APPENDIX N

DRAFT BIOLOGICAL ASSESSMENT

APPENDIX N

BIOLOGICAL ASSESSMENT

Biological Assessment on the Merced River Plan/DEIS

National Park Service

Department of the Interior

November 2012

This page intentionally left blank

TABLE OF CONTENTS

This page intentionally left blank

CHAPTER I. INTRODUCTION

Purpose and Need

The National Park Service in Yosemite has prepared the *Merced Wild and Scenic River Comprehensive Management Plan/Draft Environmental Impact Statement* (*Merced River Plan/DEIS*) to provide a comprehensive management plan for the protection of the Merced River's free-flowing condition, water quality, and the values that make the river worthy of designation. The purpose of this Biological Assessment is to review the *Merced River Plan /DEIS* in sufficient detail to determine effects of the plan on federal and state-listed threatened or endangered species, federal and state species of concern, state-listed rare species, and species that are locally rare or threatened. All of these species are also referred to as special-status species throughout this document.

The *Merced River Plan/DEIS* aims to protect and further restore degraded areas of the river to its natural free-flowing condition and encourage resource-based recreational and educational opportunities along the river corridor. The plan would contribute to subsequent planning that would manage crowding through careful design, relocation, or removal of specific facilities and by setting use limits, dispersing visitor impacts, and establishing other measures to protect river resources and the diversity of visitor experiences. The plan also proposes to reduce traffic congestion by identifying optimal road locations and facilities, parking areas, turnouts, and other transportation facilities in the river corridor. Many of these functions would move to the El Portal Administrative Site on the western boundary of the park.

This Biological Assessment will evaluate the Preferred Alternative in the *Merced River Plan/DEIS*, Alternative 5. The areas that could be affected by the Preferred Alternative include East and West Yosemite Valley, Wawona, Merced Lake High Sierra Camp, El Portal and Old El Portal. These areas are designated as the project area. Detailed maps of the project area are available in Vol. I, *Merced River Plan/DEIS*.

This Biological Assessment will:

- Evaluate and document the effects of the Preferred Alternative on special-status species or their critical habitat that are known to be or could be present within the project area
- Determine the need for consultation and conference with the U.S. Fish and Wildlife Service (USFWS)
- Conform to requirements of the Endangered Species Act (19 USC 1536 [c], 50 CFR 402) and the National Environmental Policy Act (42 USC 4321 et seq., implemented at 40 CFR Parts 1500-1508)

U.S. Fish and Wildlife Service Consultation

The Endangered Species Act (Section 7 [a][2]) directs federal agencies to consult with the responsible agency (in this case, the USFWS) to determine whether proposed actions are likely to jeopardize the continued existence of a listed species or destroy or adversely modify critical habitat. The NPS initiated informal consultation with the USFWS and obtained an updated species list from the USFWS on October 18, 2012. NPS obtained lists of federally listed endangered or threatened species within the Mount Lyell, Merced Peak, Sing Peak, Timber Know, Half Dome, El Capitan, Wawona, Mariposa Grove, El Portal, and Kinsley U.S. Geological Survey quadrangles that may be present or may be affected by actions proposed in the *Merced River Plan/DEIS*. Based on these lists and professional judgment by the park staff, seven federally listed threatened, endangered, proposed, or candidate species have been identified as known to occur or as having the potential to occur in the study area: one invertebrate species, two amphibian species, and three mammal species, and one plant species (see **table N-1**). Consultation with the USFWS will continue throughout the environmental compliance process for the Merced River Plan, and the NPS will consult with the USFWS to obtain an updated list of federally endangered or threatened species prior to project implementation.

Other species considered in this biological assessment include species identified by the California Department of Fish and Game (CDFG) as endangered, threatened, or a candidate species; and CDFG species of concern, rare species, or fully protected species. Additionally, species considered rare by the National Park Service are also included in this biological assessment. Based on these lists, previous studies, recent surveys, and professional judgment by the park staff, 33 special status wildlife species are known to occur or have the potential to occur in the study area: one invertebrate species (beetle), one fish species, three amphibian species, 14 bird species, and 14 mammal species.

Botanical surveys have identified one federal candidate plant species and two state-listed plants within the Merced River corridor in Yosemite. Therefore, for purposes of this analysis, special status plant species generally include mainly those species identified as such by the park. Park-designated sensitive plant species are those that have (1) extremely limited distributions in the park and may represent relict populations from past climatic or topographic conditions; or (2) may be at the extreme extent of their range in the park or represent changes in species genetics. These species may be included on lists such as the CNPS Inventory of Rare and Endangered Plants. 50 special status plant species are known to occur or have the potential to occur in the study area.

Species Evaluated in this Biological Assessment

Federally Listed Species

The Endangered Species Act defines an endangered species as any species that is in danger of extinction throughout all or a significant portion of its range. A threatened species is defined as any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Of the Federally listed species that could be affected by the *Merced River Plan/DEIS*, one is endangered: Sierra Nevada bighorn sheep *(Ovis canadensis sierrae)*; and one is threatened: Valley elderberry longhorn beetle *(Desmocerus californicus dimorphus)*.

TABLE N-1: SPECIES CONSIDERED IN THIS BIOLOGICAL ASSESSMENT

Federal Threatened Species

Invertebrates

Valley elderberry longhorn beetle *(Desmocerus californicus dimorphus)*

Federal Candidate Species

Mammals

Pacific fisher *(Martes pennanti pacifica)*

Reptiles and Amphibians

Yosemite toad *(Bufo canorus*)
Sierra Nevada yellow-legged frog (*Rana sierrae*)

Plants

Whitebark pine (*Pinus albicaulis*)

California State Endangered Species

Birds

Willow flycatcher *(Empidonax traillii)*
Bald eagle *(Haliaeetus leucocephalus*)

Mammals

Sierra Nevada bighorn sheep *(Ovis canadensis sierrae)*

California State Threatened Species

Mammals

California wolverine (*Gulo gulo*)
Sierra Nevada red fox (*Vulpes vulpes necator*)

California State Fully Protected Species

Birds

Golden eagle (*Aquila chrysaetos*)
Peregrine Falcon (*Falco peregrinus*)
Bald eagle (*Haliaeetus leucocephalus)*)

California State Rare Species

Plants

Thompkins' sedge (*Carex tompkinsii*)
Congdon's woolly-sunflower *(Eriophyllum congdonii)*
Congdon's lewisia *(Lewisia congdonii)*

California State Species of Special Concern

Birds

Northern goshawk *(Accipiter gentilis*)
Long-eared owl *(Asio otus)*
Vaux's swift *(Chaetura vauxi)*
Northern harrier *(Circus cyaneus)*
Olive-sided flycatcher *(Contopus cooperi)*
Black swift (*Cypseloides niger*)
Yellow warbler *(Setophaga petechia)*
Harlequin duck *(Histrionicus histrionicus)*
Great gray owl *(Strix nebulosa)*
California spotted owl *(Strix occidentalis occidentalis)*

TABLE N-1: SPECIES CONSIDERED IN THIS BIOLOGICAL ASSESSMENT (CONTINUED)

California State Species of Special Concern (cont.)

Fish

Hardhead *(Mylopharodon conocephalus)*

Mammals

Pallid bat *(Antrozous pallidus)*
Sierra Nevada mountain beaver *(Aplodontia rufa californica*)
Townsend's big-eared bat *(Corynorhinus townsendii townsendii)*
Spotted bat *(Euderma maculatum)*
Greater western mastiff bat *(Eumops perotis californicus)*
Western red bat *(Lasiurus blossevillii)*
Sierra Nevada snowshoe hare *(Lepus americanus tahoensis)*
Western white-tailed jackrabbit *(Lepus townsendii townsendii)*
Pacific fisher *(Martes pennanti pacifica)*
Mount Lyell shrew *(Sorex lyellii)*
American badger *(Taxidea taxus)*

Reptiles and Amphibians

Yosemite toad *(Bufo canorus*)
Western pond turtle *(Emys marmorata*)*
Mount Lyell salamander *(Hydromantes platycephalus)*
Foothill yellow-legged frog *(Rana boylii)*
Sierra Nevada yellow-legged frog *(Rana sierrae)*

Park Rare Species

Plants

Spurred snapdragon *(Antirrhinum leptaleum)*
Lemmon's wild ginger *(Asarum lemmonii)*
California bolandra *(Bolandra californica)*
Threadleaf beakseed *(Bulbostylis capillaris)*
Mono Hot Spring evening primrose (*Camissonia sierrae* ssp. *alticola*)
Sierra suncup (*Camissonia sierrae* ssp. *sierrae*)
Buxbaum's sedge *(Carex buxbaumii)*
Silvery sedge (*Carex canescens*)
Cleft sedge (*Carex fissuricola*)
Yosemite sedge (*Carex sartwelliana*)
Thompkins' sedge (*Carex tompkinsii)*
Bolander's woodreed *(Cinna bolanderi)*
Narrow leaf collinsia *(Collinsia linearis)*
Short-bracted bird's beak (*Cordylanthus rigidus* ssp. *brevibracteus*)
Mountain lady's slipper (*Cypripedium montanum*)
Stream orchid *(Epipactis gigantea)*
Congdon's wooly sunflower (*Eriophyllum congdonii*)
Purple fawn-lily *(Erythronium purpurascens*)
Northern mannagrass (*Glyceria borealis*)
California sunflower (*Helianthus californicus*)
Common mare's tail (*Hippuris vulgaris*)
Redray alpinegold (*Hulsea heterochroma*)
Western quillwort (*Isoetes occidentalis*)
Sierra laurel *(Leucothoe davisiae)*
Congdon's lewisia (*Lewisia congdonii*)
False pimpernel *(Lindernia dubia* var. *anagallidea)*
Tanoak (*Lithocarpus densiflorus* var. *echinoides*)
Northern bugleweed (*Lycopus uniflorus*)
Yellow and white monkeyflower (*Mimulus bicolor*)
Inconspicuous monkeyflower *(Mimulus inconspicuus)*
Cutleaf monkeyflower (*Mimulus laciniatus*)

TABLE N-1: SPECIES CONSIDERED IN THIS BIOLOGICAL ASSESSMENT (CONTINUED)

Park Rare Species (cont.)
Pansy monkeyflower *(Mimulus pulchellus)*
Sierra sweet-bay *(Myrica hartwegii)*
California bog asphodel *(Narthecium californicum)*
Azure penstemon *(Penstemon azureus* ssp. *angustissimus)*
Purdy's foothill penstemon *(Penstemon heterophyllus* var. *purdyi)*
Tansy leafed phacelia *(Phacelia tanacetifolia)*
Coleman's piperia *(Piperia colemanii)*
Torrey's popcornflower *(Plagiobothrys torreyi* var. *torreyi)*
Nuttall's pondweed *(Potamogeton epihydrus* ssp. *nuttallii)*
Valley oak *(Quercus lobata)*
Wood saxifrage *(Saxifraga mertensiana*)
Oregon saxifrage (*Saxifraga oregana*)
Bolander's skullcap *(Scutellaria bolanderi)*
Clark's ragwort *(Senecio clarkianus)*
Small bur reed *(Sparganium natans)*
Sierra bladdernut *(Staphylea bolanderi)*
Narrowleaf wakerobin *(Trillium angustipetalum)*
California red huckleberry (Vaccinium parvifolium)
Hall's wyethia *(Wyethia elata)*
*Believed to be extirpated from the Merced River corridor.

The Sierra Nevada bighorn sheep formerly ranged throughout the high elevations of the Sierra Nevada. By the beginning to the 20th century, however, their numbers had been decimated by overhunting, competition for forage with domestic sheep, and especially by diseases contracted from domestic sheep. By 1999, fewer than 200 Sierra Nevada bighorn sheep were left in the entire range, prompting its listing that year as endangered. Currently, the Sierra Nevada bighorn sheep occurs primarily along the Sierra Crest in the northeast portion of Yosemite Park. Most of the herd inhabits Forest Service land adjacent to the park.

The Valley elderberry longhorn beetle was listed by the USFWS as threatened on August 8, 1980. This listing was primarily a result of destruction of riparian habitat in the San Joaquin Valley that removed the beetle's host plant, the elderberry (*Sambucus* sp.). Critical habitat has been designated for the beetle in two areas: along the American River near the Sacramento metropolitan area and along Putah Creek in Solano County. However, the beetle also occurs up to 3,000 feet in elevation in the Sierra Nevada.

Special-Status Species

Special-status species that could be affected by this plan are listed in table N-1. There are 50 special status plant species and 33 special status wildlife species known to occur or having the potential to occur within Yosemite National Park's Merced River corridor. The species on this list include the federally listed species in the ten U.S. Geological Survey quadrangles that encompass the project area for the plan (see USFWS Consultation), species listed in the California Natural Diversity Data Base, and "park rare" plants identified by National Park Service. Park rare plants include those that are:

- locally rare natives

- listed by the California Native Plant Society
- endemic to the park or local vicinity
- at the furthest extent of their range
- of special importance to the park (identified in legislation or park management objectives)
- the subject of political concern or unusual public interest
- vulnerable to local population declines
- subject to human disturbance during critical portions of their life cycle

There is no classification of "park rare" for any wildlife species.

Species Removed from Further Analysis

The following species are on the list of "Endangered and Threatened Species that may occur or be Affected by Projects in the USFWS 7 ½ Minute Quads" that was provided by the USFWS. However, the National Park Service has determined that they would not be affected by the *Merced River Plan/DEIS* because they do not occur in the project area nor were they historically found in the project area. Therefore, there is no effect on these species from the Preferred Alternative in the *Yosemite Valley Plan/DEIS*, nor are they potentially indirectly or cumulatively affected by the Preferred Alternative. These species will not be evaluated further in this Biological Assessment.

- **Delta smelt, *Hypomesus transpacificus* (Federal Threatened)**
- **Lahontan cutthroat trout, *Oncorhynchus (=Salmo) clarki henshawi* (Federal Threatened)**
- **Paiute cutthroat trout, *Oncorhynchus (=Salmo) clarki seleniris* (Federal Threatened)**
- **Central Valley steelhead, *Oncorhynchus mykiss* (Federal Threatened)**
- **California red-legged frog, *Rana draytonii* (Federal Threatened)**

Critical Habitat

Critical habitat is a specific area or type of area that is considered to be essential for the survival of a species, as designated by the USFWS under the Endangered Species Act. No critical habitat occurs in Yosemite National Park or the El Portal Administrative Site.

CHAPTER II. CURRENT MANAGEMENT DIRECTION

Authorities

The following legislation and policies address the management of special-status species in the park: the National Park Service Organic Act, the Endangered Species Act, the National Environmental Quality Act, the California Endangered Species Act, the Migratory Bird Conservation Act, the Fish and Wildlife Coordination Act, the Wild and Scenic Rivers Act, and the Wilderness Act.

The USFWS normally takes the lead departmental responsibility of coordinating and implementing provisions of the Federal Endangered Species Act for all listed endangered, threatened, and candidate species. This Biological Assessment is prepared in accordance with Section 7 of the Federal Endangered Species Act of 1973, as amended, as part of the consultation process with the USFWS.

Policy and Program Objectives

The following National Park Service policies and program objectives prescribe the management of special-status species:

- The *Natural Resources Management Guideline* NPS-77 (1991) states:

  "Management affects the distribution, abundance, and ecological relationships of and among species. Whereas preservation can be accomplished by a zoo, botanical garden, or other non-natural refugium, the National Park Service's goal is the long-term preservation of species and their ecological role and function as part of a "natural ecosystem." It is, therefore, critical that ecological aspects of management prevail in dealing with threatened and endangered species. An understanding of factors limiting the distribution and abundance of the species of concern must be well understood and incorporated into any management action."

- National Park Service *Management Policies* (1988) states:

  "Consistent with the purposes of the Endangered Species Act (16 USC 1531 et seq.), the National Park Service will identify and promote the conservation of all federally listed threatened, endangered, or candidate species within park boundaries and their critical habitats."

  "The National Park Service also will identify all state and locally listed threatened, endangered, rare, declining, sensitive, or candidate species that are native to and present in the parks, and their critical habitats. These species and their critical habitats will be considered in National Park Service planning activities."

- The 1980 *General Management Plan* for Yosemite states:

  "Protect threatened and endangered plant and animal species and reintroduce, where practical, those species eliminated from the natural ecosystems."

CHAPTER III. THE MERCED RIVER PLAN/DEIS

The Preferred Alternative – Enhanced Visitor Experiences and Essential Riverbank Restoration

The Preferred Alternative of the *Merced River Plan/DEIS* would include significant restoration within 100 feet of the river and in meadow and riparian areas, maintaining daily visitation in Yosemite Valley to accommodate the same peak levels observed in recent years, reducing unnecessary facilities and services, and converting facilities from administrative use to public use where feasible. This alternative would restore approximately 203 acres of currently disturbed or developed habitats throughout the Merced River corridor to natural conditions by removing infrastructure and development from sensitive areas such as meadows, riparian habitat, and riverbanks. Much of the development within 100 feet from the ordinary high water mark of the Merced River would be removed under this alternative. 6,135 linear feet of riprap would be removed from the banks of the Merced River. Targeted infrastructure within the bed and banks of the river would be removed. Sugar Pine Bridge would be removed to promote free-flowing conditions of the river and channel complexity would be enhanced below other bridges. Restoration actions also include filling ditches and removing informal trails from meadows to improve hydrology and reduce meadow fragmentation. Collectively, these actions would enhance meadow and floodplain connectivity and the free-flowing condition of the river.

Actions to manage visitor use and facilities under Alternative 5, specifically those concerning vehicle access and overnight accommodations, would result in a 2% increase in lodging accommodations. The campsite inventory would increase by 29% in the Merced River corridor and 37% in Yosemite Valley. All campsites within 100 feet of the river would be removed. Campsite losses would be offset with the addition of new camping adjacent to Upper Pines Campground and east of the Camp 4 Campground, as well as new sites west of Backpackers Campground, in the former Upper Rivers Campground area, and east of El Capitan Picnic Area at Eagle Creek. Under Alternative 5, there would be a net increase of 13% in Yosemite Valley overnight use. This would largely result from the increase in units at Curry Village. Management actions related to lodging would focus on removing lodging from the ordinary high water mark and Housekeeping Camp, and slightly reducing lodging in wilderness. Tent cabins in the Boys Town area would be replaced with hard-sided lodging in Curry Village to increase the availability of year-round accommodations.

Alternative 5 would restore approximately 203 acres of vegetation, including 40.52 acres of wetlands, as a result of actions common to Alternatives 2-6 in conjunction with actions specific to Alternative 5. Actions to manage visitor use and facilities would result in the loss of approximately 36.89 acres of vegetation and 2.67 acres of wetlands as a result of actions specific to Alternative 5.

For a detailed description of the Preferred Alternative, refer to Vol. I, Chapter 9 of the *Merced River Plan/DEIS* (NPS 2012).

CHAPTER IV. EXISTING ENVIRONMENT

Habitat Descriptions

The Merced River and Yosemite National Park

The Merced River is one of 23 wild and scenic rivers in California and one of six wild and scenic rivers on the western slope of the Sierra Nevada. It is one of 15 major river systems in the Sierra Nevada mountain range of California. Originating in the alpine peaks of the central Sierra Nevada, the river flows west for 145 miles to its confluence with the San Joaquin River in the Central Valley of California, encompassing a drainage basin of about 1,700 square miles. The first 122 miles of the Merced River, beginning at its Sierran headwaters, are designated as wild and scenic; the National Park Service manages 81 miles of the river through Yosemite National Park and the El Portal Administrative Site, including both the main stem and the South Fork Merced River (together referred to as *the Merced River*). In Yosemite National Park, the main stem of the Merced River flows freely through a wilderness landscape of alpine peaks, glacially carved valleys, and high-elevation meadows. As the gradient lessens into Yosemite Valley, the Merced River meanders through the rich meadow and riparian habitat. These wetlands and riparian areas are distinct and important types of vegetation communities that contribute to the outstandingly remarkable biological river values as well as values to biological communities.

Yosemite National Park, one of the largest and least-fragmented habitat blocks in the Sierra Nevada range, supports a diverse and abundant assemblage of wildlife. It plays an important role in protecting the long-term survival of certain species and the overall biodiversity of wildlife in the Sierra Nevada region. The Merced River corridor also serves an essential ecological role in linking wildlife habitats across the park's landscape and gradients of elevation.

