post-breeding waterbirds in late summer (e.g. American white Pelican; *Pelecanus erythrorhynchos*), which concentrate at the mouth of the Owens River. Shorebirds migrate through this IBA by the hundreds (occasionally thousands) in spring and fall, with over 100 Spotted Sandpipers recorded during some recent single-day surveys. Also, during winter Long Valley hosts a high density of raptors.

Ownership/Management: Crowley Lake is owned and managed by the LADWP, large areas of Long Valley are leased for ranching, and surrounding land is owned/administered by the BLM.
Habitats: water/open water, sagebrush shrubland, playas, barren rock/sand, rocky outcrops, freshwater wetlands with emergent vegetation, mid-elevation riparian woodland, and herbaceous grasslands.

Upper and Lower Owens River (includes Fish Slough) IBA. Owens River drains the eastern Sierra Nevada from Long Valley south to Owens Lake. The Owens River IBA encompasses an extensive network of riparian woodland, freshwater marsh and alkali meadow habitats at the eastern base of the Sierra Nevada. In the early 1900s, Owens River was rerouted from the eastern Sierra Nevada into the Los Angeles Aqueduct to support agricultural expansion in southern California/Los Angeles. As a result, Owens River was transformed and degraded. The flow of the lower Owens was reduced drastically. The floor of the Owens Valley, was transformed into comparatively arid ranchland with small stringers of grazed riparian vegetation. Nearly all the habitat is still in private ownership or controlled by the LADWP along the main stem of the Owens River and associated tributaries. Key areas include (from north to south): the Fish Slough Area (6,400 acres of freshwater marsh, alkali meadow and limited riparian habitat, jointly-owned by BLM, DFG, LADWP just north of Bishop), Warren and Klondike Lakes (LADWP), Baker Meadow (LADWP; excellent riparian and meadow habitat west of Big Pine), the Tinemaha Reservoir Area and Fish Springs (LADWP; a large area of marshes and meadows, and mature riparian woodland along above and below the reservoir), Billy Lake (LADWP; a large freshwater marsh near Independence), Hogback Creek north of Lone Pine, and Edward's Field an area with mature riparian woodland and meadow in Lone Pine.

The riparian habitats associated with the Upper and Lower Owens River IBA are among the most extensive in the state. The northern end of the Owens River valley has been found to support two riparian breeding birds that appear extirpated from historic range in central and southern California: Bank Swallow and Willow Flycatcher, which persist locally southwest of Fish Slough. Bell's Vireo breed along the Owens River. Baker Meadow has emerged as one of the consistent spots for Yellow-billed Cuckoo in the state, with up to 9 birds summering recently at Baker Meadow and scattered pairs and singles elsewhere (e.g. Hogback Creek; along the Owens River north and south of Tinemaha Reservoir). Most of the riparian birds known for this IBA may be found commonly at Baker Meadow. The Summer Tanager nears the northern limit of its California range at Baker Meadow in remnant patches of mature riparian woodland throughout the IBA. Swainson's Hawk breed throughout the IBA in large Fremont Cottonwoods on the valley floor. Freshwater marsh habitats support large numbers of rails, as well as local pockets of summering Least Bittern (Fish Slough, Billy Lake). At Tinemaha Reservoir winter waterfowl concentrations are the largest in the IBA. Klondike and Warren Lakes also see heavy use by waterfowl. Local water conditions (e.g. draw-downs that expose mudflats) can make wet areas attractive to many species of migrating shorebirds, with 1000+ shorebirds during a recent spring survey at Tinemaha Reservoir. This IBA also supports summering Short-eared Owl along the Owens River southeast of Bishop.

Ownership/Management: with the exception of urban areas and a few housing developments, nearly the entire IBA is owned and managed by the LADWP.
Habitats: extensive wetlands, freshwater marshes, open river, mudflats/littoral areas, herbaceous grasslands, cottonwood/willow riparian, and desert riparian.

Owens Lake IBA. Owens Lake is a 100-square-mile terminal alkali playa at 3,600 ft elevation at the southern end of the Owens Valley, surrounded by the high elevation southern Sierra Nevada on the west and the Inyo Mountains to the east. Historically, the Owens Lake would fill in winter and spring depending on rainfall, and support large concentrations of waterbirds and shorebirds. After 1924, it was turned nearly dry year-round due to water diversions associated with the Los Angeles Aqueduct. About a dozen wetlands supported by natural seeps or artesian wells surround the margin of the lakebed. Except for a strip of land at the Owens River delta on the northern end, the entire lake bed is owned by the California State Lands Commission. Beginning in the 2000, LADWP has shallow flooded or ponded 25 square miles of the lake bed in order to control massive dust pollution (Clean Air Act requirement). This has led to a substantial increase in the acreage of wetland habitat on Owens Lake. LAWDP has also worked to increase wetland habitat acreages around the lake.

The Owens Lake IBA provides a major stop-over site for shorebirds and waterfowl in the southern California interior. Each spring and fall, brine flies on the lake support thousands of shorebirds, mainly Western and Least sandpipers, and thousands of ducks utilize the wetlands and small impoundments around the periphery of the lake bed. American avocets and snow geese (*Anser caerulescens*) stop at the lake during the fall migration (Ruhlen et al 2006). Snowy plover, an alkali playa obligate in the interior of California, breed here in high numbers (400-600 adults). Many of the alkali marsh birds associated with northeastern California also breed here, including yellow-headed blackbird, long-billed curlew (*Numenius americanus*) and Wilson's phalarope.

Ownership/Management: The majority of the Owens Lake bed is owned by the California State Lands Commission and LADWP. There are some small private parcels along the historic western shoreline. In 2004, the California Department of Fish and Game acquired 218 acres as the Cartago Springs Wildlife Area at the southern end of the lake. The BLM controls the 15,790-acre Owens Lake Management Area that surrounds most of Owens Lake.
Habitats: Open water, shoreline playa/mudflats, herbaceous grassland upland, desert shrubland, salt scrub, and desert playas

Recreational Uses of LADWP Eastern Sierra/Owens River Managed Lands

The Eastern Sierra has many opportunities for recreation. Importantly, the majority recreation use is closely associated with lakes and riparian habitats. As previously noted, most of the Project area is owned and administered by the US Forest Service and the Bureau of Land Management.

The City of Los Angeles owns approximately 250,000 acres in Inyo County and 60,000 acres in Mono County. Much of the Owens Valley floor is comprised of LADWP land. About 75% of LADWP-owned land in Inyo and Mono Counties is open to the public for such uses as fishing, hiking, hunting, nature studies, photography, painting, and other daytime recreational uses.