Yosemite Valley is a glacier-carved valley with sheer granite cliffs rising over 2,000 feet above the valley floor. Alluvial deposits are found to a depth of about 2,000 feet below the soil surface, creating a huge underground aquifer. Habitats in Yosemite Valley can be loosely grouped into meadow, riparian, and upland. Mammals resident or transient in Yosemite Valley include deer mouse, California ground squirrel, western gray squirrel, broad-footed mole, Botta's pocket gopher, mink, ringtail, raccoon, coyote, bobcat, mule deer, mountain lion, and black bear.

Regional Vegetation and Habitats

The major vegetation zones of the Sierra Nevada region form readily apparent, large-scale, north-south elevational bands along the axis of the Sierra Nevada range. In the Yosemite region, these vegetation zones include foothill-woodland, lower montane forest, upper montane forest, subalpine forest, and alpine zones; they are distributed from the lowest elevations on the western boundary of the park to the highest elevations from 9,500 feet along the crest of the Sierra Nevada range. Major east-west watersheds that dissect the Sierra Nevada range into steep canyons form a secondary pattern of vegetation.

Merced River Habitats

All eight major vegetation types supported by Yosemite National Park occur within the Merced River corridor and are presented in **table N-2**, below. It is estimated that half of all plant species in the park occur within the Merced River corridor. The *Special Status Plant Species Report* (NPS, 2011b) concluded that the characteristic pattern of special status species occurrence along the Merced River corridor within Yosemite National Park was found to be within unique habitat types that are often restricted in size. These habitat types are typically associated with specific kinds of water availability, such as waterfall spray zones, braided river channel oxbow cutoffs, gravel bars resulting from periodic flooding, water seepage on rock walls, vernal pools resulting from snowmelt flooding, and the average high water margin of streams and rivers. Although riparian and wetland habitats are not classified independently under the eight broad-scale vegetation types used in the parkwide vegetation map of the Merced River Plan/DEIS, their value as biological communities warrants a thorough discussion. Therefore, they are discussed in-depth below. Additionally, because meadow habitats are integral in connecting upland and aquatic habitats, they are also discussed in-depth in this assessment.

TABLE N-2: VEGETATION TYPES WITHIN THE MERCED RIVER CORRIDOR

Vegetation Type	Area per Segment (acres)								Total
	1	2	3	4	5	6	7	8	
Alpine (9,500 to 11,800 feet)*	87.8	0	0	0	6.5	0	0	0	94.3
Meadow (2,000 to 11,000)	1,801.3	324.1	67.6	28.8	389.0	0	140.6	0.9	2,752.3
Chaparral (2,000 to 10,000 feet)	1,669.1	991.4	2,270.6	74.9	694.0	0	166.4	66.6	5,933.0
Subalpine Coniferous Forest (8,000 to 9,500 feet)	9,610.4	45.8	0	0	3,108.9	0	0	0	12765.1
Upper Montane Coniferous Forest (6,000 to 8,000 feet)	16,525.7	3,697.0	1,572.0	0	11,611.8	23.3	990.5	28.4	34,448.7
Lower Montane Coniferous Forest (3,000 to 6,000 feet)	3,505.6	7,248.5	4,785.3	151.4	6,010.4	72.0	4,969.0	1,980.8	28,723.0
Lower Montane Broadleaf Forest (3,000 to 6,000 feet)	461.6	3,331.4	2,982.7	569.7	816.7	3.4	761.1	397.0	9,323.6
Foothill Woodland (1,800 to 3,000 feet)	0	0	9.8	324.8	0	0	0	0	334.6
Barren (1,800 to 11,800 feet)	14,143.4	2,319.5	455.7	27.6	2586.4	2.9	170.2	2.6	19,708.3
Developed	0.3	150.0	59.3	54.5	8.1	0.2	82.2	10.3	364.9

*Elevation ranges are approximated

SOURCE: NPS 1997; NPS 2007x

Meadows. Meadow habitats within the Merced River corridor include alpine, subalpine, and montane meadows and seeps. The meadows in Yosemite National Park play a particularly critical role in the Merced River ecosystem. There are approximately 2,752.3 acres of meadow habitat within the Merced River corridor. Meadows serve as a transition zone, linking aquatic and riparian habitats along the Merced River to drier upland habitats such as California black oak. High spring flows create wet areas in side channels, low-lying wetlands, meadows, and cutoff channels. These areas support the

concentration of organic matter, nutrients, microorganisms, and aquatic invertebrates throughout the relatively dry summer. When the flush of winter or spring flooding occurs, this stored aquatic biomass is washed into the main river channel, forming the base of the aquatic food chain.

Meadows in Yosemite Valley were maintained in the past by natural flooding and by frequent, low-intensity broadcast fires set by Native American residents of the Valley. Today, prescribed fire is used as a tool to clear the meadows of encroaching conifers and release nutrients into the soil.

Special-status species that use meadows, seeps, and other wetlands in Yosemite Valley for foraging and/or reproduction include the Yosemite toad, Mount Lyell salamander, western pond turtle, northern harrier, olive-sided flycatcher, peregrine falcon, great gray owl, special-status bats, California wolverine, Mount Lyell shrew, Sierra Nevada red fox, special-status sedges and grasses, stream orchid, purple fawnlily, California sunflower, false pimpernel, among others (see table N-3 for a complete listing of special-status species that have been found or could occur in Yosemite Valley).

Riparian Habitats. There are approximately 180.7 acres of riparian habitat within the Merced River corridor. Riparian zones extend outward from the banks of the Merced River and its tributaries toward adjacent meadow and forest communities. Broadleaf deciduous trees such as white alder, black cottonwood, and willow characterize riparian zones in Yosemite Valley. Riparian vegetation along moving water is frequently disturbed and constantly responds to the deposition and removal of soil. Riparian vegetation actively colonizes new areas and is made up of a wide range of ages and types of vegetation. This in turn provides a wide range of foraging, nesting, and resting opportunities for wildlife.

Special-status species that are representative of riparian habitats in Yosemite Valley include amphibians (foothill yellow-legged frog, Sierra Nevada yellow-legged frog), reptiles (western pond turtle), birds (yellow warbler, willow flycatcher, harlequin duck), and mammals (special-status bats, Mount Lyell shrew), among others. Special-status plants occurring in riparian habitats include the Sierra sweet bay, stream orchid, purple fawnlily, and Sierra laurel, among others (see Table N-3 for a complete listing of special-status species that have been found or could occur in Yosemite Valley).

Upland Habitats. Upland plant communities are found where soil moisture conditions are average to dry and where soils are not periodically flooded or saturated. Upland habitats within the Merced River corridor are comprised of Chaparral, Foothill Woodland, Lower Montane Broadleaf Forest, Lower Montane Coniferous Forest, Subalpine Coniferous Forest, Alpine, and Barren (table N-2, above). In-depth descriptions of each habitat type within each segment of the Merced River are described in Chapter 9 of the Merced River Plan/DEIS (NPS, 2012).

Segment 1

At its headwaters, the Merced River begins in the lower alpine/subalpine forest zone. The river then descends through the upper montane forest zone and concludes in Little Yosemite Valley within the lower montane forest zone. Vegetation in the upper main stem river corridor is classified into seven broad vegetation types: meadow, chaparral, lower montane broadleaf forest, lower montane coniferous forest, upper montane coniferous forest subalpine coniferous forest, and alpine plant

communities. Special-status species that are representative in upland habitat within the Merced River corridor above Nevada Falls include northern goshawk, golden eagle, northern harrier, yellow warbler, California spotted owl, special-status bat species, California wolverine, western white-tailed jackrabbit, Mount Lyell shrew, Sierra Nevada red fox, and Pacific fisher. Special-status plants occurring in upland habitat within this segment includes California bolandra, redray alpinegold, and Coleman's piperia (see table N-3 for a complete listing of special-status species that have been found or could occur in Segment 1).

Segment 2

Yosemite Valley is a broad, flat-bottomed valley formed by glaciation and subsequent alluvial deposition. The river corridor includes the Merced River in addition to portions of Illilouette Creek, Tenaya Creek, Yosemite Creek, Sentinel Creek, Ribbon Creek, and Bridalveil Creek. Upland habitats cover about 75% of Yosemite Valley and are dominated by mixed conifer, canyon live oak, California black oak, and microhabitats on steep granite walls (Acree 1994).

Mixed conifer communities in Yosemite Valley are typically dominated by ponderosa pine, but may have significant numbers of incense-cedar, Douglas-fir, white fir, California black oak, and an occasional sugar pine. The mixed conifer community is naturally adapted to low-intensity, frequent fires. Nearly 100 years of fire suppression has resulted in a change from open forest to dense thickets of shade-tolerant tree species such as incense-cedar and white fir. Under natural conditions, the return interval for fire is estimated at 8 to 12 years (NPS 1990). Most undeveloped, mixed conifer areas of Yosemite Valley are now managed through a combination of mechanical removal of hazardous fuel and prescribed burning. These treatments simulate the natural and Native American – maintained fire regimes of the Valley and help decrease forest densities to more natural levels.

Canyon live oak communities grow on both north- and south-facing talus slopes. They often form pure or almost pure stands. Fires in this community are infrequent but intense, with a fire return interval of 20 to 50 years on south-facing slopes. Most trees and shrubs in this community resprout after fires.

In addition to being a component of the mixed conifer community, California black oaks in Yosemite Valley form pure, open stands of large trees with a herbaceous understory. These pure stands are found between the upland forest communities and lower-lying meadow and riparian communities. These stands are unique to the Valley due to thousands of years of Native American activities, including annual burning and removal of young conifers. California black oaks also grow in dense stands on talus slopes near drainages.

Special-status species that are representative of upland habitats in Yosemite Valley include Special-status species that are representative in upland habitat within Yosemite Valley include long-eared owl, Vaux's swift, northern harrier, olive-sided flycatcher, yellow warbler, bald eagle, great gray owl, California spotted owl, special-status bat species, Sierra Nevada mountain beaver, western white-tailed jackrabbit, and American badger. Special-status plants occurring in upland habitat within this segment includes Sierra suncup, Buxbaum's sedge, short-bracted bird's beak, purple fawnlily, tanoak,

monkeyflowers, penstemons, redray alpinegold, and wood saxifrage, among others (see table N-3 for a complete listing of special-status species that have been found or could occur in Yosemite Valley).

Segment 3 and 4

The Merced River gorge travels through the lower montane forest zone and into the foothill-woodland zone, where it enters the El Portal area. Vegetation in the Merced River gorge and El Portal river corridor is classified into four broad vegetation types: chaparral, foothill woodland, lower montane broadleaf forest, and lower montane coniferous forest. Valley oak woodland (foothill woodland) occurs in the El Portal area.

El Portal lies in the Merced River canyon at 2,000 feet in elevation. The Merced River in this segment is lined with a narrow band of riparian vegetation with occasional wider floodplains. A dense mosaic of chaparral and foothill woodland communities lines the steep canyon walls. Many factors shape this unique biological environment, including natural floods and lightning-ignited fire. Soils derived in the contact zone between metamorphic and granitic rock form a unique substrate for vegetation. Many special-status plants are concentrated in this unique area. Steep canyon walls that are almost inaccessible to human passage create secluded refuges for wildlife. Extremely hot and dry summer weather places a critical importance on riparian habitat for many wildlife species.

Special-status species that have been found or could occur in El Portal include the long-eared owl, bald eagle, and Townsend's bigeared bat. Special-status plants with the potential to occur in this segment include Thompkin's sedge, mountain lady's slipper, narrowleaf collinsia, Congdon's woolly-sunflower, tanoak, Congdon's lewisia, northern bugleweed, small flowered monkeyflower, valley oak, and Sierra bladdernut (see table N-3 for a complete listing of special-status species that have been found or could occur in El Portal).

Segments 5 and 8

These segments include nearly a full range of environments typical to the Sierra Nevada. Vegetation zones along the upper South Fork (Segment 5) include the alpine, subalpine, upper montane forest, and lower montane forest zones. Vegetation in the upper South Fork is classified into six broad vegetation types: meadow, chaparral, lower montane broadleaf forest, lower montane coniferous forest, upper montane coniferous forest and subalpine coniferous forest.

Vegetation zones along the lower South Fork (Segment 8) include the lower montane forest and foothill-woodland zones. Vegetation in the lower South Fork is classified into three broad vegetation types: chaparral, lower montane broadleaf forest, and lower montane coniferous forest. These segments of the river are designated as wilderness.

Special-status species with the potential to occur within these segments include the northern goshawk, golden eagle, long-eared owl, olive-sided flycatcher, yellow warbler, California spotted owl, special-status bats, Sierra Nevada mountain beaver, California wolverine, Sierra Nevada snowshoe hare, western white-tailed jackrabbit, Pacific fisher, and Sierra Nevada red fox. Special-status upland plants with the potential to occur along the upper and lower South Forks include the small flowered monkeyflower.

Segments 6 and 7

Major vegetation zones in the central South Fork (Wawona) include the upper montane forest and lower montane forest zones. Vegetation in the central South Fork is classified into four broad categories: meadow, chaparral, lower montane broadleaf forest, and lower montane coniferous forest.

Special-status species that are representative of these areas include the golden eagle, long-eared owl, Vaux's swift, northern harrier, olive-sided flycatcher, bald eagle, great gray owl, California spotted owl, special-status bats, Sierra Nevada mountain beaver, western white-tailed jackrabbit, pacific fisher, and American badger. Special-status plants representative of these areas include spurred snapdragon, mountain lady's slipper, narrow leaf collinsia, small flowered monkeyflower, Sierra sweet-bay, California red huckleberry, and Hall's mule ears (see **table N-3** for a complete listing of special-status species that have been found or could occur in the Wawona area).

Species Accounts

TABLE N-3: PRESENTS A SUMMARY OF SPECIAL-STATUS WILDLIFE AND PLANT SPECIES ADDRESSED IN THIS ANALYSIS

Scientific Name Common Name	Listing Status: Federal/State/ CNPS	General Habitat	Potential to Occur in Project Area Segment
Invertebrates			
Desmocerus californicus dimorphus Valley elderberry longhorn beetle	FT	Breeds and forages exclusively on elderberry shrubs (*Sambucus* spp.) typically associated with riparian forests, riparian woodlands, elderberry savannas, and other Central Valley and foothill habitats below 3,000 feet in elevation.	3,4,
Fish			
Mylopharodon conocephalus Hardhead	CSC	Inhabits larger middle- and low elevation streams and rivers, from sea level to 4,750 feet. Typically found in undisturbed streams with clear, deep pools that have sand-gravel-boulder substrates and slow water velocities.	4,6,7
Amphibians			
Hydromantes platycephalus Mount Lyell salamander	CSC	Occurs in massive rock areas between 4,000 and 12,139 feet in elevations, in rock fissures, seeps, shade, and low-growing plants. Commonly found in talus slopes of granite where water is flowing. Also found near streams and within the spray zones of waterfalls, under rocks and moss.	1,2,5
Anaxyrus canorus Yosemite toad	FC/CSC	Restricted to wet mountain meadows, lakes, ponds, and shallow spring channels in the central high Sierra Nevada, between 4,790 - 11910 feet. Wet meadow habitat is the focal habitat for this species	1,5
*Rana boylii** Foothill yellow-legged frog	CSC	Primarily found in streams with riffles, rocky substrates and open banks from sea level to 6,390 feet.	2,3,4,6,7,8
Rana sierrae Sierra Nevada yellow-legged frog	FC/CCE/CSC	High mountain lakes, ponds, tarns and streams at elevations ranging from 5,500 to 12, 000 feet; rarely found more than 3 feet from water.	1,5

TABLE N-3: PRESENTS A SUMMARY OF SPECIAL-STATUS WILDLIFE AND PLANT SPECIES ADDRESSED IN THIS ANALYSIS (CONTINUED)

Scientific Name Common Name	Listing Status: Federal/State/ CNPS	General Habitat	Potential to Occur in Project Area Segment
Reptiles			
*Emys marmorata** Western pond turtle	CSC	Inhabit a wide range of permanent and ephemeral aquatic habitats including ponds, marshes, rivers, streams, and ditches to about 6,700 feet, but are uncommon anywhere above 5,000 feet. Prefers open, grassy south-facing slopes for nest sites.	2,3,4,6,7,8
Birds			
Histrionicus histrionicus Harlequin duck	CSC	Breeds along large, swift-moving mountain rivers with vegetated banks for cover. At the conclusion of the breeding season, they move back to the coast where they forage in intertidal areas.	1-8
Accipiter gentilis Northern goshawk	CSC	Favors moderately dense coniferous forests broken by meadows, and other openings, between 5,000 and 9,000 feet in elevation. Typically nest in mature conifer stands near streams. Forage in mature and old-growth forests that have relatively dense canopies and open understories, but also hunt among a variety of vegetative cover, including meadow edges.	1,5
Aquila chrysaetos *Golden eagle*	CFP	Forages in open terrain such as grasslands, deserts, savannahs, and early successional stages of forest and shrub habitats; nests in canyons and large trees in open habitats. In the Sierra Nevada, golden eagles favor grasslands and areas of shrubs or saplings, and open-canopied woodlands of young blue oaks.	1-8
Circus cyaneus Northern harrier	CSC	Favors open areas such as grasslands, meadows, wetlands, and agricultural clearings. Rarely seen migrant that passes through Yosemite.	2,7
Haliaeetus leucocephalus Bald eagle	FD/CE/CFP	Nests in tall trees, usually over 100 feet in height, or on cliffs, usually near water. Favor lakes and rivers with abundance prey (mostly fish).	2,3,4,7
Falco peregrinus Peregrine falcon	CFP	Nests on vertical cliff habitat, with large potholes or ledges, that is inaccessible to land predators. Hunts in a wide variety of habitats including meadows, woodlands, marshes, and mudflats.	1,2,3,5,7
Asio otus Long-eared owl	CSC	In the Sierra Nevada, this species is found from blue oak savannah up to ponderosa pine and black oak habitats, usually in association with riparian habitats.	2,3,4,5,6,7,8
Strix nebulosa Great gray owl	CE	Entire California population of this species is restricted to the Yosemite region. Breeds in mixed conifer/red fir forests bordering meadows. Winters in mixed conifer down to blue oak woodlands.	2,7
Strix occidentalis occidentalis California spotted owl	CSC	Strongly associated with areas of mature and old forest with thick dense canopy closure that contains many dense, old, live trees and snags and fallen logs.	1,2,3,5,7
Chaetura vauxi Vaux's swift	CSC	Inhabits redwood and Douglas-fir habitats. Utilizes large hollow trees and snags, especially tall, burned-out stubs for nest sites. Breeding occurs in Yosemite Valley, usually in forested habitat near meadows.	2,3,7,8

TABLE N-3: PRESENTS A SUMMARY OF SPECIAL-STATUS WILDLIFE AND PLANT SPECIES ADDRESSED IN THIS ANALYSIS (CONTINUED)

Scientific Name Common Name	Listing Status: Federal/State/ CNPS	General Habitat	Potential to Occur in Project Area Segment
Birds (cont.)			
Cypseloides niger borealis Black swift	CSC	In Yosemite, black swifts only nest near or behind waterfalls, through elsewhere in their range nests are found on sea cliffs or other sheer rock faces.	2
Contopus cooperi Olive-sided flycatcher	CSC	Breeds in montane and northern coniferous forests, at forest edges and openings, such as meadows and ponds. Winters at forest edges and clearings where tall trees or snags are present.	1,2,5,7
Empidonax traillii Willow flycatcher	CE	Breeds in moist, shrubby areas, often with standing or running water. Winters in shrubby clearings and early successional growth. Deciduous trees and shrubs interspersed with open areas enhances the quality of foraging habitat	2,6,7
Setophaga petechia Yellow warbler	CSC	Prefers riparian woodlands, but also breeds in chaparral, ponderosa pine, and mixed conifer habitats with substantial amounts of brush.	1-8
Mammals			
Sorex lyelli Mount Lyell shrew	CSC	Found primarily in wetland communities, near streams, in grassy areas, under willows, and in sagebrush steppe communities. Requires moist soil and uses logs, stumps, and other surface objects for cover.	1,5
Antrozous pallidus Pallid bat	CSC	Common species of low elevations in California. Occupies grasslands, desert, shrublands, woodlands, and forests from sea level up through mixed conifer forests. This species is quite versatile in its choice of roosting sites, and has been documented using tree hollows, rock crevices, caves, abandoned mines, and structures.	1-8
Corynorhinus townsendii Townsend's big-eared bat	CSC	Found in all habitat types from low to moderate elevations. Not found in high elevation subalpine and alpine habitats. Requires caves, mines, or buildings for roosting. Prefers mesic habitats where it gleans from brush or trees along habitat edges.	2,3,4,7,8
Euderma maculatum Spotted bat	CSC	Occupies a wide variety of habitats from arid deserts and grasslands through mixed conifer forests. In montane habitats, the spotted bat forages over meadows, along forest edges, or in open coniferous woodland. Feeds almost entirely on moths. Needs rock crevices in cliffs or caves for roosting.	1,2,5,7
Lasiurus blossevillii Western red bat	CSC	Typically found in trees, hedgerows, and forest edges. Roosts in foliage in summer.	1-8
Eumops perotis Western mastiff bat	CSC	Found in a variety of habitats, from desert scrub and chaparral to montane coniferous forest. Typically found in rocky cliff and canyon areas. Its presence is determined by the availability of significant rock features offering suitable roosting habitat.	1,2,5,7

TABLE N-3: PRESENTS A SUMMARY OF SPECIAL-STATUS WILDLIFE AND PLANT SPECIES ADDRESSED IN THIS ANALYSIS (CONTINUED)

Scientific Name Common Name	Listing Status: Federal/State/ CNPS	General Habitat	Potential to Occur in Project Area Segment
Mammals (cont.)			
Lepus americanus tahoensis Sierra Nevada snowshoe hare	CSC	Boreal riparian areas in the Sierra Nevada. Thickets of deciduous trees in riparian areas and thickets of young conifers.	1,5
Lepus townsendii townsendii Western white-tailed jackrabbit	CSC	Inhabits a variety of habitats, including sagebrush, perennial grasslands, alpine dwarf-shrub, early successional conifer habitats, and wet meadows to timberline and above.	1,5
Aplodontia rufa californica Sierra Nevada mountain beaver	CSC	Dense growth of small deciduous trees and shrubs, wet soil, and abundance of forbs in the Sierra Nevada and east slope. Needs dense understory for food and cover. Burrows into soft soil. Needs abundant supply of water.	1,5
Vulpes vulpes necator Sierra Nevada red fox	CT	Occupied habitats are typical of the high Sierra Nevada: high elevation barren, conifer and shrub habitats, montane meadows, talus slopes, subalpine woodlands, and fell-fields. Found mostly above 7,000 feet and rarely below elevations of 5,000 feet.	1,5
Gulo gulo California wolverine	FC/CT/CSC	Habitats used in the southern Sierra Nevada include red fir, mixed conifer, lodgepole, subalpine conifer, alpine dwarf-shrub, barren, wet meadows, montane chaparral, and Jeffrey pine, from 6,400 to 10,800 feet. Uses caves, hollows in cliffs, logs, rock outcrops, and burrows for cover and denning.	1,5
Martes pennanti pacifica Pacific fisher	FC/CSC	Dens and bears young in the cavities of large trees or snags and strongly associated with mid-elevation mature and late successional coniferous or mixed forests. Generally found in stands with high canopy closure, large trees and snags, large woody debris, large hardwoods, and multiple canopy layers.	1,2,5,7
Taxidea taxus American badger	CSC	Drier open stages of most shrub, forest, and herbaceous habitats, with friable soils.	7
Ovis canadensis sierrae Sierra Nevada bighorn sheep	FE/CE/CFP	Occurs primarily along the Sierra Crest in the northeast portion of the park. Most of the herd inhabits Forest Service land adjacent to the park.	5

STATUS:
FE – Federal Endangered
FT – Federal Threatened
FC – Federal Candidate
FD – Federal Delisted
CE – California Endangered
CT – California Threatened
CCE – California Candidate Endangered
CFP – California Fully Protected Species
CSC – California Species of Concern

*Believed to be extirpated from the Merced River Corridor

SOURCE: *Special Status Wildlife Species Report for the Merced River Corridor in Yosemite National Park* (NPS 2011a)

TABLE N-3: PRESENTS A SUMMARY OF SPECIAL-STATUS WILDLIFE AND PLANT SPECIES ADDRESSED IN THIS ANALYSIS (CONTINUED)

Scientific Name Common Name	Listing Status: Park/CNPS/ State	General Habitat	Potential to Occur in Project Area Segment
Plants and Fungi			
Antirrhinum leptaleum Spurred snapdragon	SSP	Small washes, shallow ditches, disturbed areas, in foothill woodland, yellow pine forest; historic collection from Wawona; elevations between 300-2100 meters.	7
Asarum lemmonii Lemmon's wild ginger	SSP	Shady wet places along creeks, north-facing river banks; Yosemite Valley, Wawona; elevations between 1100-1900 meters.	2,7
Bolandra californica California bolandra	SSP/4.3	Lower and upper montane coniferous forest, mesic, rocky shaded places; Lyell Fork Merced River; elevations between 2000-3000 meters.	1
Bulbostylis capillaris Threadleaf beakseed	SSP/4.2	Meadows and seeps, meadow habitats, vernally moist gravel pans; Yosemite Valley; elevations between 1000-2000 meters.	2
Camissonia sierrae ssp. *alticola* Mono Hot Spring evening primrose	SSP/1B.2	On vernally moist gravel and sand pans; Merced Lake; elevations between 2000 - 2350 meters.	1
Camissonia sierrae ssp. sierrae Sierra suncup	SSP/4.3	Granite gravel seepage areas; Yosemite Valley; elevations between 500-1300 meters.	2
Carex buxbaumii Buxbaum's sedge	SSP/4.2	Montane and subalpine fens; Coastal Prairie, Yellow Pine Forest, Red Fir Forest, Lodgepole Forest, Subalpine Forest, Meadows and seeps, wet conditions in meadow habitats. Yosemite Valley; elevations between 1200-3300 meters.	2
Carex canescens Silvery sedge	SSP	Lake margins, drainages in wet meadows; historic collection from Clark's Wawona; elevations between 1000-3200 meters.	7
Carex fissuricola Cleft sedge	SSP	Meadow slopes and flats, among rocks, wet areas, spray zones; Nevada Falls; elevations between 1500-3500 meters.	1
Carex sartwelliana Yosemite sedge	SSP	Moist forest openings and meadow borders; Wildcat Creek; elevations between 1200-2600 meters.	1,2,5,7
Carex tompkinsii Thompkins' sedge	SSP/4.3/ Rare	Canyon slopes and river bottomlands under conifer-oak woodland canopy; El Portal area; elevations between 1200-1800 meters.	4
Cinna bolanderi Bolander's woodreed	SSP/1B.2	Montane stringer meadows and fens; Wawona & Little Yosemite Valley; elevations between 1670-2440 meters.	1,7
Collinsia linearis Narrow leaf collinsia	SSP	Rocky, metamorphic substrates of broad-leaved upland forest, chaparral, cismontane woodland; El Portal & Wawona; elevations between 200-2000 meters.	4,7

TABLE N-3: PRESENTS A SUMMARY OF SPECIAL-STATUS WILDLIFE AND PLANT SPECIES ADDRESSED IN THIS ANALYSIS (CONTINUED)

Scientific Name Common Name	Listing Status: Park/CNPS/ State	General Habitat	Potential to Occur in Project Area Segment
Plants and Fungi (cont.)			
Cordylanthus rigidus ssp. *brevibracteatus* Short-bracted bird's beak	SSP/4.3	North side Yosemite Valley, dry sandy roadside full sun, 1 mi E Cascade Creek; elevations between 1100-2500 meters.	2
Cypripedium montanum Mountain lady's slipper	SSP/4.2	Deep humus and shade of canyon bottoms; Wawona & below Yosemite Valley; elevations between 200-2200 meters.	3,7
Epipactis gigantea Stream orchid	SSP	Moist conditions in meadows, streambank habitats & cliff basins; Yosemite Valley; elevations between 1500-2600 meters.	2
Eriophyllum congdonii Congdon's woolly sunflower	SSP/1B.2/Rare	Sunny rockys slopes on metamorphic talus; next to river in El Portal; elevations between 500-1900 meters.	4
Erythronium purpurascens Purple fawnlily	SSP	Open forests, meadows, rocky places; Yosemite Valley - possibly extinct; elevations between 1500-2700 meters.	2
Glyceria borealis Northern mannagrass	SSP	Marshes and shallow lake borders; Yosemite Valley; elevations between 800-1250 meters.	2
Helianthus californicus California sunflower	SSP	Meadows, seeps, streambanks, seasonally inundated areas; Wawona; elevations between 1600-2000 meters.	7
Hippuris vulgaris Common mare's tail	SSP	Lakes, ponds, springs, rivers. Little Yosemite Valley; elevations between 0-2600 meters.	1
Hulsea heterochroma Redray alpinegold	SSP	Chaparral, openings in yellow pine forest, Yosemite Valley, 5 miles above Nevada Fall; elevations between 300-2500 meters.	1,2
Isoetes occidentalis Western quillwort	SSP	Mountain lakes and rivers; In Merced River Little Yosemite Valley; elevations between 1500-2500 meters.	1
Leucothoe davisiae Sierra laurel	SSP	Moist, shaded drainage bottoms along creeks and rivers; Yosemite Valley; elevations between 1300-2600 meters.	2
Lewisia congdonii Congdon's lewisia	SSP/1B.3/Rare	Lower montane coniferous forest, metamorphic cliffs; El Portal; elevations between 500-2800 meters.	3,4
Lindernia dubia var. *anagallidea* False pimpernel	SSP	Exposed margins of lakes and ponds, mudflats; Yosemite Valley; elevations between 500-1600 meters.	2
Lithocarpus densiflorus var. *echinoides* *Tanoak*	SSP	Dry shady forest conditions in slope habitats; Merced River below Yosemite Valley; elevations between 600-2000 meters.	2,3
Lycopus uniflorus Northern bugleweed	SSP/4.3	Moist areas, marshes, near springs; Merced River banks from El Portal up; elevations between 1600-2000 meters.	3,4

TABLE N-3: PRESENTS A SUMMARY OF SPECIAL-STATUS WILDLIFE AND PLANT SPECIES ADDRESSED IN THIS ANALYSIS (CONTINUED)

Scientific Name Common Name	Listing Status: Park/CNPS/ State	General Habitat	Potential to Occur in Project Area Segment
Plants and Fungi (cont.)			
Mimulus bicolor Yellow and white monkeyflower	SSP	Occurs under vernally moist conditions; usually in non-wetlands, but occasionally found on wetlands & river bottomlands; Wawona; elevations between 360-2100 meters.	7
Mimulus inconspicuus Small flowered monkeyflower	SSP/4.3	Chaparral, cismontane woodland, lower montane coniferous forest, mesic, shady areas; mouth of Moss Creek; elevations between 160-2000 meters.	2,3,7,8
Mimulus laciniatus Cutleaf monkeyflower	SSP/4.3	Chaparral, lower and upper montane coniferous forest, mesic areas of granitic substrate, vernally moist seepage areas; Yosemite Valley; elevations between 900-2000 meters.	2
Mimulus pulchellus Yellowlip pansy monkeyflower	SSP/1B.2	Lower montane coniferous forest, vernally mesic meadows; Yosemite Valley; elevations between 600-2000 meters.	2
Myrica hartwegii Sierra sweet bay	SSP	Stream and riverbanks; Along Merced below Wawona; elevations between 300-1500 meters.	7,8
Narthecium californicum California bog asphodel	SSP	Fens, seeps; occurs under wet conditions by streams and waterfalls; Bridalveil Falls; elevations between 700-2600 meters.	2
Penstemon azureus ssp. angustissimus Azure penstemon	SSP	Chaparral, Yellow Pine Forest, Sagebrush Scrub, Foothill Woodland; occurs under dry conditions in slope habitats. Yosemite Valley; elevations between 300-700 meters.	2
Penstemon heterophyllus var. *purdyi* Purdy's foothill penstemon	SSP	Chaparral, Foothill Woodland, Yellow Pine Forest; occurs under dry conditions in slope habitats. Yosemite Valley; elevations between 50-1600 meters.	2
Phacelia tanacetifolia Tansy leafed phacelia	SSP	Habitat variable, occurs in slope habitats; Bridalveil Falls, Yosemite Valley; elevations between 1000-2000 meters.	2
Pinus albicaulis Whitebark pine	FC	Cold, windy high elevation sites between 3,000 meeters-3,750 meters	1,2,5
Piperia colemanii Coleman's piperia	G3/4.3	Chaparral, lower montane coniferous forest. Little Yosemite Valley; elevations between 1200-2300 meters.	1
Plagiobothrys torreyi var. *torreyi* Torrey's popcornflower	SSP/1B.2	Moist meadows and flats, forest edges; Yosemite Valley; elevations between 1200-3400 meters.	2
Potamogeton epihydrus ssp. *nuttallii* Nuttall's pondweed	SSP/2.2	Freshwater marshes, tanks; Yosemite Valley; elevations between 400-1900 meters.	2
Quercus lobata Valley oak	SSP	Deep soil on slopes and in valleys. Known from a few majestic specimens in El Portal; elevation 720 meters.	4

TABLE N-3: PRESENTS A SUMMARY OF SPECIAL-STATUS WILDLIFE AND PLANT SPECIES ADDRESSED IN THIS ANALYSIS (CONTINUED)

Scientific Name Common Name	Listing Status: Park/CNPS/ State	General Habitat	Potential to Occur in Project Area Segment
Plants and Fungi (cont.)			
Saxifraga mertensiana Wood saxifrage	SSP	Mossy rocks, cliffs; Yosemite Valley; elevations between 1000-2500 meters.	2
Saxifraga oregana Oregon saxifrage	SSP	Meadows and seeps; occurs under wet conditions in meadow habitats; Yosemite Valley & Little Yosemite Valley; elevations between 150-2500 meters.	1,2
Scutellaria bolanderi ssp. *bolanderi* Sierra skullcap	SSP	Gravelly soils, stream & riverbanks, meadows in oak or pine woodland; Wawona; elevations between 300-2000 meters.	7
Senecio clarkianus Clark's ragwort	SSP	Damp montane meadows; Wawona; elevations between 1400-2700 meters.	7
Sparganium natans Small bur reed	SSP/4.3	Freshwater wetlands, in lake margin and edge habitats, tanks in meadows; tributaries of Merced River; elevations between 2000-2500 meters.	2,7
Staphylea bolanderi Sierra bladdernut	SSP	Chaparral, Foothill Woodland, Yellow Pine Forest; occurs in shaded canyon habitats; Merced River Canyon in El Portal; elevations between 240-1720 meters.	3,4
Trillium angustipetalum Narrowpetal wakerobin	SSP	Shaded bottomlands; Wawona, Yosemite Valley; elevations between 100-2000 meters.	2,7
Vaccinium parvifolium California red huckleberry	SSP	Moist, shaded drainage bottoms along creeks and rivers; Merced River Wawona area; elevations between 1400-2500 meters.	7
Wyethia elata Hall's mule ears	SSP/4.3	Open woodland, forest; Wawona; elevations between 1000-1400 meters.	7

STATUS:

FC – Federal Candidate
Rare: Designated as rare by the State of California
SSP: Park Designated Special Status Species

CNPS RANKINGS:

List 1A: Plants presumed extinct in California
List 1B: Plants Rare, Threatened, or Endangered in California and Elsewhere
List 2: Plants Rare, Threatened, or Endangered in California, But More Common Elsewhere
List 3: Need more information
List 4: Plants of Limited Distribution
Threat Ranks:
.1: Seriously endangered in California
.2: Fairly endangered in California
.3: Not very endangered in California

SOURCE: Special Status Plant Species in the Merced River Corridor within Yosemite National Park (NPS 2011b)

Federal Endangered Species

Mammals

Sierra Nevada bighorn sheep
Ovis canadensis sierrae

Status. Federal Endangered, California Endangered, California Fully Protected

General Distribution. Sierra Nevada bighorn sheep use habitats ranging from the highest elevations along the crest of the Sierra Nevada (4,000 meters [13,120 feet]) to winter ranges at the eastern base of the range as low as 1,450 meters (4,760 feet) (USFWS 2007). The Sierra Nevada bighorn sheep population has increased from a low of 100 individuals in 1995 to more than 400 animals since the species was listed as endangered under the federal ESA in 1999. The Yosemite Recovery Unit consists of approximately 40 individuals at high elevations along the northeastern section of Yosemite.

Habitat Requirements. Habitats used by Sierra Nevada bighorn sheep include alpine dwarf-shrub, low sage, sagebrush, bitterbrush, pinyon-juniper, palm oasis, desert riparian, desert succulent shrub, desert scrub, subalpine conifer, perennial grassland, montane chaparral, and montane riparian (DeForge 1980, Monson and Sumner 1980, Wehausen 1980). Bighorn sheep use rocky, steep terrain for escape and bedding and remain near rugged terrain while feeding in open habitat (Zeiner et al. 1990). Low-elevation winter ranges provide this species an important source of high quality forage early in the growing season (USFWS 2007). They use steep, rugged slopes and canyons for lambing areas (Wehausen 1980).

Status in Merced River Corridor. Historically, bighorn sheep occupied alpine and subalpine areas along the Sierra Crest and in the Cathedral Range. It is generally believed that they seasonally migrated from the crest to winter on the eastern escarpment. Given that they occupied the Cathedral Range, it is very likely that bighorn sheep historically occupied the upper reaches of the Merced River drainage. A Museum of Vertebrate Zoology specimen was taken from the east lobe of Lyell Glacier within 1 kilometer (0.62 mile) of the Merced River corridor in October 1933. Another specimen was taken within 3 kilometers of the river corridor east of Crescent Lake near Wawona in 1921 (Museum of Vertebrate Zoology Database 2011). In 1976, a bighorn sheep was sighted near Donohue Pass, approximately 3.5 kilometers northeast of the Merced River corridor (Yosemite Wildlife Observation Database 2011). Although rams might occasionally (rarely) wander into the upper (along the crest) Merced River drainage, it is highly unlikely that bighorn sheep currently occupy the Merced River drainage (Chow, pers. comm.). In addition, bighorn sheep critical habitat (designated in 2008 by USFWS) does not occur within the Merced River corridor.

Federal Threatened Species

Invertebrates

Valley elderberry longhorn beetle
Desmoscerus californicus dimorphus

Status. Federally threatened

General Distribution. The valley elderberry longhorn beetle is found in areas below 915 meters (3,000 feet) in elevations that support species of elderberry (*Sambucus* sp.). At the time of listing in 1980, the beetle was known from fewer than 10 locations on the American River, Putah Creek, and Merced River. Current distribution ranges from southern Shasta County to Fresno County.

Habitat Requirements. The valley elderberry longhorn beetle is an invertebrate species that is completely dependent on its host plant, elderberry, throughout its one-year to two-year life cycle. The beetle spends most of its life in the larval stage, living in the stems of elderberry shrubs. Adults emerge from late March through June, when feeding and mating occurs, about the same time the elderberry flowers. The adult stage is short-lived; females lay their eggs on the bark, larvae hatch and burrow into the stems, and the cycle is repeated. Although elderberry shrubs are relatively common in riparian habitat, it appears that to serve as suitable habitat, shrubs must have stems that are 1 inch or greater in diameter at ground level (Barr 1991). Use of elderberry by the beetle is rarely apparent. Frequently, the only exterior evidence of the use by the beetle is a distinct exit hole created by the larva just before the pupal stage.

Status in Merced River Corridor. The El Portal Administrative Site is the only area in Yosemite National Park that lies below 915 meters (3,000 feet) in elevation. In El Portal, elderberry plants represent a subdominant species within live oak forests, interior live oak forests, interior live oak woodlands, blue oak woodlands, canyon live oak forests, mixed north slope forests, foothill pine/live oak/chaparral woodlands, northern mixed chaparral, interior live oak chaparral, and westside ponderosa pine forests. Elderberry shrubs are scattered throughout the El Portal Administrative Site.

Federal Candidate Species

Amphibians

Yosemite toad
Bufo canorus

Status. Federal candidate, California species of special concern

General Distribution. The historic range of Yosemite toads in the Sierra Nevada occurs from the Blue Lakes region north of Ebbetts Pass (Alpine County) to 5 kilometers (3.1 miles) south of Kaiser Pass in the Evolution Lake/Darwin Canyon area (Fresno County) (Jennings and Hayes 1994). Historically, the

toad ranged from 1,460 meters to 3,630 meters (4,790 feet to 11,910 feet) in elevation (Stebbins 1985) throughout its range and from 1,950 meters to 3,444 meters (6,400 feet to 11,300 feet) in elevation in Yosemite (Karlstrom 1962). The toad is currently known from 179 sites in Yosemite between the elevations of 2,134 meters to 3,505 meters (7,000 feet to 11,500 feet) (Knapp 2003). Estimates suggest that the toad has disappeared from between 47% and 79% of the sites that it previously occupied (Jennings and Hayes 1994, Drost and Fellers 1996). Remaining populations appear more scattered across the landscape and consist of a small number of breeding adults (Kagarise Sherman and Morton 1993).