Key LADWP public recreation areas include (north to south):

- Crowley Lake; fishing, swimming, boating

- Blackrock Waterfowl Management Area (1,500 acres); managed to improve habitat conditions for resident and migratory waterfowl.
- Pleasant Valley Reservoir; fishing (boating is restricted)
- Fish Slough Area (6,400 acres of freshwater marsh, alkali meadow and limited riparian habitat, jointly-owned by BLM, DFG, LADWP/Private; just north of Bishop)
- Warren and Klondike Lakes--large impoundments just north of Big Pine (LADWP); public access for fishing and boating
- Baker Meadow (LADWP/Private); excellent riparian and meadow habitat just west of Big Pine)
- Tinemaha Reservoir Area; administered by LADWP with public access for fishing; 10 miles south of Big Pine; includes Fish Springs, a large area of marshes and meadows, and mature riparian woodland along the Owens River above and below the reservoir
- Billy Lake; large freshwater marsh administered by LADWP, public access for fishing, birding
- Hogback Creek; LADWP/Private; riparian habitat west of Highway 395 about 5 miles north of Lone Pine)
- Edward's Field (LADWP/Private; Mature riparian woodland and meadow in town of Lone Pine)

15. IMPACTS OF ONGOING AND FUTURE CLIMATE CHANGE

The Sierra Nevada is already experiencing the effects of human-caused climate change. Therefore, climate change is not the future but the present in California and the Sierra Nevada. Impacts are manifesting by reduced depth and duration of winter snow cover, water shortages, more and larger wildfires, and drought cycle-induced insect and pathogen mortality to large areas of low and mid elevation conifer forests. To understand how climate change is impacting the Sierra Nevada, it helps to review the historical and recent climate for the area.

The Sierra Nevada region is characterized by high topographical and climatological diversity (Dettinger et al. 2018), extending 400 mi north to south and 70 mi east to west. Elevations are higher in the southern end of the range, with Mount Whitney (14,505 ft) being the highest peak in the contiguous United States; peaks in the northern part of the range are generally less than 8,800 ft (Minnich and Padgett 2003). The western portion of the Sierra Nevada region is characterized by a Mediterranean climate, with cool, wet winters and warm, dry summers. The western portion of the Sierra Nevada receives moisture and warm air from prevailing westerly winds off the North Pacific Ocean (Dettinger et al. 2018). As air moves upward over the mountain range, air cools, and moisture condenses into clouds and precipitation. Thus, the western, mountainous portions of the Sierra Nevada receive more precipitation than the eastern portion (Fig. 15.1). The eastern portion of the Sierra Nevada region lies in a rain shadow and thus receives less precipitation (Fig. 15.1). The eastern portion of the range is also more heavily influenced by Great Basin climate, with colder winters and more rainfall in the summer (Dettinger et al. 2018). Temperatures are generally cooler and more precipitation falls as snow in the southern portion of the Sierra Nevada than the central and northern portions of the range because of higher elevations.

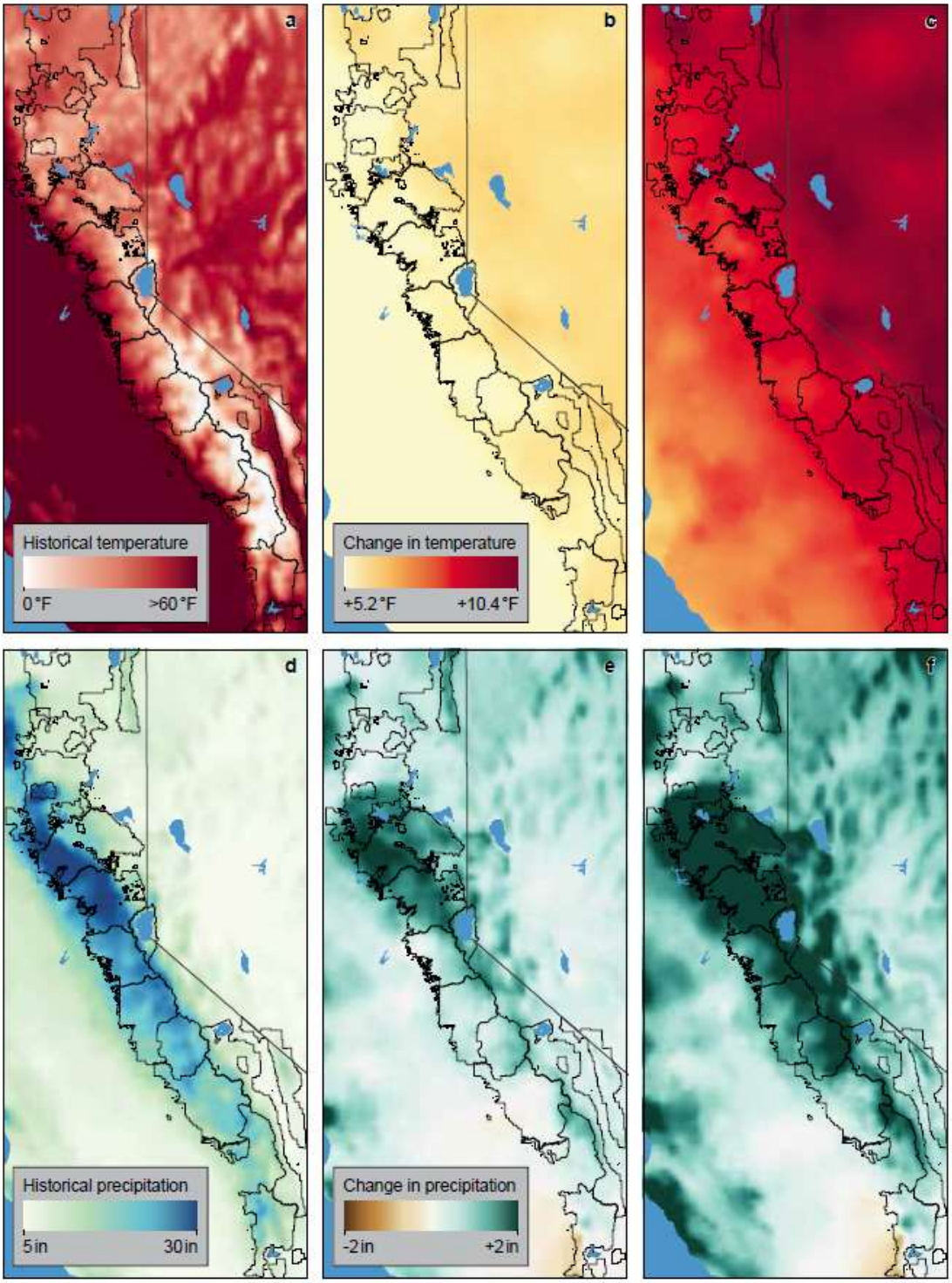


Figure 15.1. Historical (1961–1990) average annual temperature (a) and precipitation (d); and average changes in temperature (b and c) and precipitation (e and f) by 2070–2099, as projected by 10 global climate models under moderate greenhouse gas emissions (Representative Concentration Pathway [RCP] 4.5; b and e) and high greenhouse-gas emissions

(RCP 8.5; c and f). Sierra Nevada National Forest boundaries are shown in black. (Data courtesy of M. Dettinger. Adapted from Dettinger et al. 2018. Figure by R. Norheim).