The NPS surveyed 446 meadows for Yosemite toads during the summer of 2010, 166 of which had been surveyed at least once between 1992 and 2009. The remaining 280 meadows had never been surveyed. The surveys documented 44 new breeding populations of toads, and increased the number of documented breeding populations from 135 to 179. Toads were not found in approximately 50% of the sites where toads had been previously documented, while 9% of meadows where toads had not been documented previously had breeding during the 2010 survey.

Habitat Requirements. The Yosemite toad has been recorded in a broad range of high montane, subalpine, and alpine habitats, including wet meadows, lakes, ponds, and shallow spring channels. The Yosemite toad is most commonly found, however, in shallow, warm water areas, including standing and flowing water in wet meadows, small permanent and ephemeral ponds, and flooded shallow grassy areas and meadows adjacent to lakes (Karlstrom 1962). Wet meadow habitat is the focal habitat for this species.

Status in the Merced River Corridor. Yosemite toad observations have been recorded on 2,142 occasions in Yosemite. Of these observations, 11 records are from the Merced River corridor. There are no records of Yosemite toads within the Merced River corridor prior to 1999, which is likely due to a lack of survey efforts targeting the toad. Between 1999 and 2010, there were a multiple sightings at higher elevation sites around Triple Divide, Isberg, and Rodgers peaks.

Sierra Nevada yellow-legged frog
Rana sierrae

Status. Federal candidate, California candidate

General Distribution. Sierra Nevada yellow-legged frogs currently range from north of the Feather River in northern Plumas County, California, south, including all of Yosemite, to the divide between the South and Middle Forks of the Kings Rivers in Kings Canyon National Park. The majority of their range is in federally designated wilderness. Despite the fact that most of their habitat is fully protected, the Sierra Nevada yellow-legged frog has disappeared from >93% of their historic range. The declines have escalated since the late1970s, and most of the remaining populations are much smaller than those that would have occurred historically (Knapp 2005). Consequently, the Sierra Nevada yellow-legged frog has gone from being one of the most abundant species in the Sierra Nevada (Grinnell and Storer 1924) to one that is considered critically endangered. This species is currently known to occur at approximately 166 sites in Yosemite at elevations ranging from 1,676 meters to 3,536 meters (5,500 feet

to 11,600 feet). The Sierra Nevada yellow-legged frog is a candidate species for listing under the federal ESA, and the USFWS plans to initiate a proposed rule to list this species in 2013. A listing decision would occur within 12 months of proposed ruling.

Habitat Requirements. The Sierra Nevada yellow-legged frog occupies aquatic habitats for almost all of their seasonal life history; they breed, tadpoles develop, and they overwinter in lakes and ponds or low-flowing streams and use flowing water to move between sites. This species is rarely found more than a few feet from water. Because it overwinters in water and has a multi-year tadpole phase, it requires waters that are deep enough that they don't freeze solid in the winter and they don't dry out during the summer.

Status in the Merced River Corridor. Sierra Nevada yellow-legged frog observations have been recorded on 4,581 occasions in Yosemite. Of these observations, 20 records are from the Merced River corridor. Most of the sites where Sierra Nevada yellow-legged frogs are known to exist fall outside of the Merced River corridor. Concerted efforts to survey amphibians in the park have been conducted between 1992 and 2010. Before 1992, there were five records of Sierra Nevada yellow-legged frogs within the river corridor at Wawona (1922), Yosemite Valley (1922, 1958), Triple Peak (1940), and Horsethief Canyon (1991). One of the historic records from Yosemite Valley may have been from farther up Tamarack Creek rather than from the Valley. During a comprehensive survey of all mapped and unmapped lakes and ponds in Yosemite conducted in 2000–2002, Knapp (2005) observed Sierra Nevada yellow-legged frogs at 13 sites around Red and Rodgers peaks. A total of 30 adults or subadults and about 1400 tadpoles were recorded at these sites. Between 1992 and 2010, there were two additional observations in the upper reaches of the Merced River.

Mammals

California Wolverine
Gulo gulo luteus

Status. Federal candidate, California threatened

General Distribution. The California wolverine is an uncommon resident of north Coast Range mountains and the Sierra Nevada. Sightings range from Del Norte and Trinity counties east through Siskiyou and Shasta counties, and south through Tulare County (Zeiner et al. 1990). Wolverines have not been scientifically confirmed in California since the 1920s, but a remote camera sighting detected an individual wolverine in Tahoe National Forest in March 2008.

Habitat Requirements. Habitats used by the California wolverine in the southern Sierra Nevada include red fir, mixed conifer, lodgepole, subalpine conifer, alpine dwarf-shrub, barren, wet meadows, montane chaparral, and Jeffrey pine, while their elevation range in the southern Sierra Nevada is 2,000 meters to 3,400 meters (6,400 feet to 10,800 feet) (Zeiner et al. 1990). The wolverine uses caves, hollows in cliffs, logs, rock outcrops, and burrows for cover and denning, generally in denser forest stages (Zeiner et al. 1990). The wolverine may dig dens in the snow. Wolverines are hunters and scavengers and feed primarily on small mammals and carrion but might kill large snowbound prey (Grinnell et al. 1937, Ingles 1965). Wolverines have extremely large home ranges; in Montana, their

yearly home range was 422 km^2 (156 mi^2) for males and 388 km^2 (144 mi^2) for females (Hornocker and Hash 1981).

Status in Merced River Corridor. Two California wolverine specimens were collected at the head of Lyell Canyon in 1915, just 2 kilometers from the Merced River corridor (Museum of Vertebrate Zoology Database 2011). There have been three unconfirmed sightings within the corridor; along the south fork of the Merced River in 1959, near Pohono Bridge in 1990, and near the junction of Iron Creek and the Merced River in 1959 (Yosemite Wildlife Observation Database 2011). The likelihood of these latter three sightings being legitimate is highly unlikely, however.

Pacific fisher
Martes pennanti pacifica

Status. Federal candidate, California species of special concern

General Distribution. Although the historic distribution of Pacific fisher was once contiguous across California and the Pacific Northwest, including the northern Coast range, Klamath Mountains, southern Cascades, and western slope of the Sierra Nevada, the fisher has declined during the past century. Remaining populations are geographically and, in some cases, genetically isolated from one another (Grinnell et al.1937, Zielinski et al. 1995). Pacific fisher currently occur in only two regions of the state, which are separated by over 430 kilometers: the northwest, including the northern Coast Range and Klamath Province; and the southern Sierra Nevada, including Yosemite National Park (Zielinski et al. 1995). Yosemite lies at the northern tip of the fisher's southern range. The fisher's elevation range is approximately 1,219 meters to 2,134 meters (4,000 feet to 7,000 feet).

Habitat Requirements. The Pacific fisher is one of the most habitat-specific mammals in North America (Buskirk and Powell 1994). Fishers den and bear young in the cavities of large trees or snags and are strongly associated with mid-elevation, mature and late successional coniferous or mixed forests (Powell and Zielinski 1994, Zielinski et al. 2004a, 2004b). In particular, fisher are generally found in stands with high canopy closure, large trees and snags, large wood, large hardwoods, and multiple canopy layers. Fisher generally avoid entering open areas that have no overstory or shrub cover (Buskirk and Powell 1994), while Chow (2009) found that fisher in Yosemite prefer habitat near permanent streams. The fisher has a varied diet consisting primarily of small mammals, such as squirrels, but they also consume porcupines, birds, invertebrates, vegetation, and fruit (Powell and Zielinski 1994).

Status in Merced River Corridor. Fisher are elusive and more challenging to detect compared with other carnivores, but recent fisher surveys (2009–2011) conducted in collaboration with U.C. Berkeley have confirmed the presence of 5– 8 individual fisher south of the Merced River near Chinquapin, Wawona, Mariposa Grove, and along the South Fork Merced River. Previous fisher surveys in the park conducted by Chow (2009) during 1992–1994 detected relatively few fisher despite the availability of suitable habitat and use of a combination of survey methods, including remote cameras and track plates. Chow (2009) concluded that Pacific fisher inhabit Yosemite at very low population densities. The Merced River may be one of multiple barriers currently preventing northward expansion of their

range. Two fisher specimens were collected within the Merced River corridor in Yosemite Valley in 1919 and 1920 (Museum of Vertebrate Zoology Database 2011).

Plants

Whitebark pine
Pinus albicaulis

General Ecology and Distribution. Whitebark pine, a tree from the pine family, is native to California. It occurs in subalpine and upper montane forests at elevations ranging between 2,300 and 4,000 meters. It is considered a keystone species and a major food source for many species of birds and mammals. Whitebark pine is rapidly declining throughout most of its range, primarily due to a combination of white pine blister rust, periodic mountain pine beetle outbreaks, fire suppression, and climate change (Natural Resources Defense Council [NRDC], 2008 and Fryer, 2002).

Habitat and Status in the Project Area. This species occurs on cold and windy, high-elevation sites in isolated stands in the subalpine zone. However, it also co-occurs with a diversity of confiers that vary by location and elevation (NRDC, 2008 and Fryer, 2002). In the Project Area, it is found in Segments 1, 2, and 5 (Merced River above Nevada Fall, Yosemite Valley, and South Fork above Wawona, respectively).

California State Endangered Species

Sierra Nevada bighorn sheep (see Federal Endangered Species section)

Birds

Willow flycatcher
Empidonax trailii

Status. California endangered

General Distribution. The willow flycatcher is a neotropical migrant that breeds in riparian and moist meadow willow thickets in the United States and southern Canada (American Ornithologists' Union 1983). The willow flycatcher winters from Mexico to northern South America. Currently, about half of the willow flycatcher breeding population in California occurs in the Sierra Nevada (Zeiner et al. 1990, Kus et al. 2000). Most willow flycatchers in the Sierra Nevada are found at elevations from 366 meters to 2,900 meters (1,200 feet to 9,500 feet), although most of the known willow flycatcher sites (88%) occur at elevations between 1,200 meters and 2,400 meters (3,900 feet to 7,900 feet) (Serena 1982, Harris et al. 1988, Stafford and Valentine 1985). Willow flycatchers are a rare former breeder in Yosemite.

Habitat Requirements. As their name suggests, willow flycatchers frequent the willows found along languid streams and, to a lesser degree, within moist meadows (Gaines 1992). Deciduous trees and shrubs interspersed with open areas enhance the quality of foraging habitat. Willow flycatchers forage by either gleaning insects from vegetation while flying, or by waiting on an exposed perch and capturing insects in flight (Ettinger and King 1980, Sanders and Flett 1989).

Status in Merced River Corridor. Once a commonly observed bird in Yosemite Valley, willow flycatchers are now exceedingly rare in the park as a whole. Willow flycatcher observations have been recorded on 50 occasions in Yosemite. Of these observations, 26 records are from the Merced River corridor. The first documented observation of a willow flycatcher in Yosemite was made by the Grinnell survey in 1915. Almost all of the river corridor's willow flycatcher observations fall between 1915 and 1931 (Yosemite Wildlife Observation Database 2011). Gaines (1992) indicates that they had stopped breeding in the Valley by 1966. Two observations from the 1970s (Yosemite Valley 1974, Wawona 1977) are the most recent sightings of willow flycatchers in the river corridor, although they are still seen on rare occasions elsewhere in the park. A recent study found that willow flycatchers no longer breed in Yosemite National Park (Siegel et al. 2008).

Bald eagle
Haliaeetus leucocephalus

Status. California State endangered, California fully protected

General Distribution. Bald eagles are found throughout North America, and there are breeding populations in almost all U.S. states and Canadian provinces. Once far more numerous than they are today, bald eagle populations suffered tremendously during the 20th century due to state-enacted bounties (Robards and King 1966) and poisoning from pesticides like DDT (Buehler 2000). Stricter protection measures and a reduced exposure to environmental toxins has led to the large-scale recovery of bald eagles, a feat widely regarded as one of the most successful modern conservation efforts. Bald eagles are uncommon but occasional breeders in Yosemite.

Habitat Requirements. Bald eagles favor lakes and rivers with abundant prey (mostly fish) and large trees in which to nest. The relative paucity of bald eagle observations in Yosemite indicates that there may be insufficient fish in Yosemite rivers to support a robust eagle population. Bald eagles also compete directly with ospreys, occasionally stealing food from them. Bald eagles are regularly observed in Sierra foothill reservoirs and at lakes east of Tioga Pass; in both locations the eagles are feeding on stocked fish populations that are higher in elevation than what would naturally be present.

Status in Merced River Corridor. Bald eagle observations have been recorded on 123 occasions in Yosemite. Of those observations, 25 records are from the Merced River corridor (Yosemite Wildlife Observation Database 2011). Roughly half of the bald eagle observations in the river corridor are from areas downstream of Yosemite Valley. The first records of bald eagles in Yosemite are from Wawona (November 1957). From the late 1970s to 1992, bald eagles were documented in the river corridor at a rate of one every few years.

California State Threatened Species

California wolverine (see Federal Candidate Species section)

Mammals

Sierra Nevada red fox
Vulpes vulpes necator

Status. California threatened

General Distribution. The Sierra Nevada red fox is one of 10 currently recognized red fox subspecies in North America (Hall 1981). *Vulpes vulpes necator* is one of three subspecies of mountain red fox, along with the foxes of the Cascade Mountains (*V. v. cascadensis*) and the Rocky Mountains (*V. v. macroura*) (Perrine et al. 2010). The Sierra Nevada red fox has historically been found throughout high elevations of the Sierra Nevada from Tulare County northward to Sierra County, and from Mount Shasta and Lassen Peak westward to the Trinity Mountains (Trinity County) (Grinnell et al. 1937). The Sierra Nevada red fox elevation range is approximately 1,200 meters to 3,600 meters (4,000 feet to 11,800 feet); it is seldom observed below 1,500 meters (4,900 feet) and most often is seen above 2,100 meters (6,900 feet) (Grinnell et al. 1937, Perrine et al. 2010). This fox occurs at low densities, even in areas of high relative abundance (Perrine et al. 2010). Current Sierra Nevada red fox distribution and range are uncertain (CDFG 1996); until recently, the Lassen Peak region accounted for the only verified contemporary detections of mountain red fox (Kucera 1993 and 1995, Perrine and Arnold 2001, Perrine 2005). In August 2010, biologists on the Humboldt-Toiyabe National Forest detected a Sierra Nevada red fox at an automatic camera station near Sonora Pass at an elevation of 3,048 meters (10,000 feet) along the border of Tuolumne and Mono counties. Since this detection, three (and possibly five) individual Sierra Nevada red foxes have been detected within 80 miles of this area, with the lowest detection at 1,828 meters (6,000 feet).

Habitat Requirements. The Sierra Nevada red fox occupied habitats are typical of the high Sierra Nevada: high-elevation barren, conifer, and shrub habitats, montane meadows, talus slopes, subalpine woodlands, and fell-fields (Perrine et al. 2010, Grinnell et al. 1937, Ingles 1965). Possible den sites include natural cavities in talus slopes or rockslides, earthen dens, boulder piles, or even the space beneath vacant cabins (Grinnell et al. 1937, Aubry 1983). In the winter, Sierra Nevada red foxes may follow the forested edge of openings, possibly avoiding areas where they would be exposed to attack by other carnivores, while ski tracks and other packed snow may also facilitate travel (Perrine et al. 2010). Red foxes are opportunistic predators and scavengers that eat a wide variety of foods, depending on their seasonal availability, including small and medium-sized mammals, birds, insects, invertebrates, fruit, carrion, and garbage (Perrine et al. 2010).

Status in Merced River Corridor. Until recently, the last verified Sierra Nevada red fox sighting (confirmed by photograph) near Yosemite National Park occurred during the winter of 1990-1991 at the Tioga Pass Resort 2,940 m (9,645 ft) on the Inyo National Forest, just outside the park (Les Chow, NPS Inventory and Monitoring Network, pers. comm.). However, in the last few years there have been

several more detections. In 2009, the CDFG began surveying high-elevation habitats in the southern Cascade and Sierra Nevada ranges for Sierra Nevada red fox with the goal of determining current red fox distribution as well as genetic make-up of existing individuals or populations. Using baited remote, motion-sensing camera stations and passive hair-snaring devices, a total of nine individual Sierra Nevada red foxes have been detected in high elevation wilderness areas in the Sierra (C. Stermer, Pers. Comm.). In April 2012, a Sierra Nevada red fox was detected on the northern border of Yosemite National Park near Dorothy Lake in Toiyabe National Forest. Surveys targeting other carnivores, such as *Martes,* are not adequate for detecting Sierra Nevada red fox (Perrine et al. 2010). Surveys in the park targeting red fox are being proposed; however, based on previous survey and sighting data, it is unlikely that a significant red fox population exists in Yosemite National Park.

California State Fully Protected Species

Birds

Bald eagle (see California State Endangered Species section)

Golden eagle
Aquila chrysaetos

Status. California fully protected

General Distribution. Golden eagles occur across most of North America, ranging from high alpine habitats to low deserts. Nearly all nesting in the United States occurs west of the Great Plains, with the rest of the range used primarily by migrants (Palmer 1988). In California, they inhabit foothills, mountainous areas, sage-juniper flats, and desert habitats (Zeiner et al. 1990). In the Sierra Nevada, golden eagles favor grasslands and areas of shrubs or saplings, and open-canopied woodlands of young blue oaks. In late summer, they often range to above timberline (Zeiner et al. 1990). The golden eagle is a locally uncommon breeder at Yosemite.

Habitat Requirements. Golden eagles feed mostly on rabbits and rodents but may also take other mammals, birds, reptiles, and carrion. They hunt in meadows, clearings, rock outcroppings, granite shelves, fell-fields, talus, and other open or openly wooded habitats, but they avoid dense forests (Gaines 1992). They employ three main strategies to search for prey: soaring, still-hunting from a perch, and low contouring flight (Edwards 1969, Dunstan et al. 1978, Dekker 1985, Palmer 1988).

Status in Merced River Corridor. Golden eagle observations have been recorded on 273 occasions in Yosemite. Of these observations, there are 74 records from the Merced River corridor. These records span the years from 1915–2008. The majority of these observations are from locations in Yosemite Valley. Golden eagles have also been observed near Wawona Dome (1983) and at Washburn Lake (1940), as well as in the Merced Gorge between the Valley and El Portal (Yosemite Wildlife Observation Database 2011). Nevada Fall is a representative nesting location (Gaines 1992).

Peregrine falcon
Falco peregrinus

Status. California fully protected

General Distribution. Peregrine falcons can be found on nearly every ice-free landmass on earth. They will frequently migrate enormous distances; individuals from northern populations might travel 25,000 kilometers (15,530 miles) annually (White et al. 2002). In California, they breed along the coast as well as in most northern mountain ranges, including the Sierra Nevada (Polite and Pratt 1990). Peregrine falcon nests are often scrapes on ledges or cliffs, a habit they practice in the Valley on features like El Capitan and Glacier Point. The use of dichlorodiphenyltrichloroethane (DDT) as a pesticide in the mid-to-late 1900s decimated peregrine falcon populations, and as recently as 1981 there may have been as few as 39 breeding pairs in California (Monk 1981). Intensive management of peregrines falcons, including captive rearing, led to a resurgence of their populations in the last three decades. The peregrine falcon is a rare but regular breeder in Yosemite.

Habitat Requirements. Peregrine falcons will hunt in a wide variety of habitats, including meadows, woodlands, marshes, and mudflats, but typically nest on cliff ledges with expansive views (Gaines 1992). Peregrine falcons feed almost exclusively on birds, which are taken in flight. They require cliffs and ledges for cover and usually breed and hunt near water (Polite and Pratt 1990).

Status in Merced River Corridor. Peregrine falcon observations have been recorded on 118 occasions in Yosemite. Of those observations, 65 records are from the Merced River corridor (Yosemite Wildlife Observation Database 2011). The first documented peregrine sighting in Yosemite Valley was in 1940. Following this record are three observations from the summer of 1949, one of which involved two peregrines. In the 1950s and 1960s, DDT sent peregrine falcon populations plummeting all over the world. In 1972, the use of DDT was essentially banned; and in 1973, the peregrine was one of the first species to be listed under the federal ESA. By the early 1970s, peregrine falcons had all but disappeared in Yosemite. In 1978, rock climbers scaling the face of El Capitan in Yosemite Valley discovered nesting peregrine falcons; the first time in over 35 years that this species had been confirmed as breeding in the park. Since 1978, over 30 years ago, peregrine falcons have continued to recover in the park. Breeding surveys conducted in 2010 revealed eight active nests in Yosemite, the most ever documented in one season. Yosemite has a policy of temporarily closing rock climbing routes between March and August that pass through active peregrine falcon nesting sites.