Observed and Projected Climate in the Sierra Nevada

Temperatures have increased in recent decades (Safford et al 2012; Vose et al 2017) in California and the western US. Between 1901 and 2016, average annual temperatures for the Southwest United States (including California) increased by 1.6 °F (Vose et al. 2017). Temperatures during the decade from 2001 to 2010 were the highest in the 110-year instrumental record for the same region (Hoerling et al. 2013). Increased winter temperatures have resulted in more precipitation falling as rain rather than snow (Knowles et al 2006), and measured reduced snowpacks in many parts of the Sierra Nevada. Most snow-course sites in the Sierra Nevada had declines in April 1 snow-water equivalent (a measure of snowpack) between 1955 and 2016 (Mote et al 2018). Reduced snowpack and earlier snowmelt have led to earlier timing of streamflow in the Sierra Nevada (Stewart et al. 2005). Increased spring and summer temperatures have also been associated with increased wildfire area burned (Littell et al. 2009; Westerling 2016; Westerling et al. 2006) and incidences of large fires, reviewed below (Dennison et al. 2014; Halofsky 2021; PSW-GTR 272)

Climate Change Effects on Hydrology in the Sierra Nevada

The Sierra Nevada is a critical source of water resources to otherwise water-limited ecosystems and downstream communities. As a result of the Mediterranean climate, approximately 80 percent of total annual precipitation falls during the cool winter months, typically followed by a warm, dry summer (Belmecheri et al. 2015). Precipitation events are driven by orographic uplift, where moisture held in air masses delivered by the mid-latitude jetstream precipitates as air is forced into higher and colder elevations. Because of these orographic effects, higher elevations typically have the highest precipitation and snow accumulation rates. Across the Sierra Nevada, annual snowpack accumulation is highly variable and a function of topography, elevation, atmospheric circulation patterns, temperature, incoming precipitation, and vegetation. The snow accumulation season is also shorter than in other mountain ranges in the Western United States, with a majority of precipitation events occurring from December through March. A few large snow events often comprise the majority of the total annual snowpack (Huning and Margulis 2017). Across the region, the total average amount of annual precipitation stored in the mountain snowpack is approximately two-thirds the volume of water capacity of California's human-made reservoir network (Dettinger et al. 2018). Historically, this water has been slowly released as snowmelt throughout the spring months and into summer. Although precipitation patterns in the Sierra Nevada exhibit large interannual variability, and will be uncertain in the future, the effects of climate change are already having measurable impacts on hydrological processes and water resources. Low precipitation coupled with above-average temperatures have led to snowpack deficits and severe drought in recent years. Warmer temperatures reduce snow levels by both decreasing the fraction of precipitation falling as snow relative to rain and increasing melt rates.

During the 2012–2017 drought, higher temperatures attributed to climate change exacerbated drought conditions and reduced snowpack levels by an additional 25 percent, with declines greater than 40 percent in the most vulnerable elevations (Berg and Hall 2017). The frequency and intensity of these recent droughts are expected to increase through the 21st century, likely resulting in snowpack reductions of 60 to 85 percent from historical levels, depending on future greenhouse gas emissions. Although patterns and processes of snow accumulation and melt will likely be altered with climate

change, much of the Sierra Nevada is characterized by steep environmental gradients and complex terrain. Owing to this heterogeneity, the effects of climate change on snowpack and hydrologic processes may be highly variable across the landscape. However, snowpack at elevations of 5,000 to 8,000 ft are the most vulnerable to warming temperatures, and these mid-elevations comprise over 60 percent of the current snow-dominated extent of the Sierra Nevada.

Climate-related shifts in patterns and timing of snow accumulation and melt will have cascading effects on streamflow from catchment to landscape scales. Coupled with declining snow packs, shifts in streamflow timing have already been observed with rivers in the Sierra Nevada exhibiting some of the highest sensitivity to temperature increases. Over the past half century in the Sierra Nevada, snowmelt-derived peak stream flows have occurred 10 to 30 days earlier in the spring (Stewart et al. 2005). Earlier peak stream flows are expected to continue into the 21st century, with advances occurring 80 days earlier than historical averages under a high emission scenario (Schwartz et al. 2017). Shifts in winter and spring stream flows can also affect summer low flows; streams in the Sierra Nevada show strong negative trends in fractional flows during summer months (Stewart et al. 2005). Future declines in summer flows may place increasing pressure on aquatic ecosystems and water resource infrastructure as water becomes increasingly limited during severe drought and periods of peak water demand.

The distribution and productivity of forest ecosystems across the Sierra Nevada are largely shaped by water availability. Hydrologic shifts will likely affect vegetation through lower soil moisture and higher evaporative demand. Altered distribution and amount of soil moisture available to plants, along with increasingly dry atmospheric conditions, may lead to increased vulnerability of drought-sensitive plant species and ecosystems. In the Sierra Nevada, peak soil moisture is sensitive to the last day of snow presence, suggesting that future declines in precipitation falling as snow and rapid melt rates may lead to higher soil moisture deficit later in the summer (Harpold and Molotch 2015). Higher temperatures will also likely lead to drier atmospheric conditions. For example, climatic water deficit (Lutz et al. 2010) and vapor pressure deficit (Ficklin and Novick 2017), both metrics describing the drying capacity of the atmosphere, are projected to increase with warming air temperatures. Increased frequency and extent of drought in the future would reduce soil moisture availability for plants, reducing tree vigor, and, in some cases, causing tree mortality. Morelli (2009a) noted that the ecosystem services that society depends upon may be endangered by anthropogenic climate change.

Climate Change and Fire Regimes

Wildfire, is a dominant ecological process in the Sierra Nevada, and a continued warming climate will have profound effects on fire frequency and fire extent in the Sierra Nevada. Modern climate and fire records indicate that over the past century in the Western United States, warm and dry conditions in any given year (primarily in summer, but also in winter and spring) generally have led to larger fires and more area burned (Abatzoglou and Kolden 2013; Dennison et al. 2014; Kitzberger et al. 2017; Littell et al. 2009; McKenzie et al. 2004; Stavros et al. 2014; Westerling 2016; Westerling et al. 2006). Warmer spring and summer conditions led to increased evapotranspiration, lower summer soil and fuel moisture, and longer fire seasons (Westerling 2016; Westerling et al. 2006). Dry fuels and longer fire seasons are associated with higher area burned (Gedalof et al. 2005), although summer precipitation is an important modifier of fire activity (Holden et al. 2018). Simulations by Lenihan et al. (2003, 2008) indicated a 5 to 8 percent increase in annual area burned in California, depending on future climate. Projections by Westerling and Bryant (2008) suggested risk of large fires will increase by 12 to 53

percent by the end of the century across California. For the Sierra Nevada, Liang et al. (2017) projected increases in fire area burned per decade of 393,000 to 457,000 ac. Recent projections by Westerling (2018) indicate that annual average area burned in parts of the Sierra Nevada may double or quadruple by end of century (comparing 2070–2099 to 1961–1990). Although these projections vary (because of differences in model types and assumptions), it is clear that increases in the areas burned by fire as well as fire severity is likely in the Sierra Nevada due to ongoing climate change (Safford et al. 2012).