California State Rare Species

Plants

Thompkins' sedge
Carex tompkinsii

General Ecology and Distribution. This perennial herb in the sedge family is endemic to California and occurs in chaparral, foothill woodland, red fir forest, and yellow pine forest habitats at elevations of 1,200 to 1,800 meters.

Habitat and Status in the Project Area. It is found in canyon slopes and river bottomlands under conifer-oak woodland canopy. This species occurs in the El Portal area (Segment 4).

Congdon's woolly-sunflower
Eriophyllum congdonii

General Ecology and Distribution. This species, a native annual herb in the aster family, is endemic to California and restricted to Mariposa County. It is found on dry, mostly south-facing metamorphic and metasedimentary outcrops in chaparral and oak woodlands. It is endemic to the main stem of the Merced River canyon near El Portal and the South Fork of the Merced River downstream of Wawona.

Habitat and Status in the Project Area. Habitat for this species occurs on sunny rocky slopes next to the river in El Portal (Segment 4).

Congdon's lewisia
Lewisia congdonii

General Ecology and Distribution. This perennial herb in the montia family is endemic to California and occurs in chaparral, foothill woodland, red fir forest, and yellow pine forest. It is only found within Mariposa and Fresno Counties at elevations between 500 and 2,800 meters.

Habitat and Status in the Project Area. This species is known from approximately ten occurrences in the canyons of the Kings and Merced Rivers. In the Project Area, it occurs on metamorphic cliffs within lower montane coniferous forests in El Portal (Segment 3).

California State Species of Special Concern

California wolverine (see Federal Candidate Species section)

Pacific fisher (see Federal Candidate Species section)

Yosemite toad (see Federal Candidate Species section)

Sierra Nevada yellow-legged frog (see Federal Candidate Species section)

Fish

Hardhead
Mylopharodon conocephalus

Status. California species of special concern

General Distribution. Hardhead are endemic to California and native to the Sacramento and San Joaquin River basins and the Russian River watershed. Hardhead are typically found in undisturbed

areas of larger middle- and low-elevation streams and rivers. This species ranges from sea level to 1,450 meters (4,750 feet) in elevation. Historically, hardhead were regarded as a widespread and locally abundant species. Hardhead still appear to be widespread in foothill streams, but their specialized habitat requirements combined with widespread alteration of downstream habitats has resulted in isolated populations making them more susceptible to local extinction (Moyle et al. 1995).

Habitat Requirements. Hardhead are typically found in undisturbed streams with clear, deep pools that have sand-gravel-boulder substrates and slow water velocities (Moyle et al. 1995). This species distribution might be limited to well-oxygenated streams because they are relatively intolerant of low oxygen levels, especially at higher temperatures (Cech et al. 1990). Most streams in which they occur have summer temperatures in excess of 20 °Celsius (C) (68 °Fahrenheit [F]); optimal temperatures for hardhead appear to 24–28 °C (75–82 °F).

Status in the Merced River Corridor. Hardhead observations have been recorded on two occasions in Yosemite, both from the Merced River. It is unlikely that hardheads occurred above El Portal on the Merced River. The Merced River gorge likely prevented them from migrating any farther up the river. The only documented observations of hardheads in the Merced River corridor were in 1987 and 2006 in El Portal (Stillwater Sciences 2008). Electrofishing surveys conducted by CDFG in 2008 at two sites in El Portal did not detect any hardhead.

Amphibians

Foothill yellow-legged frog
Rana boylei

Status. California species of special concern

General Distribution. Historically, foothill yellow-legged frogs occurred from the Santiam River (Marion County), Oregon, in the north to the San Gabriel Mountains (Los Angeles County), California (Hayes and Jennings 1988) in the south. They occupied the western slopes of the Cascade Mountains, the western foothills of the Sierra Nevada and Coast Ranges, and the Tehachapi and San Gabriel Mountains. An isolated population also occurred in the Sierra San Pedro Martir, Baja California, Mexico (Loomis 1965). Today, foothill yellow-legged frogs continue to occur across their historical range in Oregon and California but in greatly reduced numbers (Lannoo 2005). In California, they inhabit elevations from sea level to 1,939 meters (6,360 feet) (Hemphill 1952). The species is believed to have disappeared from 51% of its historic localities throughout its range and is estimated to have disappeared from approximately two-thirds of its historic localities within the Sierra Nevada (Hayes and Jennings 1996).

Habitat Requirements. Foothill yellow-legged frogs are primarily found in streams with riffles, rocky substrates, and open banks (Lannoo 2005). Adults have also been found in deep, isolated pools and vegetated backwaters (Hayes and Jennings 1988). Breeding and rearing habitat is located in gently flowing water where there is a reduced risk to egg masses and tadpoles from high water events and scouring (Kupferberg 1996a).

Status in the Merced River Corridor. There are only four recorded observations of foothill yellow-legged frogs in Yosemite. All four of those sightings were in Yosemite Valley and near Cascade Creek. The first specimen was collected near Cascade Creek in July 1948 (University of Michigan Museum of Zoology). Three additional observations were reported for Yosemite Valley in 1974 (Yosemite Wildlife Observation Database 2011). No individuals have been reported in the park since the mid-1970s, and the species is believed to be extirpated from the park. The low number of historic records is likely a reflection of the limited habitat for foothill yellow-legged frogs in the park.

Birds

Northern goshawk
Accipter gentilis

Status. California species of special concern

General Distribution. Northern goshawks occupy temperate and boreal forests throughout the Holarctic (Brown and Amadon 1968, Squires and Reynolds 1997). They are year-round residents throughout all or most of the California range, although in winter some individuals remain on or near breeding territories while others migrate short distances to winter elsewhere (Keane 1999). Throughout their range, they inhabit moderately dense coniferous forests broken by meadows and other openings, at elevations between 1,500 meters and 2,700 meters (4,920 feet and 8,860 feet). Northern goshawk is an uncommon year-round resident in Yosemite.

Habitat Requirements. Northern goshawks forage in mature and old-growth forests that have relatively dense canopies and open understories (Beier and Drennan 1997) but also hunt among a variety of vegetative cover, including meadow edges (Younk and Bechard 1994). Goshawks hunt from tree perches, scanning the ground and lower canopy for prey. As such, an open understory improves the chances of detection and capture of prey (Reynolds et al. 1992).

Status in Merced River Corridor. Northern goshawk observations have been recorded on 160 occasions in Yosemite. Of these records, 54 observations were in the Merced River corridor, mostly in Yosemite Valley. Besides in the Valley, one bird was seen in flight near Wawona Dome (1982), three were recorded from Little Yosemite Valley (1990, 1994), and two were recorded from Merced Lake (1982, 1990) (Yosemite Wildlife Observation Database 2011). Gaines (1992) indicates Little Yosemite Valley as a "representative nesting locality."

Long-eared owl
Asio otus

Status. California species of special concern

General Distribution. The long-eared owl inhabits open and sparsely forested habitats across North America and Eurasia between 30° and 65°North latitude (Marks et al. 1994). Long-eared owls are found across most of the United States but are uncommon throughout their range. In the Sierra

Nevada, this species is found from blue oak savannah up to ponderosa pine and black oak habitats, usually in association with riparian habitats. In Yosemite, they are known to nest in riparian forests and oak-conifer woodlands (Gaines 1992). Long-eared owls will also use live oak thickets and other dense stands of trees for roosting and nesting (Zeiner et al. 1990). Long-eared owl is a rare summer resident and breeder at Yosemite.

Habitat Requirements. Long-eared owls nest in riparian, oak-conifer, and eastside pine and juniper forests in the Sierra Nevada, and are associated with edges between forests and grasslands or shrublands (Gaines 1992, Marks et al. 1994, Hunting 2008). These owls might be more numerous than is known; little is known of their population status, habitat requirements, and prey in the park (Gaines 1992).

Status in Merced River Corridor. In Yosemite, little is known about the status of the long-eared owl. During one year of meadow surveys for great gray owls, long-eared owls were detected at 5 out of 15 meadows (Keane et al. 2011); none of these meadows were within the Merced River corridor. The species has been recorded on 22 different occasions in Yosemite, of which only three records are from Yosemite Valley (Yosemite Wildlife Observation Database 2011). Long-eared owls are only known to have nested in the Valley on one occasion, and that bird was shot and collected by the Grinnell/MVZ survey in 1915. Two records are from the same date and general location (Yosemite School and Leidig Meadow, October 1, 1987).

Vaux's swift
Chaetura vauxi

Status. California species of special concern

General Distribution. Vaux's swifts breed from southwestern Canada through the western United States to Mexico, Central America, and northern Venezuela. In winter, northern migrant populations of this species overlap southern residents (Bull and Collins 2007). Vaux's swifts are an uncommon breeder in Yosemite.

Habitat Requirements. Vaux's swifts require older trees and hollow snags for nesting and roosting habitat. To maintain nest and roost trees over time, both live and dead large-diameter hollow trees should be maintained, as well as green trees with some indication of decay to replace those that fall or become unsuitable (Bull and Collins 2007).

Status in Merced River Corridor. Vaux's swift observations have been recorded on 24 different occasions in Yosemite. Of these observations, five records are from the Merced River corridor (Yosemite Wildlife Observation Database 2011). They are a rare summer resident in the Merced River corridor, although Gaines (1992) suspects that Wawona Meadow is a regular nesting site for them. Furthermore, Gaines (1992) suspects that Vaux's swifts are "thinly but widely distributed" through old-growth forests with suitable nesting sites, and that the many documentations of them near meadows may not reflect the true nature of their habitat preferences.

Northern harrier
Circus cyaneus

Status. California species of special concern

General Distribution. The northern harrier is found as a breeding species throughout North America and Eurasia (where it is called the hen harrier). It is a long-distance migrant, and its range extends from northern South America to breeding grounds north of the Arctic Circle (Macwhirter and Bildstein 1996). Throughout its range, the northern harrier favors open areas such as grasslands, meadows, wetlands, and agricultural clearings. Northern harrier is a rarely seen migrant that passes through Yosemite.

Habitat Requirements. Northern harriers nest on the ground and in winter will roost communally on the ground. Their densest populations on the breeding grounds are typically associated with large tracts of undisturbed habitats dominated by thick vegetation growth (Apfelbaum and Seelbach 1983, Toland 1986, Kantrud and Higgins 1992). Northern harriers winter in a variety of open habitats dominated by herbaceous cover, including upland grasslands, open-habitat floodplains, and freshwater marshes (Temeles 1986, Collopy and Bildstein 1987). They typically hunt by flying low over habitats while searching for mammals and small birds (Macwhirter and Bildstein 1996).

Status in Merced River Corridor. Northern harriers observations have been recorded on 47 occasions in Yosemite. Of these observations, 19 records are from the Merced River corridor (Yosemite Wildlife Observation Database 2011). The majority of the records are from meadows in Yosemite Valley during the fall. Three records are from Wawona; two of those observations were in the same location on the same day (Wawona Meadow, August 1, 1977), and one was from 2006. The earliest documentations of northern harriers in the Valley are two records from 1926 and 1928 (Gaines 1992). Following these records is an observation of two birds from 1954. Beginning in 1977, there are records of several northern harriers per decade in the Valley through 2006 (Yosemite Wildlife Observation Database 2011).

Olive-sided flycatcher
Contopus cooperi

Status. California species of special concern

General Distribution. The olive-sided flycatcher breeding range extends from Alaska across Canada south into the United States, where it occupies forested areas. In California, the general outline of its current breeding range is largely unchanged from historic range. However, local extirpations have been reported for a few areas (Marshall 1988, Raphael et al. 1988). The olive-sided flycatcher is well sampled by Breeding Bird Surveys, which show that while the species is still abundant in the state, populations declined steadily from 1968 to 2004 (Sauer et al. 2005). Likewise, migration data from Southeast Farallon Island also show significant declines over a 25-year period (1968–1992) (Pyle et al. 1994). Olive-sided flycatchers are a fairly common summer resident in Yosemite.

Habitat Requirements. Olive-sided flycatchers forage in unobstructed canopies with high perches (Altman and Sallabanks 2000). Grinnell and Miller (1944) described their foraging and singing-post perches as apical tips of snags that protrude above the surrounding canopy. Altman (1999) observed that most foraging took place from the upper third of trees or snags.

Status in Merced River Corridor. Olive-sided flycatcher observations have been recorded on 81 occasions in Yosemite. Of these observations, 15 records are from the Merced River corridor. The first recorded observations of olive-sided flycatchers in Yosemite Valley were in the 1920s. Between 1923 and 1939, there were nine observations of this species in the Valley. Four records are from the 1970s, with one of these being the sole Wawona observation. An observation at Washburn Lake from 1990 is the highest-elevation observation from the Merced River corridor (Yosemite Wildlife Observation Database 2011).

Black swift
Cypseloides niger borealis

Status. California species of special concern

General Distribution. Black swifts are found throughout the western United States and Canada, and as far south as Costa Rica. Despite their large range, black swift populations are poorly understood and probably small; fewer than 100 of their breeding sites have been documented (Lowther and Collins 2002). In California, their populations are focused in the central coast, the central and southern Sierra Nevada, and in the San Bernardino and San Jacinto mountains (Roberson and Collins 2008).

Habitat Requirements. In Yosemite, black swifts only nest near or behind waterfalls, although elsewhere in their range nests are found on sea cliffs or other sheer rock faces (Lowther and Collins 2002). Their primary food source during the breeding season are events of emergent winged ants, which in southern California accounts for as much as 90% of what adults feed a fledgling (Foerster 1987, Marin 1999, Rudalevige et al. 2003).

Status in Merced River Corridor. Black swifts have been observed on 32 occasions in Yosemite National Park. Of these observations, 21 records are from the Merced River corridor. Despite suitable habitat elsewhere in Yosemite, the vast majority of black swift observations in the park are in or near the main stem of the Merced River (Yosemite Wildlife Observation Database 2011). There is only one documented observation of a black swift in the Tuolumne River drainage (Hetch Hetchy Reservoir, 2001). In the 1920s, local naturalists located black swift nests near Yosemite Valley (Gaines 1992), and Grinnell and Miller (1944) indicate the Valley and other locations in Mariposa County as nesting sites. Bridalveil Fall is suspected to be one of only three sites in California where nesting populations of black swifts exceed 10 pairs (Roberson and Collins 2008). Gaines also indicates Nevada Fall as a nesting site.

Yellow warbler
Setophaga petechia

Status. California species of special concern

General Distribution. Breeding range of the yellow warbler extends over most of North America, and wintering range extends to northern South America. In California, yellow warblers breed over much of the state where suitable breeding habitat occurs. Some yellow warblers winter in extreme southern California. Yellow warbler is a locally common summer resident and regular breeder in Yosemite.

Habitat Requirements. Yellow warblers breed primarily in riparian woodlands from coastal, valley, and desert lowlands, up to 2,400 meters in elevation in the Sierra Nevada. Other breeding habitat types includes montane chaparral, ponderosa pine, and mixed conifer where substantial amounts of brush occur (Zeiner et al. 1990). In the Merced River corridor, they generally inhabit areas of willow and cottonwood.

Status in Merced River Corridor. Yellow warbler observations have been recorded on 53 occasions in Yosemite (Yosemite Wildlife Observation Database 2011). Of these observations, 24 records are from the Merced River corridor. The first documented observation of yellow warblers in Yosemite Valley was in 1926 (Gaines 1992). Gaines (1992) characterized the Valley and Little Yosemite Valley as representative nesting localities. In 2010, bird surveys detected 49 individual yellow warblers in Yosemite Valley and confirmed breeding based on two specific observations: (1) an adult carrying food for young and (2) recently fledged young.

Harlequin duck
Histrionicus histrionicus

Status. California species of concern

General Distribution. Harlequin ducks are found on both the western and eastern seaboards of North America. In western North America, their breeding range extends from western Alaska and the northern Yukon south to the Sierra Nevada. From April to September, they migrate inland to breed along turbulent mountain rivers with vegetated banks for cover (Beedy 2008). At the conclusion of the breeding season, they move back to the coast where they forage in intertidal areas. Harlequin duck population decline has been noted across much of their range (Robertson and Goudie 1999). Harlequin duck is a rare breeder in Yosemite.

Habitat Requirements. Yosemite features the clear, fast-flowing river and stream conditions associated with the breeding grounds of harlequin ducks. These conditions include low acidity, steep banks, and substantial streamside vegetation (Beedy 2008). They feed primarily by diving into the water and searching among rocks for aquatic insects, although they will occasionally take fish (Robertson and Goudie 1999).

Status in Merced River Corridor. As of 2011, there are 43 records of harlequin ducks in Yosemite's Wildlife Observation Database. Of these records, 39 observations are from the Merced River corridor. According to Gaines (1992), harlequin ducks were found in every major Yosemite watershed from 1,200 meters in elevation to timberline until the 1920s. After an absence of nearly 20 years, a female harlequin was observed in Wawona in 1940 (Gaines 1992). It wasn't until 1977 that harlequins were again observed in the Merced River, and they were seen with some regularity until 1985. After a 15-year absence, harlequin ducks were documented repeatedly in the Merced River between 2000–2007 (Yosemite Wildlife Observation Database 2011).

Great gray owl
Strix nebulosa

Status. California Endangered

General Distribution. The great gray owl is a large forest owl that ranges across northern boreal and temperate forests in both North America and Eurasia. Throughout its circumpolar range, the species is considered rare. In California, great gray owls are restricted to the Sierra Nevada and southern Cascades. The core breeding distribution is centered on Yosemite and the immediately adjacent and surrounding Stanislaus, Sierra, and Sequoia National Forests (Winter 1986, Rich 2000, Keane et al. 2011). The Sierra Nevada population is the southernmost population in the world, with the closest known breeding population occurring in southern Oregon. An estimated 100 to 200 pairs of great gray owls occur in California, with a limited geographic distribution centered in Yosemite and adjacent National Forest lands in the central Sierra Nevada (Keane et al. 2011). Recent genetic work by Hull et al. (2010a) has revealed that the Yosemite population of great gray owls has been demographically isolated from other *S. nebulosa* populations for an extensive period of time, and the authors recommend designating a separate subspecies *S. n. yosemitensis* for the Sierra Nevada lineage. Genetic diversity also was extremely low for this subspecies, which is typical of recent population bottlenecks and likely attributable to habitat loss and fragmentation (Hull et al. 2010a). Given that *S. n. yosemitensis* is essentially restricted to Yosemite and immediate environs, this park is unequivocally imperative for the conservation of this subspecies (Hull et al. 2010a). The great gray owl is a rare year-round resident and regular breeder in Yosemite.

Habitat Requirements. In the Sierra Nevada, the owls require extensive, densely vegetated wet or moist meadows margined by old-growth coniferous forest from the mixed conifer through the red fir to the lower lodgepole pine zones (Siegel and DeSante 1999) between 750 meters to 2,700 meters elevation (Greene 1995). Great gray owls breed in conifer stands with large snags and high canopy closure in the immediate vicinity of a montane meadow. The vast majority of known nesting sites have been within 250 meters of a meadow, with most averaging 150 meters from the meadow's edge (Maurer 2006, Siegel 2006). In the greater Yosemite area, great gray owls tend to nest in large, broken-topped conifer snags, particularly red fir (*Abies magnifica*) or white fir (*Abies concolor*), and in lower elevations have also been found in black oak (*Quercus kellogi*) (Greene 1995, Keane et al. 2011).

Status in Merced River Corridor. Great gray owl observations have been recorded on 204 occasions in Yosemite. Of these observations, 21 records are from the Merced River corridor. The majority of

these observations were in or around Wawona Meadow, with just five observations in Yosemite Valley (Yosemite Wildlife Observation Database 2011).

California spotted owl
Strix occidentalis occidentalis

Status. California species of concern

General Distribution. The California spotted owl ranges from the southern Cascades south throughout the entire Sierra Nevada and in the central Coast Ranges. Population density in Yosemite is higher than elsewhere in the Sierra Nevada. In Yosemite, owl density was estimated from 0.25 to 0.46 owls per square kilometer (km2) (1,000 square miles [m2]), whereas the mean density in surrounding areas in the Sierra Nevada was estimated from 0.10 to 0.21 km2 (1,000 m2) (Roberts 2008). Although Roberts (2008) did not calculate home ranges, California spotted owl pairs in Yosemite [1 pair per 5.6 km2 (3.48 m2)] exceeded the mean home range estimate throughout California [10.5 km2 (6.52 m2)] (Zabel et al. 1992). Roberts (2008) estimated 315 spotted owl pairs in Yosemite, with 154 pairs in burned mixed-conifer forest and 161 pairs in unburned forest. Spotted owl is an uncommon year-round resident and regular breeder in Yosemite.