Climate Change Effects on Vegetation and Plant Communities

Climate change is likely to alter the species composition and structure of vegetation in the Sierra Nevada. Altered disturbance regimes (e.g., drought, insects/disease, wildfires) are likely to be the major catalysts of vegetation change (Safford et al. 2012). The 2012–2017 drought, insect damage, and associated forest mortality in the Sierra Nevada (Fettig et al. 2019) illustrate how extreme climatic events can affect ecosystems in the region. The climatic and topographic diversity of the Sierra Nevada and proximity to other bioregions contribute to its diverse vegetation assemblages (Minnich 2007). Approximately half of California's 7,000 plant species occur in the Sierra Nevada, and 400 occur only in the Sierra Nevada (USDA FS 2014). On the west slope of the Sierra Nevada, vegetation ranges from chaparral and foothill woodlands, to mixed-conifer forests at mid elevations, to subalpine forests at high elevations. Alpine vegetation types are found above tree line. Descending the east side of the range, there are narrow belts of subalpine and pine-dominated forests, with pinyon-juniper woodlands and desert scrub vegetation types at lower elevations (Minnich and Padgett 2003). The White Mountains and Inyo Mountains (Inyo NF) are high-elevation desert landscapes with little vegetation cover, but with iconic tree species such as Great Basin bristlecone pine (*P. longaeva*) and foxtail pine (*P. balfouriana*). Decreased snowpack and a longer growing season (Kershner 2014; Lenihan et al. 2003, 2008) may reduce habitat for subalpine and alpine vegetation types in some locations in the Sierra Nevada, as conditions become more suitable for lower elevation conifer species. However, warmer temperatures, earlier snowmelt, and longer growing seasons may increase subalpine conifer growth (Graumlich and Brubaker 1986; Peterson and Peterson 2001), and conifer encroachment in meadows will likely increase (Millar et al. 2004). Drought and fire may become more common disturbances (Fites-Kaufman et al. 2007), although north aspects are likely to remain cooler, retain more snow, and provide refugia for high-elevation plant and animal species (Kershner 2014).

Changes in temperature, extreme weather, snowfall and dry season moisture patterns will have complex impacts on plant and animal interactions and responses. Plant species are often described in "communities," or a grouping of certain plants commonly found together, based on climatic conditions such as temperature, precipitation and altitude. In both Mono and Inyo County, the Eastern Sierra escarpment creates a sharp elevation and climate gradient from Sierra peaks to the high desert. Plants tend to follow a regular progression from cold-tolerant species at high altitudes to heat-tolerant species at low altitudes (Smith and Vestal 2003). In the late 1990s, the popular ecological model suggested entire plant communities would migrate from one climate zone to the next as the climate changed. More-recent studies indicate that vegetation responses to climate change can be highly individual, depending on site locations and species-specific ecological traits (Sugimura et al. 2008). Millar et al. (2004) suggest trees may show a diversity of individual responses to climate change, including changing stand density, growth rates and mortality rates. Other potential plant responses to climate change include a reduction of alpine and subalpine forests (Hayhoe et al. 2004) and increasing drought stress mortality in adult trees due to insects, pathogens and air pollution (Dettinger 2005). Movement patterns

of Mono and Inyo County flora may not be simple; species may migrate north or south, in addition to higher or lower elevations, and familiar communities may not remain intact. In addition, species may contract their ranges to localized refugia, or locations that are relatively unaffected by climate change.

Climate Change Effects on Wildlife Resources

Altered climate, disturbance regimes, and vegetation composition and structure will affect plant and animal species in the Sierra Nevada. Increasing temperatures and changing precipitation will have direct physiological effects on some species. Other species will be affected indirectly through altered phenology (timing of life history) relative to forage plants and invertebrate prey, shifts in geographic ranges and density and ranges of competitors, forage, prey, and symbiotic species (and subsequent changes in biotic interactions); and effects from other stressors such as fire, insects, and disease. Related changes in habitat characteristics and quality may affect the long-term viability of some species.

Animals can respond to changing climate conditions in a number of ways, including evolutionary adaptation, alterations in behavior or phenology, or shifting their geographic range to track suitable conditions (Root et al. 2003). It is now well established that species' geographic ranges have shifted in response to past climate change (Webb III & Bartlein 1992; Bennett 1997; Chen et al. 2011), and that geographic range shifts are the dominant response to a changing climate (Moritz & Agudo 2013). A conceptual framework for understanding the impacts of climate change on species focuses on the widely documented pattern of poleward and upslope range shifts, exemplified by peripheral range contraction and expansion. But that view is changing as it is becoming apparent that, like many plants, individual animal organisms will respond differently, depending on life histories and physiological requirements linked to temperature ranges and extremes. Increased variability and more extreme conditions with climate change will likely favor species adapted to frequent disturbance and some invasive species (Friggens et al. 2018). It may be more difficult for endemic and specialist species with narrow habitat requirements or dependencies on specific forage species to find suitable habitat under changing climate. For example, old-growth specialists such as the California spotted owl (*Strix occidentalis occidentalis* Xántus de Vésey) and Pacific fisher (*Pekania pennanti)* are likely to be negatively affected by changes in fire regimes and reduced connectivity of late-successional forests (Scheller et al. 2011). Alternatively, fishers are a mid-elevation mixed conifer forest species (Sweitzer et al. 2016), and may be able to expand into high elevation forests, depending on availability of prey. In contrast, generalist species with high climatic tolerance, broad habitat and forage requirements, and high dispersal ability may increase in abundance (Pounds et al. 2005).

Distribution and abundance of birds, mammals, and amphibians are all expected to shift with changes in climate in the Sierra Nevada (Lawler et al. 2009a, 2009b; Stahlberg et al. 2009). Some species in this region are of particular concern or highly vulnerable. Animal species in alpine or subalpine habitats have narrow physiological tolerances and may be vulnerable to thermal stress. Beever et al. (2008) and Morrison and Hik (2007) observed greater cold stress in American pikas under lower snow cover conditions. Migratory songbirds may be particularly vulnerable if climate shifts mismatch certain ecological events, such as breeding and brooding, with habitat and food resources. Researchers have already noted some migratory bird species arriving earlier to California in spring (MacMynowski and Root 2007), and changing snowpack conditions may be negatively impacting some songbirds in Yosemite National Park (Siegel et al. 2012). A comprehensive historical comparison also conducted in Yosemite National Park indicates that many small mammals have shifted to higher elevations or contracted their

range at high elevations, although the pattern was not consistent or readily predictable (Moritz et al. 2008). The ability of animal species to disperse or migrate will depend on the availability of migration corridors and suitable habitats, and the concurrent movement of forage, prey, and cover.

In past climate cycles, many species have shifted their ranges to stay within suitable climate conditions. Tracking upslope movement of suitable conditions can reduce the range sizes for montane species. For example, Rossi assessed niche relationships for montane mammals (three species of Sciurid rodents; "squirrels") in the high Sierra Nevada west of the ESNR Project area. Rossi's analyses (2021) showed both gains and losses to suitable area for these species, but with important differences among them. Both golden-mantled ground squirrel and yellow-bellied marmot were predicted to have a net gain of suitable area, while Belding's ground squirrel and American pika were predicted to experience a net loss. Yellow-bellied marmot, golden-mantled ground squirrel, and American pika all had gains of suitable area, primarily along the high-elevation crest of the Sierra Nevada. Belding's ground squirrel was predicted to lose suitable area overall, and that loss was primarily along the crest (Rossi 2020). There is also solid evidence for climate-linked niche tracking by bird species in the Sierra Nevada. Tingley et al. (2009) compared the directions of range shifts by 53 bird species relative to the centroids of species' range-wide climatic niches; 48 species tracked their climatic niche, and analyses of niche sensitivity mostly predicted the temperature and precipitation gradients tracked by species. Furthermore, in 50 species, site-specific occupancy models showed that the position of each site relative to the climatic niche centroid explained colonization and extinction probabilities better than a null model.