Habitat Requirements. The California spotted owl is strongly associated with areas of mature and old forest with thick canopy that contains many dense, old, live, and dead trees and fallen logs (Blakesley et al. 2005, Seamans 2005). Spotted owls prey mainly on small to medium-sized mammals, primarily rodents in the Sierra Nevada. It mostly consumes northern flying squirrels (*Glaucomys sabrinus*) in the higher elevations (conifer forests) and woodrats (*Neotoma* spp.) at lower elevations (burned mixed-conifer, oak woodlands, and riparian forests) and throughout southern California (Verner et al. 1992a, Roberts 2008). Downed woody debris in higher-elevation forests of the Sierra Nevada is strongly associated with underground fungi, which are important food for spotted owl prey species, such as northern flying squirrels (Davis and Gould 2008).

Status in Merced River Corridor. The Sierra Nevada offers the only extensive, nearly continuous habitat for the California spotted owl and is of critical importance for protecting this subspecies (Siegel and DeSante 1999). California spotted owl observations have been recorded on 72 occasions in Yosemite. Of these observations, 14 records are from the Merced River corridor. The first documented observation of a California spotted owl in Yosemite Valley was in 1940. Sightings of California spotted owls are sporadic in the Valley. Yosemite's wildlife observation database only contains one reference to a California spotted owl in Wawona in 1972 and one high-elevation observation at Merced Lake in 2004 (Yosemite Wildlife Observation Database 2011).

Mammals

Pallid bat
Antrozous pallidus

Status. California species of special concern

General Distribution. The pallid bat is found from southern British Columbia and Montana to central Mexico and Cuba, and east to Texas, Oklahoma, and Kansas. Throughout California, the species inhabits primarily low to mid elevations, although it has been found up to 3,400 meters (11,000 feet) in the Sierra Nevada (Barbour and Davis 1969). Habitats range from desert to coniferous forest and nonconiferous woodlands. The pallid bat occurs in Yosemite, but its status is not well known. There are eight museum specimens for pallid bats for Yosemite, all from Yosemite Valley (Museum of Vertebrate Zoology Database 2011) collected between 1934 and 1940 (Pierson et al. 2006).

Habitat Requirements. This species is quite versatile in its choice of roosting sites and has been documented using tree hollows (both oak and ponderosa pine), rock crevices, caves, abandoned mines, and other anthropogenic structures such as buildings and bridges (Barbour and Davis 1969, Hermanson and O'Shea 1983, Lewis 1996, Orr 1954, Pierson et al. 1996, Pierson et al. 2001). This species is gregarious and roosts in nursery colonies of typically between 30 and several hundred individuals. The pallid bat feeds primarily on large, flightless arthropods such as scorpions, Jerusalem crickets, cicadas, wolf spiders, and centipedes (Pierson et al. 2006). Large cerambycid beetles, particularly *Prionus californicus*, and ten-lined June beetles (*Polyphylla decemlineata*) are also major prey items (Orr 1954, Pierson et al. 2004).

Status in Merced River Corridor. The pallid bat has been detected within the Merced River corridor in Yosemite Valley and in Little Yosemite Valley, and recent acoustic surveys by park biologists in 2010 have detected the pallid bat in El Portal, Little Yosemite Valley, and along the South Fork Merced River. In Yosemite, the species shows an association with oak habitat (Rainey and Pierson 1996), mixed deciduous forest (for example, in Yosemite Valley and Wawona), and giant sequoia habitat (Pierson and Heady 1996, Rainey et al. 1992, Pierson et al. 2006). This species occurs at elevations of at least 1,890 meters (6,200 feet) in Yosemite (Pierson and Rainey 1993, 1995, Pierson et al. 2001).

Sierra Nevada mountain beaver
Aplodontia rufa californica

Status. California species of special concern

General Distribution. The Sierra Nevada mountain beaver is endemic and restricted to western North America. Currently seven subspecies are recognized (Dalquest and Scheffer 1945, Hall 1981), including the isolated population *A.r. californica* that extends through much of the Sierra Nevada in eastern California into the western extreme portion of Nevada (Arjo 2007). Sierra Nevada mountain beavers can be found up to 3,000 meters (9,800 feet) in elevation in portions of the Sierra Nevada; however, they are more commonly found at lower elevations in humid, densely vegetated understory

areas (Feldhamer et al. 2003). Sierra Nevada mountain beavers are confined to well-vegetated, moist, cool environments and require a large daily intake of water due to their poor ability to concentrate urine and low tolerance for temperature extremes (Nungesser and Pfeiffer 1965).

Habitat Requirements. Sierra Nevada mountain beavers require abundant riparian plants for harvesting, but the species composition is relatively unimportant (Todd 1990). Good forage cover (e.g., ferns, forbs, and shrubs) as well as large amounts of small-diameter woody debris or uprooted stumps are usually found in areas selected by Sierra Nevada mountain beaver (Todd 1992, Hacker and Coblenz 1993). Willow (*Salix* sp.), alder (*Alnus* sp.), and fir (*Abies* sp.) dominate areas preferred by mountain beavers in the higher elevations of the Sierra Nevada (Arjo 2007).

Status in Merced River Corridor. Todd (1990) estimated that Sierra Nevada mountain beavers occupy approximately 200 to 550 sites in Yosemite. By extrapolating the number of Sierra Nevada mountain beaver sites to the numbers of animals, Todd (1990) estimated from 400 to 6,600 adults living in the park. Of the 41 sites Todd (1990) found occupied by mountain beaver, none fell within the Merced River corridor. Unverified sightings of Sierra Nevada mountain beaver within the corridor include the Civilian Conservation Corps (CCC) camp near El Capitan Meadow in 1993 and along the south fork of the Merced River in Wawona in 1960 (Yosemite Wildlife Observation Database 2011). Although no Museum of Vertebrate Zoology specimens have been taken from within the corridor, several were taken just outside the corridor at the head of Lyell Canyon in 1915 (Museum of Vertebrate Zoology Database 2011). More recently during the Grinnell Resurvey Project, a mountain beaver specimen was recorded from Indian Creek at Chinquapin (Moritz 2007). Mountain beaver sign was also observed along both Lyell Fork and Maclure Creek (at elevations of 2,987 meters to 3,200 meters or 9,800 feet to 10,500 feet) during the Grinnell Resurvey Project (Moritz 2007).

Townsend's big-eared bat
Corynorhinus townsendii townsendii

Status. California species of special concern

General Distribution. The Townsend's big-eared bat occurs throughout the west and is distributed from the southern portion of British Columbia south along the Pacific coast to central Mexico and east into the Great Plains, with isolated populations occurring in the central and eastern United States. In California, the majority of records are from low-to-moderate elevations, although the species has been found to almost 3,000 meters (9,800 feet) in elevation. In the Sierra Nevada, maternity colonies have been found to up over 1,500 meters (5,000 feet) in elevation. The Townsend's big-eared bat is concentrated in areas with mines (particularly in the desert regions to the east and southeast of the Sierra Nevada) or caves (in the northeast portion of California and karstic regions in the Sierra Nevada and Trinity Alps) as roosting habitat (Pierson and Fellers 1998).

Habitat Requirements. The Townsend's big-eared bat feeds primarily on small moths, with over 90% of its diet composed of lepidopterans. Foraging associations include edge habitats along streams, adjacent to and within a variety of wooded habitats (Fellers and Pierson 2002, Sherwin 2005). All known nursery sites in the Sierra Nevada occur at relatively low elevations (the highest being at

1,650 meters (5,400 feet) along the Yuba River), although males have been detected much higher (Pierson et al. 2001). Szewczak et al. (1998) reported two nursery roosts in the White Mountains at elevations higher than 1,700 meters (5,500 feet).

Status in Merced River Corridor. In Yosemite, Townsend's big-eared bats have been detected at Mirror Lake (Pierson and Rainey 1993), Wawona (Pierson and Rainey 1995), and at the barium mine on U.S. Forest Service (USFS) land in El Portal. This mine is fenced and protected from disturbance. This species was detected within the Merced River corridor at two sites in Yosemite Valley in 1996 and 2004. Acoustic surveys conducted by park biologists in summer of 2010 did not detect this species within the Merced River corridor.

Spotted bat
Euderma maculatum

Status. California species of special concern

General Distribution. Although considered one of North America's rarest mammals (Zeiner et al. 1990), the spotted bat is widely distributed throughout much of the western United States, with its range extending as far north as southern British Columbia and as far south as Durango, Mexico (Pierson et al. 2006). In the Sierra Nevada, spotted bats are widely distributed in habitats ranging from desert scrub to montane coniferous forest, with acoustic detections at elevations up to 3,000 meters (9,800 feet) (Pierson et al. 2006).

Habitat Requirements. Limited information suggests that spotted bats do not roost in colonies, predominantly in crevices in high cliff faces (Wai-Ping and Fenton 1989). Surveys in the Sierra Nevada suggest that they are most abundant in areas with fractured rock (Pierson and Rainey 1996, 1998a, b). The spotted bat is capable of long distance and rapid flight, thus foraging ranges can be large. Radio-tracking studies in Arizona documented this species traveling up to 40 kilometers each night (Chambers et al. 2005). In montane habitats, the spotted bat forages over meadows, along forest edges, or in open coniferous woodland. Spotted bats feed primarily on large [(5–12 millimeter (0.20 inch–0.47 inch)] moths, particularly noctuids (Chambers and Herder 2005).

Status in Merced River Corridor. Studies conducted in Yosemite have shown that spotted bats are relatively abundant in many areas where suitable cliff-roosting habitat is prevalent. The majority of detections are from relatively open foraging settings (such as wet meadows) at lower elevations (for example, Yosemite Valley and Wawona) and from a number of sites with elevations up to 3,000 meters (9,800 feet) (Pierson and Rainey 1993, 1995, 1996, Pierson et al. 2001). Yosemite Valley had the highest population of spotted bats of any location surveyed in California (Pierson and Rainey 1995, 1996). Surveys have revealed spotted bats foraging on the north side of El Capitan Meadow, just below El Capitan, Bridalveil Meadow, Leidig Meadow, and Ahwahnee Meadow (Pierson and Rainey 1993). Pierson and Rainey (1993) suggest that spotted bats roost on or near Half Dome and El Capitan. Acoustic surveys conducted in 2010 detected this species in Yosemite Valley, Little Yosemite Valley, Merced Lake, and along the South Fork Merced River.

Western mastiff bat
Eumops perotis

Status. California species of special concern

General Distribution. The subspecies of western mastiff bat that occurs in North America ranges from central Mexico across the southwestern United States (parts of California, southern Nevada, Arizona, southern New Mexico and western Texas) (Eger 1977, Bradley and O'Farrell 1967). The western mastiff bat is found along the west side of the Sierra Nevada, primarily at low to mid-elevations but has been detected up to 3,000 meters (9,800 feet) in the summer (Pierson et al. 2006).

Habitat Requirements. Western mastiff bats are found in a variety of habitats, from desert scrub and chaparral to montane coniferous forest. Its presence is determined by the availability of significant rock features offering suitable roosting habitat (Pierson et al. 2006). This species may forage in flocks, regularly 30 inches to 60 meters over the substrate and can forage considerable distances from their roosting sites (Siders 2005). Foraging habitats include dry desert washes, floodplains, chaparral, oak woodland, open ponderosa pine forest, grassland, agricultural areas, and high-elevation meadows surrounded by mixed-conifer forests (Siders 2005). The diet of western mastiff bats consists primarily of moths (*Lepidoptera*) but also includes beetles, crickets, and katydids (Siders 2005).

Status in Merced River Corridor. In Yosemite, western mastiff bats have been detected in Yosemite Valley in Bridalveil Meadow, El Capitan Meadow, Leidig Meadow, Cook's Meadow, Ahwahnee Meadow, Stoneman Meadow, Wosky Pond, and wetlands near Happy Isles. They were also detected in a few upland habitats east of El Capitan Meadow and Sentinel Beach Picnic Area (Pierson and Rainey 1995). A radio-telemetry study in 1996 detected a large colony in the cliffs west of Cascade Creek (Pierson 1997). Yosemite Valley has the highest population of the western mastiff bat of any locality surveyed in California (Pierson and Rainey 1995). In addition, the species has been captured in Wawona (Pierson and Rainey 1995). Acoustic surveys conducted in 2010 detected this species in El Portal, Yosemite Valley, Little Yosemite Valley, and Merced Lake.

Western red bat
Lasiurus blossevillii

Status. California species of special concern

General Distribution. The western red bat is broadly distributed from southern British Columbia in Canada, through much of the western United States, through Mexico and Central America, to Argentina and Chile in South America (Bolster 2005). In California, the majority of records are from the coastal areas from the San Francisco Bay Area south, plus the Central Valley and bordering foothills, with a limited number of records from southern California extending as far east as western Riverside and central San Diego Counties (Pierson et al. 2006). There are a few records from higher elevations and the east side of the Sierra Nevada (Constantine 1998, Pierson et al. 2000). Winter populations of both sexes are concentrated along the central and southern coast (Pierson et al. 1999).

Grinnell (1918) suggested that western red bats in California were sexually segregated in summer, with males moving to higher elevations, a pattern more recently noted in other species (e.g., Cryan et al. 2000). Western red bats (most likely males or nonreproductive females) have been documented at elevations up to 2,500 meters (8,200 feet) in the Sierra Nevada (Pierson et al. 2000 and 2001).

Habitat Requirements. Western red bats roost on the underside of overhanging leaves. Recent studies in the Central Valley found that summering populations (and breeding females) are substantially more abundant in remnant stands of cottonwood/sycamore riparian that extend greater than 50 meters (164 feet) back from the river than they are in younger, less extensive stands (Pierson et al. 1999). Red bats forage on a number of insect taxa and fly at both canopy height and low over the ground (Shump and Shump 1982). Studies have reported diets consisting of primarily small moths, in addition to a variety of other insects, primarily *Orthoptera* (Ross 1961) but also *Homoptera*, *Coleoptera*, *Hymenoptera*, and *Diptera* (Shump and Shump 1982).

Status in Merced River Corridor. The first record of a western red bat in Yosemite was the capture of three individuals (two adult males and one nulliparous female) over the South Fork Merced River on September 16, 1998. Since then, the species has been documented acoustically at multiple localities up as high as Siesta Lake at 2,422 meters (8,000 feet) (Pierson et al. 2001). Previous acoustic detections have been obtained in association with black cottonwood in both Yosemite and Sequoia National Parks; however, acoustic surveys conducted in 2010 did not detect this species within the Merced River corridor.

Sierra Nevada snowshoe hare
Lepus americanus

Status. California species of special concern

General Distribution. Sierra Nevada snowshoe hares inhabit the mid-elevations (914 meters to 2,133 meters [3,000 feet to 7,000 feet) of the northern and central Sierra Nevada from approximately Mount Lassen in southeastern Shasta County south through Yosemite National Park to Mono and Mariposa counties (Bolster 1998). They have also been recorded from Nevada in the general vicinity of Lake Tahoe (Hall 1946, Richardson 1954). The southern locality is north of Mammoth in Mono County (Bolster 1998). The population status of the Sierra Nevada snowshoe hare is poorly known.

Habitat Requirements. In California, the Sierra Nevada snowshoe hare is primarily found in montane riparian habitats with thickets of alders and willows, and in stands of young conifers interspersed with chaparral. The early seral stages of mixed conifer, subalpine conifer, red fir, Jeffrey pine, lodgepole pine, and aspen are likely snowshoe hare habitats, primarily along edges and especially near meadows (Orr 1940, Ingles 1965). This species' abundance is highly cyclic in parts of its range, and may be in California as well, but there is little evidence. They prefer dense cover, either in understory thickets of montane riparian habitats or in shrubby understories of young conifer habitats. The snowshoe hares' summer food primarily consists of grasses, forbs, sedges, and low shrubs (Zeiner et al. 1990). They eat needles and the bark of conifers, and leaves and green twigs of willow and alder in the winter (Wolff 1980).

Status in Merced River Corridor. Sierra Nevada snowshoe hare favor dense streamside vegetation. This species typically occurs at elevations below 2,438 meters (8,000 feet); however, its upper elevation limits are unknown. There are a number of apparent sightings from Yosemite above 2,438 meters, although these have not been verified (Yosemite Wildlife Observation Database 2011). Other unconfirmed snowshoe hare sightings within the Merced River corridor include the Merced Lake Ranger Station in 1991 and at the junction of the Merced River and Echo Creek in 1990 (Yosemite Wildlife Observation Database 2011).

Western white-tailed jackrabbit
Lepus townsendii townsendii

Status. California species of special concern

General Distribution. The western white-tailed jackrabbit ranges from the high Sierra crest and upper east slope from the Mount Whitney region at elevations up to 3,657 meters (12,000 feet) in sagebrush, subalpine conifers, alpine dwarf-shrub, and grasslands; it is also found on flat areas east of the mountains, especially in winter.

Habitat Requirements. This species inhabits a variety of habitats, including sagebrush, perennial grasslands, alpine dwarf-shrub, and wet meadows to timberline and above, and early successional stages of a variety of conifer habitats, including lodgepole pine, yellow pine, western juniper, dwarf juniper, red fir, and mixed conifers (Verner and Boss 1980, Williams 1986, Zeiner et al. 1990). In most of these habitats, western white-tailed jackrabbits prefer open or sparsely wooded areas with young or stunted conifers, or scattered shrubs which they use for protective cover during the day (Grinnell and Storer 1924, Verner and Boss 1980, Harris 1982). During the spring through fall, they eat grasses and a variety of herbaceous plants, including cultivated crops (as encountered) (Zeiner et al. 1990). In winter, they prefer buds, bark, and twigs of shrubs, particularly sagebrush, creambush, and small trees (Bailey 1931, Orr 1937).

Status in Merced River Corridor. Unverified sightings of western white-tailed jackrabbit within the Merced River corridor include two sightings in Little Yosemite Valley in 1974 and1975 and a sighting near Merced Lake in 1951 (Yosemite Wildlife Observation Database 2011).

Mount Lyell shrew
Sorex lyelli

Status. California species of special concern

General Distribution. The known range of this species spans a small area of the east-central Sierra Nevada, California, including areas in and around Yosemite in Tuolumne, Mariposa, and Mono counties, at elevations of 2,100 meters–3,150 meters (6,900 feet–10,350 feet) (Grinnell 1933, Williams 1984). This shrew might possibly occur in similar habitat from Mono County to Modoc County, but the area outside its known range has not been adequately surveyed. Recent surveys by the Grinnell Resurvey

Project in 2007 documented this species at the two original localities where it was recorded in the Grinnell era (upper Lyell Basin and Vogelsang Lake) (Moritz 2007). The Mount Lyell shrew was also found to have expanded its known range to the north, and to lower elevations, at Glen Aulin (2,408 meters [7,900 feet]), Kerrick Meadow (2,926 meters [9,600 feet]) and upper Return Creek in Virginia Canyon (3,018 meters [9,900 feet]). This species was found to be uncommon at each locality (Moritz 2007).

Habitat Requirements. Mount Lyell shrew specimens have been found primarily in wetland communities, near streams, in grassy areas, under willows, and in sagebrush steppe communities (Grinnell 1933, Williams 1984, Museum of Vertebrate Zoology Database 2011). This shrew requires moist soil (Ingles 1965) and uses logs, stumps, and other surface objects for cover (Grinnell and Storer 1924). This species eats insects and other invertebrates found while foraging on the ground, in stumps, and in logs (Grinnell and Storer 1924, Ingles 1965).

Status in Merced River Corridor. Surveys for the Mount Lyell shrew in and near Yosemite in 2003–2007 yielded specimens from several locations, one of which was within the Merced River corridor at Cathedral Pass in July 2007 (Museum of Vertebrate Zoology Database 2011). In addition, one male specimen was collected in July 1915 1.5 kilometer from the river corridor at the head of Lyell Canyon (Museum of Vertebrate Zoology Database 2011).

American badger
Taxidea taxus

Status. California species of special concern

General Distribution. American badgers are uncommon but found throughout most of California, irrespective of elevation, from the Central Valley over the Sierra Nevada east into the Great Basin. The badger is most abundant in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils (Zeiner et al. 1990).