Aquatic species in the Sierra Nevada will be affected by warmer stream temperatures and changes in the quantity and timing of streamflow. Increases in summer water temperatures will likely result in stressful or lethal conditions for coldwater-adapted fish species in many streams in the Sierra Nevada, particularly in the northern and central portion of the range (owing to lower elevations) (Null et al. 2013). Thus, climate change will likely interact with other existing stressors (e.g., degraded habitat, hydropower, nonnative species) to increase risk of salmonid extinction (Katz et al. 2013, Null et al. 2013). Species restricted to limited areas, such as Califoria golden trout and the Little Kern golden trout (*Oncorhynchus mykiss whitei)* are particularly vulnerable (Katz et al. 2013; Moyle et al. 2011).

Amphibian species will also be affected by warming temperatures and altered hydrology. There are multiple endemic amphibian species in the Sierra Nevada, many of which have narrow ranges and are sensitive to disturbance and temperature increases (Kershner 2014). For example, mountain yellow-legged frogs (*Rana muscosa*) occur in limited locations, and drying in summer would have detrimental effects (USDA FS 2014). Warmer temperatures are also likely to make frogs more vulnerable to some diseases (Pounds et al. 2006).

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APPENDIX I: USDA Forest Service Riparian Conservation Objectives Analysis

The Forest Plan Direction (USDA Forest Service 2005a) describes management goals and strategies for aquatic, riparian, and meadow ecosystems. The aquatic, riparian, and meadow ecosystem strategy contains a set of land allocations, specifically riparian conservation areas (RCAs) and critical aquatic refuges (CARs), that delineate aquatic, riparian, and meadow habitats, which are to be managed consistent with the following Riparian Conservation Objectives (RCOs) and associated standards and guidelines. In order to achieve the element described above, the Forest Plan Direction requires that a site-specific analysis be conducted in order to determine the type and extent of activities that can occur within RCAs) adjacent to aquatic features. The Sierra Nevada Forest Plan Amendment (SNFPA) reference for this is Standard and Guideline # 92. Specifically, the Forest Plan Direction contains standards and guidelines that must be met for activities within RCAs.

Riparian Conservation Objective (RCO) Standards and Guidelines

The RCOs serve as a checklist for evaluating whether a proposed activity is consistent with the desired conditions described in the Aquatic Management Strategy (AMS). There are 34 applicable standards and guidelines related to the AMS. However, since these apply to a wide variety of management activities such as vegetation management, grazing and prescribed fire, any single management activity usually has a small subset of applicable standards and guidelines. Each applicable standard and guideline is described below:

Standard and Guideline – New Proposed Management Activities (SNFPA S&G #92). Evaluate new proposed management activities within CARs and RCAs during environmental analysis to determine consistency with the riparian conservation objectives at the project level and the AMS goals for the landscape. Ensure that appropriate mitigation measures/conservation measures/design features are consistent with;

1. Minimizing the risk of activity-related sediment entering aquatic systems
2. Minimizing impacts to habitat for aquatic- or riparian-dependent plant and animal species.
3. Ensuring that identified beneficial uses for the water body are protected: should identify the specific beneficial uses for the project area, water quality goals from the Regional Basin Plan, and the manner in which the standards and guidelines will protect the beneficial uses.

Standard and Guideline – Water Temperature (SNFPA S&G #96). Ensure that management activities do not adversely affect water temperatures necessary for local aquatic- and riparian-dependent species assemblages. Ensure that water temperature is within range of natural variability, ensure that effects of the action alternatives will result in maintenance of existing water temperature. Maintain or restore: (1) the geomorphic and biological characteristics of special aquatic features, including lakes, bogs, fens, wetlands, vernal pools, springs; (2) streams, including instream flows; and (3) hydrologic connectivity both within and between watersheds to provide for the habitat needs of aquatic-dependent species.

Standard and Guideline – Hydrologic Connectivity (SNFPA S&G #100). Maintain and restore the hydrologic connectivity of streams, meadows, wetlands, and other special aquatic features by identifying roads and trails that intercept, divert, or disrupt natural surface and subsurface water flow paths. Implement corrective actions where necessary to restore connectivity. Hydrologic connectivity refers to the ease of movement, or rates of exchange, with which water, energy, nutrients, and

organisms pass from one area to another, unhindered in the absence of impediments, such as trails, roads, bridges and developments crossing or immediately adjacent to water bodies. Projects should not impair hydrologic connectivity, otherwise use mitigation and corrective actions where necessary.

Standard and Guideline – Culverts and Stream Crossings (SNFPA S&G #101). Ensure that culverts or other stream crossings do not create barriers to upstream or downstream passage for aquatic-dependent species. Locate water drafting sites to avoid adverse effects to in stream flows and depletion of pool habitat. Where possible, maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows, wetlands, and other special aquatic features. No culverts would be installed which could create barriers to upstream or downstream passage for aquatic-dependent species as part of this project.

Standard and Guideline – Stream Characteristics (SNFPA S&G #102). Prior to activities that could adversely affect streams, determine if relevant stream characteristics are within the range of natural variability. If characteristics are outside the range of natural variability, implement mitigation measures and short-term restoration actions needed to prevent further declines or cause an upward trend in conditions. Evaluate required long-term restoration actions and implement them according to their status among other restoration needs.

Water Quality Project Management. Management and maintaining water quality during fuels reduction actions follow the guidance set forth in the USDA Forest Service, Pacific Southwest Region's Water Quality Management for Forest System Lands in California - Best Management Practices (2000). The Bureau of Land Management (BLM) guidance is found in Water Quality Manual (7240) also establish policies, guidance, and assign responsibilities for their stewardship of water resources, including protecting, restoring, and maintaining the quality of waters.

- Erosion Control Plan (Practice 2-2): all projects would need to develop an erosion control plan and provide oversight of implementation to minimize erosion and sedimentation.
- Timing of Construction Activities (Practice 2-3): Project implementation should be scheduled after the season of peak snowmelt runoff and when site conditions are stable.
- Protection of Water Quality within Developed and Dispersed Recreation Areas (Practice 4-9). This BMP is a corollary of the Erosion Control Plan, and prohibits the placing of sediment in or near a stream.
- Protection of Wetlands (Practice 7-3):

Watershed Objectives Mechanical treatments in Riparian Conservation Areas: Objectives for groundcover: An increase of no more than 10% of pre-project conditions. Prescribed burn Prescriptions: The objectives apply to conditions after one winter season. The objectives for this project include: a) Groundcover: greater than 25%, or a reduction of no more than 10% from pre-project conditions if pre-project conditions are less than 25%. b) Hydrophobic soils: Less than 50% hydrophobicity, or an increase no more than 10% of pre-project conditions if pre-project conditions are more than 50%. c) In Riparian Conservation Areas, canopy cover within the inner gorge (area below the first floodplain terrace, or area with 70% slope adjacent to the stream channel) or riparian vegetation zone will be greater than 25%, or a decrease of no more than 10% change from pre-project conditions if pre-project conditions less than 25%. d) In Riparian Conservation Areas, groundcover (includes duff and litter) within the inner gorge or riparian vegetation zone will be greater than 50%, or a reduction of no more than 10% preproject conditions if pre-project conditions less than 50%.

APPENDIX II: NATIONWIDE STANDARD CONSERVATION MEASURES FOR BIRDS

Listed below are effective measures that should be employed at future project sites in the ESNR Project area to reduce adverse impacts to birds and their habitats. These measures are grouped into three categories: General, Habitat Protection, and Stressor Management.

General Bird Conservation Measures

a. Educate all employees, and contractors of relevant rules and regulations that protect wildlife. Review the USFWS webpage for more information on regulations that protect migratory birds.
b. Prior to removal of an inactive nest, ensure that the nest is not protected under the Endangered Species Act (ESA) or the Bald and Golden Eagle Protection Act (BGEPA). Nests protected under ESA or BGEPA cannot be removed without a valid permit.
c. Do not collect birds (live or dead) or their parts (e.g., feathers) or nests without a valid permit.
d. Provide enclosed solid waste receptacles at all project areas. Non-hazardous solid waste (trash) would be collected and deposited in the on-site receptacles. Solid waste would be collected and disposed of by a local waste disposal contractor.
e. Report any incidental take of a migratory bird, to the local Service Office of Law Enforcement.

Habitat Protection Measures

a. Minimize project creep by clearly delineating and maintaining project boundaries (including staging areas).
b. Consult all local, State, and Federal regulations for the development of an appropriate buffer distance between development site and any wetland or waterway. For more information on wetland protection regulations see the Clean Water Act sections 401 and 404.
c. Maximize use of disturbed land for all project activities (i.e., siting, lay-down areas, and construction).
d. Implement standard soil erosion and dust control measures. For example:
    i. Establish vegetation cover to stabilize soil
    ii. Use erosion blankets to prevent soil loss
    iii. Water bare soil to prevent wind erosion and dust issues

Management or Mitigation of Various Stressors

Vegetation Removal (Conservation Goal: Avoid direct take of adults, chicks, or eggs)

<u>Conservation Measure 1:</u> Schedule all vegetation removal, trimming, and grading of vegetated areas outside of the peak bird breeding season to the maximum extent practicable. Use available resources, such as internet-based tools (e.g., the USFWS's Information, Planning and Conservation system and Avian Knowledge Network) to identify peak breeding months for local bird species.

<u>Conservation Measure 2:</u> When project activities cannot occur outside the bird nesting season, conduct surveys prior to scheduled activity to determine if active nests are present within the area of impact and buffer any nesting locations found during surveys. Generally, the surveys should be conducted no more than five days prior to scheduled activity.

a. Timing and dimensions of the area to be surveyed vary and will depend on the nature of the project, location, and expected level of vegetation disturbance.
b. If active nests or breeding behavior (e.g., courtship, nest building, territorial defense, etc.) are detected during these surveys, no vegetation removal activities should be conducted until nestlings have fledged or the nest fails or breeding behaviors are no longer observed. If the activity must occur, establish a buffer zone around the nest and no activities will occur within that zone until nestlings have fledged and left the nest area. The dimension of the buffer zone will depend on the proposed activity, habitat type, and species present and should be coordinated with the local or regional USFWS office.
c. When establishing a buffer zone, construct a barrier (e.g., plastic fencing) to protect the area. If the fence is knocked down or destroyed, work will suspend wholly, or in part, until the fence is satisfactorily repaired.
d. When establishing a buffer zone, a qualified biologist will be present onsite to serve as a biological monitor during vegetation clearing and grading activities to ensure no take of migratory birds occurs. Prior to vegetation clearing, the monitor will ensure that the limits of construction have been properly staked and are readily identifiable. Any associated project activities that are inconsistent with the applicable conservation measures, and activities that may result in the take of migratory birds will be immediately halted and reported to the appropriate USFWS office within 24 hours.
e. If establishing a buffer zone is not feasible, contact the USFWS Service for guidance to minimize impacts to migratory birds associated with the proposed project or removal of an active nest. Active nests may only be removed if you receive a permit from your local Migratory Bird Permit Office. A permit may authorize active nest removal by a qualified biologist with bird handling experience or by a permitted bird rehabilitator.

Conservation Measure 3: Prepare a vegetation maintenance plan that outlines vegetation maintenance activities and schedules so that direct bird impacts do not occur

Invasive Species (Conservation goal: Prevent the introduction of invasive plants)

Conservation Measure 1: Prepare a weed abatement plan that outlines the areas where weed abatement is required and the schedule and method of activities to ensure bird impacts are avoided.

Conservation Measure 2: For temporary and permanent habitat restoration/enhancement, use only native and local (when possible) seed and plant stock.

Conservation Measure 3: Consider creating vehicle wash stations prior to entering sensitive habitat areas to prevent accidental introduction of non-native plants.

Conservation Measure 4: Remove invasive/exotic species that pose an attractive nuisance to migratory birds.

Artificial Lighting (Conservation Goal: Prevent increased lighting of native habitats during the bird breeding season)

Conservation Measure 1: To the maximum extent practicable, limit construction activities to the time between dawn and dusk to avoid the illumination of adjacent habitat areas.

Conservation Measure 2: If construction activity time restrictions are not possible, use down shielding or directional lighting to avoid light trespass into bird habitat (i.e., use a 'Cobra' style light rather than an omnidirectional light system to direct light down to the roadbed). To the maximum

extent practicable, while allowing for public safety, low intensity energy saving lighting (e.g. low-pressure sodium lamps) will be used.

Conservation Measure 3: Minimize illumination of lighting on associated construction or operation structures by using motion sensors or heat sensors.

Conservation Measure 5: Bright white light, such as metal halide, halogen, fluorescent, mercury vapor and incandescent lamps should not be used.

Human Disturbance (Conservation Goal: Minimize prolonged human presence near nesting birds during construction and maintenance actions)

Conservation Measure 1: Restrict unauthorized access to natural areas adjacent to the project site by erecting a barrier and/or avoidance buffers (e.g., gate, fence, wall) to minimize foot traffic and off-road vehicle uses.

Bird Collisions with Vehicles (Conservation Goal: Minimize collision risk with project infrastructure and vehicles)

Conservation Measure 1: Minimize collision risk with project infrastructure by increasing visibility through appropriate marking and design features.

Conservation Measure 2: On bridge crossing areas with adjacent riparian, beach, estuary, or other bird habitat, use fencing or metal bridge poles (Sebastian Poles) that extend to the height of the tallest vehicles that will use the structure.

Conservation Measure 3: Install wildlife friendly culverts so rodents and small mammals can travel under any new roadways instead of over them. This may help reduce raptor deaths associated with being struck while tracking prey or scavenging road kill on the roadway.

Conservation Measure 4: Remove road-kill carcasses regularly to prevent scavenging and bird congregations along roadways.

Conservation Measure 5: Avoid planting “desirable” fruited or preferred nesting vegetation in medians or Rights of Way.

Conservation Measure 6: Eliminate use of steady burning lights on tall structures (e.g., >200 ft).