Habitat Requirements. The American badger prefers open areas and may also frequent brushlands with little groundcover. During periods of inactivity, badgers occupy underground burrows. They frequently reuse old burrows, although some may dig a new den each night, especially in summer (Messick and Hornocker 1981). They are usually found in relatively dry grasslands and open forests (Rahme et al. 1995) and may be active at any hour but are mainly nocturnal. Badgers feed primarily on small rodents usually captured by digging out their burrows. Their main prey species includes ground squirrels, pocket gophers, kangaroo rats, prairie dogs, and mice. Badgers also eat reptiles, insects, earthworms, eggs, birds, and carrion, especially when ground squirrel populations are low (Messick and Hornocker 1981, Zeiner et al. 1990). The American badger is active all year, but it may sleep in its den for several days or weeks during severe winter weather (Nowak 2005).

Status in Merced River Corridor. Unverified American badger sightings within the Merced River corridor include the CCC Camp in El Capitan Meadow in 1993, at the Yosemite Valley Visitor Center in 1954 (Yosemite Wildlife Observation Database 2011), and in Wawona in 2004 (California Natural Diversity Database 2012).

Western pond turtle
Emys marmorata

Status. California Species of Special Concern

General Distribution. The historic range of western pond turtles included the Pacific slope from Puget Sound to Sierra San Pedro Martir in Baja California Norte and isolated inland populations in Washington, Oregon, California, Nevada, and Idaho. Some of these isolated populations may represent introductions (Holland 1994). Western pond turtles have an elevation range from sea level to about 2,042 meters (6,700 feet) but are uncommon anywhere above about 1,524 meters (5,000 feet) (Holland 1994). The species is believed to be declining throughout 75%–80% of its range primarily due to habitat loss, nonnative predators (bullfrogs, large-mouth bass, and possums), and overharvesting for food. According to Jennings and Hayes (1994), the western pond turtle still occurs in 90% of its historic range in the Central Valley and west of the Sierra Nevada, but in greatly reduced numbers.

Habitat Requirements. Western pond turtles inhabit a wide range of permanent and ephemeral aquatic habitats, including ponds, marshes, rivers, streams, and ditches (Stebbins 1985, Behler 2002). In rivers and streams, they usually occupy slow-moving, deep pools with rocky or muddy bottoms and abundant vegetation (Stebbins 1985, Behler 2002). There is also a high correlation between turtle abundance and availability of logs, boulders, vegetation mats, and mud banks to use as basking sites (Bury and Germano 2008). Emergent basking sites such as logs are preferred because they offer some protection from terrestrial predators and offer quick escapes into deep water. This species may also spend a substantial amount of time in upland terrestrial habitats. Terrestrial habitat includes basking sites and nesting habitat. Western pond turtles deposit their eggs on land, usually above the floodplain, up to several hundred feet from water. For nesting, gravid (with eggs) females tend to seek out open areas with sparse, low vegetation (annual grasses and herbs), low slope angle, and dry hard soil.

Status in the Merced River Corridor. Western pond turtle observations have been recorded on 16 occasions in Yosemite. Of these observations, there have only been two sightings of western pond turtles in the Merced River corridor; both sightings were in Yosemite Valley in the 1950s. In 1950, there was a sighting in Sentinel Meadow and, in 1958, another turtle was observed in Stoneman Meadow (CNDDB 2012). There have been no sightings since the 1950s in the Merced River corridor, and the species is believed to be extirpated from the Merced River within Yosemite.

Mount Lyell salamander
Hydromantes platycephalus

Status. California species of special concern

General Distribution. The Mount Lyell salamander, endemic to the Sierra Nevada, ranges from the Sonora Pass (Sonora County) to Silliman Gap, Sequoia National Park (Tulare County). Isolated populations have also been documented in the Desolation Wilderness (El Dorado County) and on the Sierra Buttes (Sierra County). They inhabit high elevation (2,100 meters to 3,700 meters [6,890 feet to

12,139 feet]) snowmelt seep and waterfall habitat throughout the Sierra Nevada. There are also several populations of Mount Lyell salamander at lower elevations in the spray zones of waterfalls in Yosemite Valley (1,200 meters to 1,300 meters [3,937 feet to 4,265 feet]) and in riparian areas at lower elevation (1,400 meters to 2,000 [4,593 feet to 6,562 feet]) on the arid eastern slope of the Sierra Nevada, near the floor of the Owens Valley. The Owens Valley population was treated by CDFG as a separate species (Jennings and Hayes 1994), but recent genetics analysis does not support treating this as a separate species (Rovito 2009). Although the species has the broadest geographic range of any members of its genus *Hydromantes*, within that range, Mount Lyell salamanders may be very patchily distributed with small local populations that might be especially susceptible to local extirpation (Jennings and Hayes 1994). Consequently, they are a California species of special concern. According to Wake and Papenfuss in Lannoo 2005, there is no indication that either the size of the range or the density of this species has changed recently. In fact, new populations are continuing to be discovered. In Yosemite, the species has been observed at a number of sites in recent years.

Habitat Requirements. Juveniles and adults are commonly found in talus slopes of granite where water is flowing. They appear to favor habitats that are downslope of melting snowfields that persist long into or through the entire summer. Mount Lyell salamander may also be found near streams and within the spray zones of waterfalls, under rocks and moss. They are nocturnal and take refuge under rocks during the daytime.

Status in the Merced River Corridor. Mount Lyell salamander observations have been recorded on 140 occasions in Yosemite National Park. Of these observations, 24 records are from the Merced River corridor. Between 1950 and 1954, there were 12 observations at a site along the John Muir Trail between Yosemite Valley and Little Yosemite Valley, and at two sites in Yosemite Valley. In 1969 and again in 1995, there were single observations in Yosemite Valley. One individual was observed along the John Muir Trail between Yosemite Valley and Little Yosemite Valley in 1995. From 2000–2006, there were four sightings along the John Muir Trail between Yosemite Valley and Little Yosemite Valley and five sightings in Yosemite Valley (CNDDB 2012). In 2006, there were also two individuals observed in Yosemite Valley immediately outside of the river corridor buffer.

Park Rare Species

Plants

Spurred snapdragon (*Antirrhinum leptaleum*)

General Ecology and Distribution. Spurred snapdragon, an annual herb, is endemic to California and limited to the seasonally moist areas in the foothill and Sierra Nevada counties between 300 and 1,200 meters.

Habitat and Status in the Project Area. The snapdragon is restricted to small washes and shallow ditches in disturbed areas in Foresta and Wawona.

Lemmon's wild ginger (*Asarum lemmonii*)

General Ecology and Distribution. This perennial herb in the birthwort family is endemic to California and is found in yellow pine forests, red fir forests, and wetland-riparian habitats within the park between 1,100 and 1,900 meters. It occurs almost always under natural conditions in wetlands.

Habitat and Status in the Project Area. Lemmon's wild ginger occurs in shady wet places along creeks and north-facing river banks; it is found in Yosemite Valley and Wawona.

California bolandra (*Bolandra californica*)

General Ecology and Distribution. This perennial herb in the saxifrage family is endemic to California and is restricted to lower and upper montane coniferous forests within the park, in mesic areas and rocky soils. It is restricted to elevations between 2,000-3,000 meters.

Habitat and Status in the Project Area. The California bolandra occurs at Lyell Fork of the Merced River in Segment 1 of the Merced River corridor.

Threadleaf beakseed (*Bulbostylis capillaris*)

General Ecology and Distribution. Threadleaf beakseed is a monocot annual herb in the sedge family; it is native to California and occurs in yellow pine forests and wetland-riparian habitats at elevations between 1,000-2,000 meters.

Habitat and Status in the Project Area. The threadleaf beakseed occurs in meadows and seeps, meadow habitats, and vernally moist areas. It is found in Yosemite Valley (Segment 2).

Mono Hot Spring evening primrose (*Camissonia sierrae ssp. alticola*)

General Ecology and Distribution. This annual herb in the evening primrose family is endemic to California and is found in lodgepole and red fir forests (lower and upper montane coniferous forests) in granitic, gravel and sand pans. The Mono Hot Spring evening primrose is found at elevations of 2,000-2,350 meters.

Habitat and Status in the Project Area. This evening primrose is found on vernally moist gravel and sand pans and at Merced Lake in Segment 1.

Sierra suncup (*Camissonia sierrae ssp. sierrae*)

General Ecology and Distribution. This annual herb in the evening primrose family is endemic to California and is restricted to cismontane woodlands and lower montane coniferous forests at elevations between 500 and 1,300 meters.

Habitat and Status in the Project Area. The milkvetch occurs on granite gravel seepage areas within Yosemite Valley.

Buxbaum's sedge (*Carex buxbaumii*)

General Ecology and Distribution. Buxbaum's sedge is a monocot and perennial herb in the sedge family. It occurs in montane and subalpine fens. It favors wet conditions in meadow habitats at elevations between 1,200-3,300 meters.

Habitat and Status in the Project Area. Buxbaum's sedge occurs in Yosemite Valley.

Silvery sedge (*Carex canescens*)

General Ecology and Distribution. This monocot, perennial herb belongs to the sedge family and is found throughout the Sierra Nevada as well as other mid- to high-elevation sites in North America. It occurs in meadow and perennially moist areas in subalpine and alpine forests at elevations between 1,000-3,200 meters.

Habitat and Status in the Project Area. The silvery sedge is found in lake margins and drainages in wet meadows. Historic collections were taken from Wawona, where this species is commonly found (Segment 7).

Cleft sedge *(Carex fissuricola*)

General Ecology and Distribution. This perennial herb in the sedge family is native to California, but is confined to western North America. It is found in red fir and subalpine forests and wetland-riparian habitats at elevations between 1,500 and 3,500 meters.

Habitat and Status in the Project Area. This sedge occurs in meadow slopes and flats, among rocks, wet areas, and spray zones. It is found at Nevada Falls within Segment 1.

Yosemite sedge (*Carex sartwelliana*)

General Ecology and Distribution. This perennial herb in the sedge family is endemic to California and occurs in yellow pine and red fir forests, as well as wetland-riparian habitats at elevations of 1,200 to 2,600 meters.

Habitat and Status in the Project Area. This sedge is found in meadow borders and moist forest openings. It can be found at Wildcat Creek and in Segments 1, 2, 5, and 7.

Bolander's woodreed (*Cinna bolanderi*)

General Ecology and Distribution. This perennial herb in the grass family is endemic to California and occurs in wetland-riparian habitat, but occasionally is found in non wetlands. It is found in elevations ranging between 1,670 to 2,440 meters.

Habitat and Status in the Project Area. Bolander's woodreed is found in montane stringer meadows and fens in Wawona and Little Yosemite Valley (Segments 7 and 1, respectively).

Narrow leaf Collinsia (*Collinsia linearis*)

General Ecology and Distribution. This annual herb in the plantain family is primarily limited to California, with some extensions into adjacent states. It is found in lower- to mid-elevation (200 to 2,000 meters) coniferous forests on rock outcrops and dry slopes. It reaches the southern extent of its range in Mariposa County.

Habitat and Status in the Project Area. Narrow leaf collinsia is found in El Portal and Wawona (Segments 4 and 7, respectively), where it is restricted to dry, metamorphic rock outcrops along the metamorphic-granitic contact zone.

Short-bracted bird's beak (*Cordylanthus rigidus ssp. brevibracteus*)

General Ecology and Distribution. Short-bracted bird's beak is an annual herb in the broomrape family and is endemic to California. It is widely distributed in the Sierra Nevada from Mariposa County southward to Kern County at elevations ranging between 1,100 to 2,500 meters.

Habitat and Status in the Project Area. This plant occurs on the north side of Yosemite Valley, where it receives full sun on dry sandy roadside habitats. Known populations occur one mile east of Cascade Creek in Segment 2 (Yosemite Valley).

Mountain lady's slipper (*Cypripedium montanum*)

General Ecology and Distribution. Mountain lady's slipper is a perennial herb in the orchid family; it is native to California and is confined to western North America in yellow pine forests, mixed evergreen forests, and wetland-riparian habitats at elevations between 200 to 2,200 meters. In the Sierra Nevada, it occurs in Tuolumne, Mariposa, and Madera Counties. It also occurs in northwestern California, the Cascade Range, southwest San Francisco Bay Area, and Modoc Plateau.

Habitat and Status in the Project Area. This herb occurs on deep humus and shade of canyon bottoms. It is found in Wawona and below Yosemite Valley.

Stream orchid (*Epipactis gigantea*)

General Ecology and Distribution. This species, a perennial herb in the orchid family, is widely distributed throughout California and North America. In Yosemite, it is restricted to moist granitic ledges and planted in landscaped areas at elevations between 1,500 to 2,600 meters.

Habitat and Status in the Project Area. This species occurs in Yosemite Valley within a number of landscaped areas. Former populations above Happy Isles were obliterated by the rockfall in 1996. Natural habitat for this species exists throughout the Valley in perennially moist, shaded areas.

Purple fawn-lily (*Erythronium purpurascens*)

General Ecology and Distribution. This perennial herb is endemic to California and the Sierra Nevada. It grows along shaded streams and river corridors in montane coniferous forests at elevations of 1,500 to 2,700 meters.

Habitat and Status in the Project Area. This species is known from riparian corridors in the eastern end of Yosemite Valley. It was collected in the past for its showy flowers and is possibly extinct.

Northern mannagrass (*Glyceria borealis*)

General Ecology and Distribution. This perennial herb in the grass family is native to California and is also found elsewhere in North America and beyond. It occurs in yellow pine and red fir forests, as well as wetland-riparian habitats. In Yosemite, it is found in elevations ranging between 800-1,250 meters.

Habitat and Status in the Project Area. Northern managrass grows in marshes and shallow lake borders in Yosemite Valley (Segment 2).

California sunflower (*Helianthus californicus*)

General Ecology and Distribution. This perennial herb in the aster family is native to California and is confined to western North America. It occurs in foothill woodland, valley grassland, freshwater wetlands, and wetland-riparian habitats at elevations ranging between 1,600 and 2,000 meters.

Habitat and Status in the Project Area. California sunflower grows along streambanks, within meadows and freshwater marshes, seeps, and seasonally inundated areas. It occurs in Wawona (Segment 7).

Common mare's tail (*Hippuris vulgaris*)

General Ecology and Distribution. This perennial aquatic herb in the plantain family is native to California but is also found elsewhere in North America and beyond. It occurs in a variety of habitats, including yellow pine, red fir, lodgepole, and subalpine forests; foothill woodland, chaparral, valley grassland, and wetland-riparian habitats at elevations ranging between 0 to 2,600 meters. It occurs almost always under natural conditions in wetlands.

Habitat and Status in the Project Area. This species occurs within lakes, ponds, springs, rivers in Little Yosemite Valley (Segment 1).

Redray alpinegold (*Hulsea heterochroma*)

General Ecology and Distribution. This perennial herb in the aster family is native to California and elsewhere outside of California, but is confined to western North America. It occurs in chaparral and openings in yellow pine forests between 300 and 2,500 meters in elevation.

Habitat and Status in the Project Area. This species occurs in Yosemite Valley and 5 miles above Nevada Fall (Segments 2 and 1, respectively).

Western quillwort (*Isoetes occidentalis*)

General Ecology and Distribution. This fern is native to California and belongs to the quillworts family. It occurs in wetland-riparian habitats in the high Sierra Nevada, Klamath Ranges within California at elevations between 1,500 and 2,500 meters. Outside of California, it can be found in British Columbia and Colorado.

Habitat and Status in the Project Area. Western quillwort occurs in mountain lakes and rivers. In the Project Area, it is found in Segment 1 (Little Yosemite Valley).

Sierra laurel (*Leucothoe davisiae*)

General Ecology and Distribution. This shrub, a perennial in the heath family, is found slightly beyond California's boundaries and is restricted to wetland, bog, and moist habitats at elevations between 1,300 and 2,600 meters.

Habitat and Status in the Project Area. Within the Merced River corridor, Sierra laurel is found in moist, shaded drainage bottoms along creeks and rivers within Yosemite Valley (Segment 2).

False pimpernel (*Lindernia dubia var. anagallidea*)

General Ecology and Distribution. This annual herb in the plantain family is found in freshwater wetlands and meadows at low to mid elevations (500 to 1,600 meters) in California and North America.

Habitat and Status in the Project Area. False pimpernel is found in meadow soils throughout Yosemite Valley (Segment 2) that remain moist for the duration of the plant's seasonal life span.

Tanoak (*Lithocarpus densiflorus var. echinoide*s)

General Ecology and Distribution. Tanoak is a tree or shrub in the oak family and is native to California. It occurs on dry shady forest conditions in slope habitats at elevations ranging between 600 and 2,000 meters.

Habitat and Status in the Project Area. Tanoak occurs along the Merced River below Yosemite Valley (Segment 2) and in the El Portal area (Segment 3).

Northern bugleweed (*Lycopus uniflorus*)

General Ecology and Distribution. This perennial herb in the mint family is native to California and is also found elsewhere in North America and beyond. It occurs in freshwater wetlands and wetland-riparian habitat at elevations ranging between 1,600 and 2,000 meters.

Habitat and Status in the Project Area. Northern bugleweed occurs in moist areas, marshes, adjacent to springs, and along the Merced River banks from El Portal up to the Merced Gorge (Segments 4 and 3, respectively).

Yellow and white monkeyflower (*Mimulus bicolor*)

General Ecology and Distribution. Yellow and white monkeyflower, an annual herb from the lopseed family, is endemic to California. It occurs in foothill woodland, yellow pine forest, and chaparral habitats at elevations ranging between 360 and 2,100 meters.

Habitat and Status in the Project Area. This species occurs under vernally moist conditions, usually in non-wetlands, but occasionally found in wetlands and river bottomlands. In the Project Area, it is found in Wawona (Segment 7).

Small flowered monkeyflower (*Mimulus inconspicuus*)

General Ecology and Distribution. This annual herb in the lopseed family is endemic to California. It is restricted to wetlands and seasonally moist sites in lower montane forests and foothill woodlands in partial shade at elevations between 160 and 2,000 meters.

Habitat and Status in the Project Area. Small flowered monkeyflower occurs at the mouth of Moss Creek and also in Segments 2, 3, 7, and 8.

Cutleaf monkeyflower (*Mimulus laciniatus*)

General Ecology and Distribution. This annual herb in the lopseed family is endemic to California. It typically occurs in red fir and yellow pine forests and wetland-riparian habitats at elevations ranging between 900 and 2,000 meters.

Habitat and Status in the Project Area. Cutleaf monkeyflower occurs in chaparral, lower and upper montane coniferous forests, vernally moist seepage areas, and mesic areas with granitic substrate in Yosemite Valley (Segment 2).

Yellow-lip pansy monkeyflower (*Mimulus pulchellus*)

General Ecology and Distribution. This annual herb in the lopseed family is endemic to California and limited to Mariposa, Tuolumne, and Calaveras Counties. It is restricted to wetlands and seasonally moist sites at elevations ranging between 600 and 2,000 meters.

Habitat and Status in the Project Area. This species occurs in vernally mesic meadows and lower montane coniferous forests within Yosemite Valley (Segment 2).

Sierra sweet-bay (*Myrica hartwegii*)

General Ecology and Distribution. This perennial shrub in the wax-myrtle family is endemic to California. It is limited in occurrence to streambanks and riparian communities at low to moderate elevations (300 to 1,500 meters) in the Sierra Nevada, where it forms small thickets along the river.

Habitat and Status in the Project Area. Patchy distribution of Sierra sweet-bay occurs along the South Fork of the Merced River through Wawona as well as along tributaries to the South Fork and Big Creek near the South Entrance Station.

California bog asphodel (*Narthecium californicum*)

General Ecology and Distribution. This perennial shrub in the Nartheciaceae family and is endemic to California. It occurs along streambanks and in meadows within yellow pine, red fir, and douglas-fir forests, as well as wetland-riparian habitat. Elevation range for this species is between 700 to 2,600 meters.

Habitat and Status in the Project Area. This species occurs in fens, seeps, and adjacent to streams and waterfalls. In the Project Area, it can be found at Bridalveil Falls in Yosemite Valley (Segment 2).

Azure penstemon (*Penstemon azureus* ssp. *angustissimus*)

General Ecology and Distribution. This perennial herb in the plantain family is endemic to California and is near its southern extent in Yosemite. It is generally found in moist woodlands and open forests at lower to moderate elevations in the Sierra Nevada at elevations of 300 to 700 meters.