Entrapment (Conservation Goal: Prevent birds from becoming trapped in project structures or perching and nesting in project areas)

Conservation Measure 1: Minimize entrapment and entanglement hazards through project design measures that may include:

a. Installing anti-perching devices on facilities/equipment where birds may or perch
b. Covering or enclosing all potential nesting surfaces on the structure with mesh netting, chicken wire fencing, or other suitable exclusion material prior to the nesting season to prevent birds from establishing new nests. The netting, fencing, or other material must have no opening or mesh size greater than 19 mm.
c. Cap pipes and cover/seal all small dark spaces where birds may enter and become trapped.

Conservation Measure 2: Use the appropriate deterrents to prevent birds from nesting on structures where they cause conflicts, may endanger themselves, or create a human health and safety hazard.

a. During the time that the birds are trying to build or occupy their nests (generally , between April and August, depending on the geographic location), potential nesting surfaces should be monitored at least once every three days for any nesting activity, especially where bird use of structures is likely to cause take. It is permissible to remove non-active nests (without

birds or eggs), partially completed nests, or new nests as they are built (prior to occupation). If birds have started to build any nests, the nests shall be removed before they are completed. Water shall not be used to remove the nests if nests are located within 50 feet of any surface waters.

b. If an active nest becomes established (i.e., there are eggs or young in the nest), all work that could result in abandonment or destruction of the nest shall be avoided until the young have fledged or the nest is unoccupied. Construction activities that may displace birds after they have laid their eggs and before the young have fledged should not be permitted. If the project continues into the following spring, this cycle shall be repeated. When work on the structure is complete, all netting shall be removed and properly disposed of.

Noise (Conservation Goal: Prevent the increase in noise above ambient levels during the nesting bird breeding season)

Conservation Measure 1: Minimize an increase in noise above ambient levels during project construction by installing temporary structural barriers such as sand bags

Conservation Measure 2: Avoid permanent additions to ambient noise levels from the proposed project by using baffle boxes or sound walls.

Chemical Contamination (Conservation Goal: Prevent the introduction of chemicals contaminants into the environment)

Conservation Measure 1: Avoid chemical contamination of the project area by implementing a Hazardous Materials Plan. For more information on hazardous waste and how to properly manage hazardous waste, see the EPA Hazardous Waste website.

Conservation Measure 2: Avoid soil contamination by using drip pans underneath equipment and containment zones at construction sites and when refueling vehicles or equipment.

Conservation Measure 3: Avoid contaminating natural aquatic and wetland systems by limiting all equipment maintenance, staging laydown, and dispensing of fuel, oil, etc., to upland areas.

Conservation Measure 4: Any use of pesticides or rodenticides shall comply with the applicable Federal and State laws.

a. Choose non-chemical alternatives when appropriate
b. Pesticides shall be used only in accordance with their registered uses and in accordance with the manufacturer's instructions to limit access to non-target species.
c. For general measures to reducing wildlife exposure to pesticides, see EPA's Pesticides: Environmental Effects website

Fire (Conservation Goal: Minimize fire potential from project-related activities)

Conservation Measure 1: Reduce fire hazards from vehicles and human activities (e.g., use spark arrestors on power equipment, avoid driving vehicles off road).

Conservation Measure 2: Consider fire potential when developing vegetation management plans by planting temporary impact areas with a palate of low-growing, sparse, fire resistant native species that meet with the approval of the County Fire Department and local FWS Office.

APPENDIX III: CDFW MANAGEMENT RECOMMENDATIONS FOR AMPHIBIANS & REPTILES

While effective management of reptile or amphibian Species of Special Concern will generally require development of specific management strategies tailored to the biology of individual taxa, several general recommendations have emerged from this document. Of most importance is to protect aquatic habitats. The metric scores indicate that aquatic species are at greater risk than terrestrial ones, suggesting that remaining aquatic habitats with native amphibian and turtle populations should be high conservation priorities. California's aquatic habitats have been highly modified from a faunal perspective. As of 2002, there were 51 nonnative freshwater fishes in California, the majority of which were deliberately introduced to enhance recreational fisheries (Moyle 2020). Nonnative fishes now predominate in many California waterways, raising concerns about increased competition, predation, habitat interference, disease, and hybridization with native species (CDFW 2008). A large body of ecological research has demonstrated a negative effect of introduced fishes and bullfrogs on California's native anurans (e.g., Hayes and Jennings 1986; Knapp and Matthews 2000; Vredenburg 2004; Welsh et al. 2006; Pope 2008). As a result, predatory salmonids, centrarchids, catfishes, and other nonnative species should be eradicated wherever feasible and should not be introduced into remaining native amphibian or reptile habitat. Maintaining appropriate water flow regimes for stream-dwelling taxa is also critical, as are broad riparian buffers to maintain lotic habitats and reduce siltation (e.g., Lind et al. 2016).

Specific management recommendations include the following:

- Control, or eliminate where possible, invasive aquatic species, particularly predatory fishes, crayfish, and bullfrogs. For widespread, established invasives, plans should be developed with actions that reflect those identified in the California Aquatic Invasive Species Management Plan (CDFG 2008). For bullfrogs in particular, plan Objectives 5 and 6 apply: Education and Outreach and Long-Term Control and Management. Invasive species in the early stages of colonization (e.g., *Nerodia fasciata*, *N. sipedon* and *N. rhombifer*) should be eradicated as soon as possible to prevent further spread. Known to be present in California since the 1990s, coordinated efforts have yet to effectively coalesce to make significant progress toward eradicating Nerodia, though educational (http://biology.unm.edu /mmfuller/WebDocs/HTMLfiles/nerodia. html) and occasional agency efforts occur.

- Eliminate, limit, or mitigate effects of dams, water diversions, and other hydrological disturbances to breeding streams whenever possible, and particularly during breeding seasons

- When biologically appropriate, enhance connectivity and continuity of streams to allow free movement of aquatic species. Conversely, the potential for increasing connectivity to facilitate the spread of invasive species or disease should be considered on a species-by-species basis.

- Maintain riparian vegetation buffers and adjacent upland habitat.

- Eliminate roads within buffer zones and mitigate their effects in high-use amphibian migration areas whenever possible to avoid siltation and road mortality.

- Restrict use of heavy equipment on dirt roads and upland habitats, particularly during the breeding season when eggs and small larvae may be most affected by siltation.

- Maintain culverts under roads adjacent to breeding streams to reduce siltation.

It is also important to protect the integrity and connectivity of large terrestrial habitat patches. The size of habitat patches necessary to support healthy populations of most species may be larger than previously recognized (Prugh et al. 2008). The amount and configuration of habitat clearly has a strong impact on the overall extirpation and recolonization dynamics of adjacent populations, and ultimately, of entire species. Besides the general conclusion that more intact habitat is always desirable, specific requirements will always need some level of study on a species-by species basis. For example, ongoing work on the state and federally endangered California tiger salamander (*Ambystoma californiense*) suggests that this species routinely moves long distances (up to 2 km) away from breeding ponds, suggesting that the extent and quality of upland habitat is likely to have a strong impact on the species' long-term persistence (Trenham and Shaffer 2005; Searcy and Shaffer 2008). Several diurnally active and wide-ranging reptile species in southern California appear to be sensitive to habitat fragmentation and disappear from patches of small suit able habitat (e.g., coastal whiptail, *Aspidoscelis tigris stejnegeri*; coast patch-nosed snake, *Salvadora hexalepis virgultea*). Habitat fragmentation is a strong driver of declines for many species, and we recommend that land managers pay particular attention to preserving extensive habitat blocks where possible (see Mitrovich et al. 2009, for a well-worked example). Although the individual conservation needs of species vary, formal conservation planning occurs on a broader scale that considers large areas of habitat for many species simultaneously. Because of many aspects of their shared biology, amphibians and reptiles are often considered as a group, and some excellent, general guidelines for their management have been developed (see, e.g., the Partners in Amphibian and Reptile Conservation habitat management guidelines http://www.parcplace.org /parcplace/publications/habitat-managementguidelines.html). In addition, the biology of amphibian and reptile species needs to be jointly considered within the framework of larger conservation initiatives. The California Natural Community Conservation Planning program is one such initiative that takes an area-wide approach to conservation planning, simultaneously considering conservation of many plant and animal species as well as potential land use activities (see California Fish and Game Code Section 2800-2840). These broadscale, integrative approaches to conservation planning promise to be among the more effective strategies for achieving habitat protection and should become an increasingly central mechanism for conservation planning in California. Preserving linkages between adjacent habitat patches is also a key priority in these landscape-level conservation initiatives. Biologically, these linkages maintain metapopulation connectivity and habitat corridors that are often essential for long-term conservation. The California Essential Habitat Connectivity Project seeks to identify corridors between large remaining blocks of intact habitat and is one step in this direction (Spencer et al. 2010). Projects such as these are critically important for maintaining gene flow and migration among localized populations and should continue to be considered as landscape-level conservation initiatives move forward in the state.

Specific management recommendations include the following:

- All Species of Special Concern and the taxa in Table 11.1 should be considered in Habitat Conservation Plans, Natural Community Conservation Plans, and other local and regional habitat management planning efforts.

- Develop species-specific ecological and landscape genetic datasets to determine the most important habitat corridors for protection and management of amphibian and reptile Species of Special Concern on specific landscapes.
- Identify and either eliminate or mitigate land uses that interrupt connectivity across habitat blocks that have been set aside for conservation. These might include roads, grazing, mining, timber harvest, and many other land uses and activities.

Mitigate the effects of roads as a source of mortality and habitat fragmentation.
Roads have two primary effects: mortality and fragmentation (Fahrig et al. 1995; Mazerolle 2004; Gibbs and Shriver 2005; Andrews et al. 2015). The overall impact of road mortality on amphibian and reptile populations varies across road types, from species to species, geographically, temporally, and seasonally, and road-associated mortality levels interact with the movement patterns and seasonal migrations of individual taxa. In other parts of the country, roads have been documented to significantly contribute to fragmentation and reduced gene flow, interrupting normal metapopulation dynamics (Hels and Buchwald 2001; Sutherland et al. 2010), and the same presumably occurs in California. For example, surveys of 21 roads for migrating, federally endangered California tiger salamander (*A. californiense*) in Sonoma County suggest widespread mortality that has increased over time as traffic volume has increased. For surveys of one 1200-ft section of Stony Point Road conducted from 2001 to 2010, 160 of 262 salamanders (61%) found were road mortalities, suggesting that vehicular traffic is a substantial form of death in this extremely endangered species (D. Cook, unpublished data). Langen et al. (2009) identified predictors of hot spots of amphibian and reptile road mortality for use when planning roads or when conducting surveys on existing roads to locate priority areas for mitigation.

Although they have been employed infrequently in California, tunnels that assist amphibian and reptile movements can be an effective management tool that should be more actively investigated. Two important aspects of migration tunnels are that they must have some capacity to funnel individuals into the tunnels (drift fences, concrete walls, or other similar structures), and they must be actively maintained. Without regular, scheduled maintenance, tunnels fill with debris, drift fences become covered with leaves, runoff soil, trash, and woody debris, and the tunnel quickly ceases to function. Tunnels may also play a role in the deserts of southern and eastern California, particularly as vehicular traffic increases, and roads fragment previously contiguous habitat. For additional recommendations regarding herpetofauna and roads, see Schmidt and Zumbach (2008). Specific management recommendations include the following:

- Limit traffic, and consider road closures, during amphibian breeding migrations on sensitive public lands.
- Use signage (e.g., “Newt Crossing” warning signs) to warn vehicular traffic that they are in key migration areas.
- Develop standards for and install, maintain, and monitor usage of tunnels, underpasses or other passage mechanisms to reduce road-related mortality.
- Use various media resources for public education campaigns.

Translocate animals only when biologically appropriate.

A general management strategy, variously referred to as relocation, repatriation, or translocation (Germano and Bishop 2009), is the practice of moving animals across landscapes, often from a site destined for development to a protected site. These efforts have become increasingly common as partial or complete mitigation for development projects that affect amphibians and reptiles. Several key biological issues need to be considered before animals are translocated. Disease transmission is an important problem that has had devastating consequences for several species (Jacobson 1993). The well-known upper respiratory tract infection that has decimated desert tortoise (*Gopherus agassizii*) populations is thought to be derived from released captive animals (Jacobson 1993). Genetic consequences of relocation programs should also be considered. Increasingly, genetic data are allowing researchers to elucidate fine-scaled genetic structure among populations, and the insights gained from nonlethal genetic sampling allow insight into biological parameters that are relevant for conservation including population subdivision, gene flow, migration corridors, and population sizes. However, the overall extent and functional consequence of this variation is still poorly understood for most organisms. Moving individuals around the landscape has the potential for deleterious effects, either by diluting or eliminating unique historical lineages or by disrupting genetic variation that may be an important component of local adaptation. As emphasized in a recent review (Germano and Bishop 2009), homing and poor habitat quality are two of the primary reasons why translocation efforts may fail, and they should be carefully studied on a case-by-case basis. A recent document providing guidelines for translocations for the California tiger salamander (Wang et al. 2009) may serve as a model for some other taxa as well. It emphasizes that translocations should only be attempted into unoccupied habitat, and only after the threats that caused the initial declines have been effectively removed. It also emphasizes that sufficient research must have been conducted to provide compelling evidence that the potential damages that can be done to existing conspecific and heterospecific taxa do not outweigh the potential gains to the animals and populations being relocated. In some cases, headstarting programs may represent a suitable alternative to repatriation or translocation, particularly if the headstarting is done under seminatural conditions. Many species experience the most severe mortality during early life stages. Raising individuals in captivity from a given site to the size or age where they are past this initial peak of mortality and then releasing them at the site where they were initially collected may avoid many of the potential issues associated with translocations while also providing a temporary boost to populations that are in decline. Headstarting is only appropriate, however, where suitable unoccupied habitat exists, or where introduction of individuals will not create problems for existing species at the introduction site.

Specific management recommendations include the following:

- Only translocate animals when other alternatives do not exist.
- Only translocate animals into situations where other animals at the translocation site will not be adversely affected by the introduced animals.
- Only translocate animals when the ecological requirements of the species exist in the new habitat.
- Utilize methods to increase the likelihood that translocations will be successful. These potentially include “soft” translocations (i.e., moving young animals rather than adults with established home ranges) and moving a sufficiently large number of individuals to ensure that a successful breeding population can establish (Germano and Bishop 2009).