Habitat and Status in the Project Area. This herb is found in scattered locations in Yosemite Valley (Segment 2). It was first described from collections taken in Yosemite Valley, although that original population appears to have disappeared.

Purdy's foothill penstemon (*Penstemon heterophyllus var. purdyi*)

General Ecology and Distribution. This perennial herb in the plantain family is endemic to California. It is generally found under dry conditions in slope habitats of chaparral, foothill woodland, and yellow pine forest habitats. It occurs at elevations of 50 to 1,600 meters.

Habitat and Status in the Project Area. This penstemon occurs in Yosemite Valley (Segment 2).

Tansy Leafed Phacelia (*Phacelia tanacetifolia*)

General Ecology and Distribution. This annual herb in the borage family is found throughout California and is confined to western North America. It grows in seasonally moist, sandy and gravelly open areas.

Habitat and Status in the Project Area. This species occurs at scattered locations throughout Yosemite Valley at elevations of 1,000 to 2,000 meters, where it blooms and sets seed early each spring.

Coleman's piperia (*Piperia colemanii*)

General Ecology and Distribution. This perennial native herb is endemic to California and limited to the high North Coast Ranges, high Cascade Range, and the Sierra Nevada. It grows on sandy substrates in lower montane coniferous forests and are also found in chaparral habitat at 1,200-2,300 meters in elevation.

Habitat and Status in the Project Area. This species occurs in Little Yosemite Valley (Segment 1).

Torrey's popcornflower (*Plagiobothrys torreyi var. torreyi*)

General Ecology and Distribution. This annual herb in the borage family is endemic to California and occurs in Mariposa, Fresno, and Kern Counties. Suitable habitat include meadows within yellow pine, red fir, and lodgepole pine forests, as well as subalpine forests at elevations ranging between 1,200 and 3,400 meters.

Habitat and Status in the Project Area. This herb is found within moist meadows and flats, as well as forest edges within Yosemite Valley (Segment 2).

Nuttall's pondweed (*Potamogeton epihydrus* (previously *P. ephydrus ssp. nuttallii*))

General Ecology and Distribution. This perennial herb in the pondweed family is native to California at elevations ranging between 400 and 1,900 meters; it occurs in the outer North Coast Ranges, high Sierra Nevada, Modoc Plateau, and elsewhere in North America.

Habitat and Status in the Project Area. Nuttall's pondweed is restricted to freshwater wetlands and wetland-riparian habitats. In Yosemite Valley (Segment 2), it can be found in freshwater marshes and tanks.

Valley oak (*Quercus lobat*a)

General Ecology and Distribution. This tree is endemic to California and occurs throughout California, with the exception of eastern California and desert areas.

Habitat and Status in the Project Area. Valley oak occurs on deep soil on slopes and in valleys. It is known from a few majestic specimens in El Portal (Segment 4) at elevations of approximately 720 meters.

Wood saxifrage (*Saxifraga mertensiana*)

General Ecology and Distribution. This perennial herb in the saxifrage family is endemic to California and limited to the northern and central Sierra Nevada at elevations of 1,000 to 2,500 meters. It reaches its southern extent in Mariposa County, where it grows on mossy rocks and moist cliffs in lower to montane coniferous forests.

Habitat and Status in the Project Area. This species occurs at scattered locations in moist, shaded sites throughout Yosemite Valley (Segment 2).

Oregon saxifrage (*Micranthes oregana (*previously *Saxifraga oregana*))

General Ecology and Distribution. This perennial herb in the saxifrage family is native to California but is also found in other areas of western North America. It occurs in meadows within yellow pine, red fir, lodgepole pine, and subalpine forests, as well as wetland-riparian communities at elevations of 150 to 2,500 meters.

Habitat and Status in the Project Area. This species occurs in meadows and seeps, almost always under wet conditions, in Yosemite Valley and Little Yosemite Valley (Segments 2 and 1, respectively).

Bolander's skullcap (*Scutellaria bolanderi*)

General Ecology and Distribution. This perennial herb in the mint family is endemic to California. It is primarily found in lower montane forests in the Sierra Nevada, where it occurs in gravelly soils along streambanks and in California black oak woodlands and ponderosa pine forests at elevations between 300-2,000 meters.

Habitat and Status in the Project Area. This species is known from isolated populations scattered throughout the Wawona basin (Segment 7).

Clark's ragwort (*Senecio clarkianus*)

General Ecology and Distribution. This perennial herb in the aster family is endemic to California and occurs in red fir and lodgepole forests, as well as wetland-riparian habitats at elevations ranging between 1,400 and 2,700 meters.

Habitat and Status in the Project Area. It occurs in damp montane meadows within Wawona (Segment 7).

Small bur reed (*Sparganium natans*)

General Ecology and Distribution. This perennial herb in the Typhaceae family is native to California, but is also found elsewhere in North America and beyond. It occurs at lake margins and edges of freshwater wetlands and wetland-riparian habitats at elevations ranging between 2,000 and 2,500 meters.

Habitat and Status in the Project Area. This species is found in tributaries of the Merced River in Segments 2 and 7 (Yosemite Valley and Wawona, respectively).

Sierra bladdernut (*Staphylea bolanderi*)

General Ecology and Distribution. This tree or shrub belongs to the Staphyleaceae and is endemic to California; it occurs in canyons within chaparral, foothill woodland, and yellow pine forest communities at elevations between 240 and 1,720 meters.

Habitat and Status in the Project Area. This species occurs in shaded canyon habitats along the Merced River Canyon in El Portal and the Merced Gorge Area (Segments 4 and 3, respectively).

Narrowleaf trillium (*Trillium angustipetalum*)

General Ecology and Distribution. This perennial herb in the Melanthiaceae family is almost entirely restricted to California. It is most common in the coastal ranges of the state, but occurs in limited,

small populations in the Sierra Nevada where it is found in shady areas within mature montane coniferous forests with well-developed duff and litter layers. Elevations range from 100 to 2,000 meters. This species may be at risk due to the lack of natural fire patterns, which allows an unnatural buildup of duff and litter to the exclusion of the plant, as well as overly intense fire behavior resulting in loss of root and plant materials through overheating.

Habitat and Status in the Project Area. This species is scattered over a 10-acre area along the south side of the South Fork of the Merced River in Wawona (Segment 7), near the eastern end of River Road. It also occurs in Yosemite Valley (Segment 2).

California red huckleberry (*Vaccinium parvifolium*)

General Ecology and Distribution. This shrub belongs to the heath family and is endemic to California. It occurs in canyons within redwood forest, red fir forest, and mixed evergreen forest communities at elevations between 1,400 and 2,500 meters.

Habitat and Status in the Project Area. This species prefers moist, shaded drainage bottoms along creeks and rivers. It occurs in Wawona (Segment 7).

Hall's wyethia (*Wyethia elata*)

General Ecology and Distribution. This species, a perennial herb in the aster family, is endemic to California. It is restricted to the southern Sierra Nevada foothills and lower montane forests at elevations between 1,000 and 1,400 meters and reaches the northern extent of its range in Yosemite.

Habitat and Status in the Project Area. It is found in open woodlands and forests in the Wawona basin (Segment 7).

CHAPTER V. ENVIRONMENTAL EFFECTS

Methods Used to Assess Effects

Assumptions

The following assumptions were used as a basis in the analysis of effects on special-status species:

- The greater the size of a biotic community and the stronger its links to neighboring communities, the more valuable it is to the integrity and maintenance of biotic processes that sustain special-status species. Development limits the size of a community and fragments and disassociates communities from each other.

- The more developed areas become, the less valuable they are as habitat for special-status species. New development would increase human presence and increase the potential for soil, wildlife, and vegetation disturbance. The potential for negative wildlife interactions (such as human injury from wildlife and the introduction of unnatural food sources) also would increase. If development were removed from an area, the value of the habitat for special-status species would increase. In some cases, the dispersal of visitors over a wider area that may follow removal of developed facilities may well have a greater impact than focused visitor use within the well-defined area of development. Human effects can also improve habitat quality for non-native species and unnaturally increase the abundance of some native species, both of which can have an adverse effect on special-status species.

- The presence of humans and the effects of human food on the behavior, distribution, and abundance of wildlife species would continue in existing developments.

- Roads can change water inflow and outflow patterns and may dewater sections of meadow or wetland habitat (USFS 1996). Roads can also cause mortality of wildlife and may form barriers and fragment wildlife habitat.

- Development and effects in riparian zones may influence critical water quality elements such as temperature, suspended sediments, and nutrients. These elements interact in complex ways in aquatic systems and directly and indirectly influence patterns of growth, reproduction, and migration of aquatic organisms.

- Development that has an adverse effect on habitat features that are important to certain special-status species (e.g., particular plant species upon which a species relies, or habitat features that define suitable habitat for a species) can have an acute, negative effect on those species.

- Radiating effects of human use can affect use of habitats adjacent to developed areas by special-status species, even though such habitats are not directly affected by the development.

- Implementation of threatened or endangered species recovery plans and other formal agreements between the U.S. Fish and Wildlife Service and the National Park Service would not be affected by the management direction resulting from the *Merced River Plan/DEIS*. The current management direction for special-status species would continue to remain in effect.

Special-Status Plants

The assessment of effects on special-status plants was based on the following:

- The sensitivity of the individual species to effects (based on the rarity, resilience, size of population, and extent of the species throughout the park)
- The location of the species in relation to the Preferred Alternative

Special-Status Wildlife

The assessment of effects on special-status wildlife was based on the following:

- The possibility of a species or its preferred habitat occurring in those areas expected to be affected
- The direct loss of habitat
- The partial loss of habitat from its modification
- The species' sensitivity to disturbance from human activities that may alter use of habitats in areas adjacent to development

Habitat fragmentation was also a critical component of the analysis. Restored blocks of habitat should be large enough to support viable populations, and intact habitat must not be reduced or affected to the point that it will no longer support viable populations.

Impact Analysis

Impacts on special status species from actions proposed in the *Merced River Plan/DEIS* were evaluated in terms of the context, intensity, duration, and type of impact, as defined below. Generally, the methodology for natural resource impact assessment follows direction provided in the *Council of Environmental Quality Regulations for Implementing the National Environmental Policy Act*, Section 1508.27.

- **Context.** The context of the impact considers whether the impact would be local, segmentwide, parkwide, or regional. For the purposes of this analysis, local impacts would be those that occur in a specific area within a segment of the Merced River. This analysis will further identify if there would be local impacts in multiple segments. Segmentwide impacts would consist of a number of local impacts within a single segment or larger-scale impacts that would affect the segment as a whole. Parkwide impacts would extend beyond the river corridor and the study area within Yosemite National Park. Regional impacts would have an influence in a Sierra-wide context. Context suggests that certain impacts depend on the setting of the proposed action. For instance, impacts that would reduce the connectivity between habitat types could be minor if such connections are abundant in a given region, moderate or major if they are not.

- **Intensity.** Impacts can be adverse or beneficial. A negligible impact means that special status species would not be affected, or effects would not be measurable. A minor impact would be

detectable; both short-term and long-term impacts could potentially affect breeding success and habitat availability. Mitigation measures would be sufficient to offset minor adverse effects. A moderate impact would be readily apparent and would result in the reduction or expansion of potential habitat required to meet life requisite needs of one or more species. Mitigation would be required to offset moderate adverse impacts. A major impact would be readily apparent and would result in the direct or indirect gain or loss of occupied breeding sites, take of individuals, or changes to habitat affecting potential for occupancy or reproductive potential. Extensive mitigation would be necessary to offset adverse effects and its success could not be guaranteed. Impacts to rare, threatened, and endangered species would be quantified where possible by determining the acreage of habitat for each species altered. The amount of each habitat type that would be directly affected would be determined by a comparative analysis of suitable habitat spatial data representing existing conditions and conditions under proposed management actions. Effects associated with habitat distribution and patch size will also be addressed quantitatively where baseline data are available to support such an analysis. Other potential direct and indirect effects to rare, threatened, and endangered species habitats, such as effects associated with invasive species or the potential for disturbance to populations due to increases in human activity, will be analyzed qualitatively.

- **Duration.** A short-term impact would have an immediate effect on native habitat, diversity, and native populations but would not cause long-term declines in populations or diversity. Short-term impacts are normally associated with transitional types of activities, such as facility construction. Long-term impacts would lead to a loss of native habitat, diversity, and species populations as exhibited by a decline in species abundance, viability, and/or survival.

- **Type.** The type of impact considers whether the impact would be beneficial or adverse. Adverse impacts are those that alter the range, location, number, or population of a species or its habitat. Beneficial impacts would improve one or more of these characteristics.

Cumulative Analysis

Cumulative effects on rare, threatened, and endangered species discussed herein are based on analysis of past, present, and reasonably foreseeable actions in the Yosemite region. The intensity of impact depends on whether the impacts are anticipated to interact cumulatively. For example, factors external to the park, such as broad regional habitat loss and pesticide use, can combine with existing, in-park impacts, such as from nonnative species, to cause declines in rare, threatened, or endangered amphibians (such as Sierra Nevada yellow-legged frog and Yosemite toad), which would be an adverse, cumulative impact. The projects identified below are those that have the potential to affect populations of rare, threatened, or endangered species (i.e., within the Merced River corridor) as well as large-scale or regional populations of the same species.

Past Actions

Natural habitats in Yosemite have been manipulated almost since the beginning of the park. Regional wildlife and vegetation patterns have been historically affected by logging, fire suppression, rangeland clearing, grazing, mining, draining, damming, diversions, and the introduction of nonnative species. Mammal species that survive but are extremely rare are the Pacific fisher and Sierra Nevada red fox. Several bird species have probably been reduced in Yosemite Valley by visitor activity but are present

in less disturbed areas of the park. Willow flycatchers no longer nest in the Valley—probably due as much to parasitism by brown-headed cowbirds as to destruction of riparian and meadow habitat. Amphibians in Yosemite have suffered population declines similar to those seen in the rest of the Sierra Nevada (Drost and Fellers 1996). Red-legged frogs likely were found in the Valley in the past but are now are presumed extirpated. Significant factors in their disappearance probably include reduction in perennial ponds and wetlands, and predation by bullfrogs. At higher elevations, Sierra Nevada yellow-legged frogs and Yosemite toads are still present in a number of areas but are severely reduced in population and range. Foothill yellow-legged frogs have disappeared completely from the park, if not the entire Sierra Nevada. Research continues to identify the causes of Sierra Nevada-wide amphibian declines; known and possible causes include habitat destruction, nonnative fish, pesticides, and diseases. Past and ongoing activities that affect rare, threatened, or endangered species include construction of dams, diversion walls, bridges, roads, pipelines, riprap, recreational use, buildings, campgrounds, and other recreational features.

In 1991, the USFS and the Bureau of Land Management developed a joint *South Fork and Merced Wild and Scenic River Implementation Plan* for the main stem Merced River and South Fork Merced River that are under their jurisdiction; this plan is also a general management plan with many prescriptive goals and few actions. The plan endeavors to limit or end consumptive uses such as grazing within the river corridor and calls for the formalization of camping and launch facilities for nonmotorized watercraft. Implementation of these actions has a beneficial effect by eliminating impacts where feasible (grazing does not currently occur within the river corridor), concentrating impacts in areas able to withstand visitor use, and providing facilities that mitigate adverse effects associated with visitor use (e.g., restrooms).

Past projects and plans that could have a cumulative effect on special status species in the Merced River Wild and Scenic corridor include the following:

> ***Management and Restoration*** – *South Fork and Merced Wild and Scenic River Implementation Plan*, Cascades Diversion Dam Removal, Cook's Meadow Ecological Restoration, Fern Springs Restoration, Happy Isles Dam Removal, Happy Isles Fen Habitat Restoration Project, Happy Isles Gauging Station Bridge Removal, Merced River Ecological Restoration at Eagle Creek Project

Present Actions

Current facility-related projects and plans that could have a cumulative effect on special status species include the following:

> ***Facility Development*** – Crane Flat Utilities, *East Yosemite Valley Utilities Improvement Plan/Environmental Assessment*, Wahhoga Indian Cultural Center, Parkwide Communication Data Network, South Entrance Station Kiosk Replacement, Tioga Road Rehabilitation

Beneficial impacts of present management and restoration actions are similar to those discussed for past actions. Specific examples of present projects and plans with beneficial effects include the following:

Management and Restoration – *Yosemite Vegetation Management Plan*, General Ecological Restoration, 2004 *Fire Management Plan/EIS*, Fuels reductions/forest rehabilitation projects (USFS), *Tuolumne Wild and Scenic River Comprehensive Management Plan*

Reasonably Foreseeable Future Actions

Reasonably foreseeable future actions proposed in the region that could have a cumulative effect on regional special status species include:

- changing demographics of visitors in Yosemite
- climate change
- concessioner parking lot restoration
- Restoration of the Mariposa Grove Ecosystem
- *Yosemite Wilderness Stewardship Plan/EIS*

Federal Endangered Species

Wildlife

Sierra Nevada bighorn sheep (*Ovis canadensis sierrae*)

Direct and Indirect Effects. There would be no direct or indirect effects on the Sierra Nevada bighorn sheep or its preferred habitat. Habitat for the Sierra Nevada bighorn sheep is located in steep terrain in the northeastern portion of Yosemite Park, outside of the Merced River corridor. Additionally, most of the herd inhabits lands outside of the Park. No development would occur within suitable habitat for this species. Therefore, there would be no direct or indirect effects on the Sierra Nevada bighorn sheep.

Cumulative Effects. Regional and parkwide planning efforts such as the Vegetation Management Plan, General Ecological Restoration, Grazing Allotment Permit Renewals (U.S. Forest Service) and 2009 Fire Management Plan could provide benefits to the size, integrity, and connectivity of suitable habitat for the Sierra Nevada bighorn sheep. These regional plans would have a long-term, moderate, beneficial effect on the Sierra Nevada bighorn sheep.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on Sierra Nevada bighorn sheep.

Federal Threatened Species

Valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*)

Direct and Indirect Effects. Potential Valley elderberry longhorn beetle habitat is defined by the presence or absence of elderberry plants in areas below 3,000 feet in elevation. Potential habitat for this species occurs in Segments 3 and 4 (Merced Gorge and El Portal, respectively), generally in riparian areas; however, activities that have the potential to affect Valley elderberry longhorn beetle would only occur in Segment 4 (El Portal, see **figure N-1**).

Approximately 124 elderberry plants of a size sufficient to support the Valley elderberry longhorn beetle occur in areas of potential development or management activities in El Portal. Valley elderberry longhorn beetle exit holes that verify beetle activity were found in 11 of these elderberry plants, though beetle larvae could still be present in elderberry plants without exit holes. Actions in Segment 4, including moving temporary housing units to El Portal and development at the Abbieville and Trailer Village, would result in potential indirect or direct impacts on elderberry shrubs, including removal of shrubs. Approximately 37 elderberry plants were documented within potential areas of ground disturbance, seven with exit holes. Complete impact avoidance would not be possible for these plants. The infill in El Portal would affect up to nine elderberry shrubs with stems greater than one inch in diameter. The development at Abbieville would affect up to 16 shrubs, while the development at Trailer Village would affect up to 12 shrubs as proposed in the *Merced River Plan/DEIS*. However, planning and implementation would strive to minimize effects to riparian vegetation and shrubs that are retained in the area. For example, new employee housing would be constructed outside of the 100-year floodplain to avoid impacts to riparian vegetation. Nevertheless, shrubs retained adjacent to proposed developed areas could be subject to future damage from human activities, such as unauthorized pruning and vehicles.

Direct or indirect impacts on valley elderberry longhorn beetle habitat would result in adverse effects to this species. To minimize and avoid potential effects where possible, NPS will implement avoidance and mitigation measures outlined in the 1999 USFWS *Conservation Guidelines for the Valley Elderberry Longhorn Beetle* (Conservation Guidelines) (mitigation measure MM-WL-4, as applicable; see Appendix C). The Conservation Guidelines prescribe conservation measures to avoid and minimize adverse effects on the valley elderberry longhorn beetle, including specific procedures for transplanting, requirements to plant additional seedlings or cuttings and associated native species, protective measures, maintenance, and reporting.

Using the measures outlined in the Conservation Guidelines, the NPS estimates that 37 elderberry plants would need transplanting, 174 additional seedlings or cuttings would need to be planted, along with 101 associated native plants. In addition, a 1.53 acre Habitat Conservation Area would be required to protect transplants and establish required associated native plants. The NPS proposes to establish a 1.53 acre Habitat Conservation Area at the Greenemeyer Sand Pit, pending confirmation from the USFWS (see Appendix C for details).

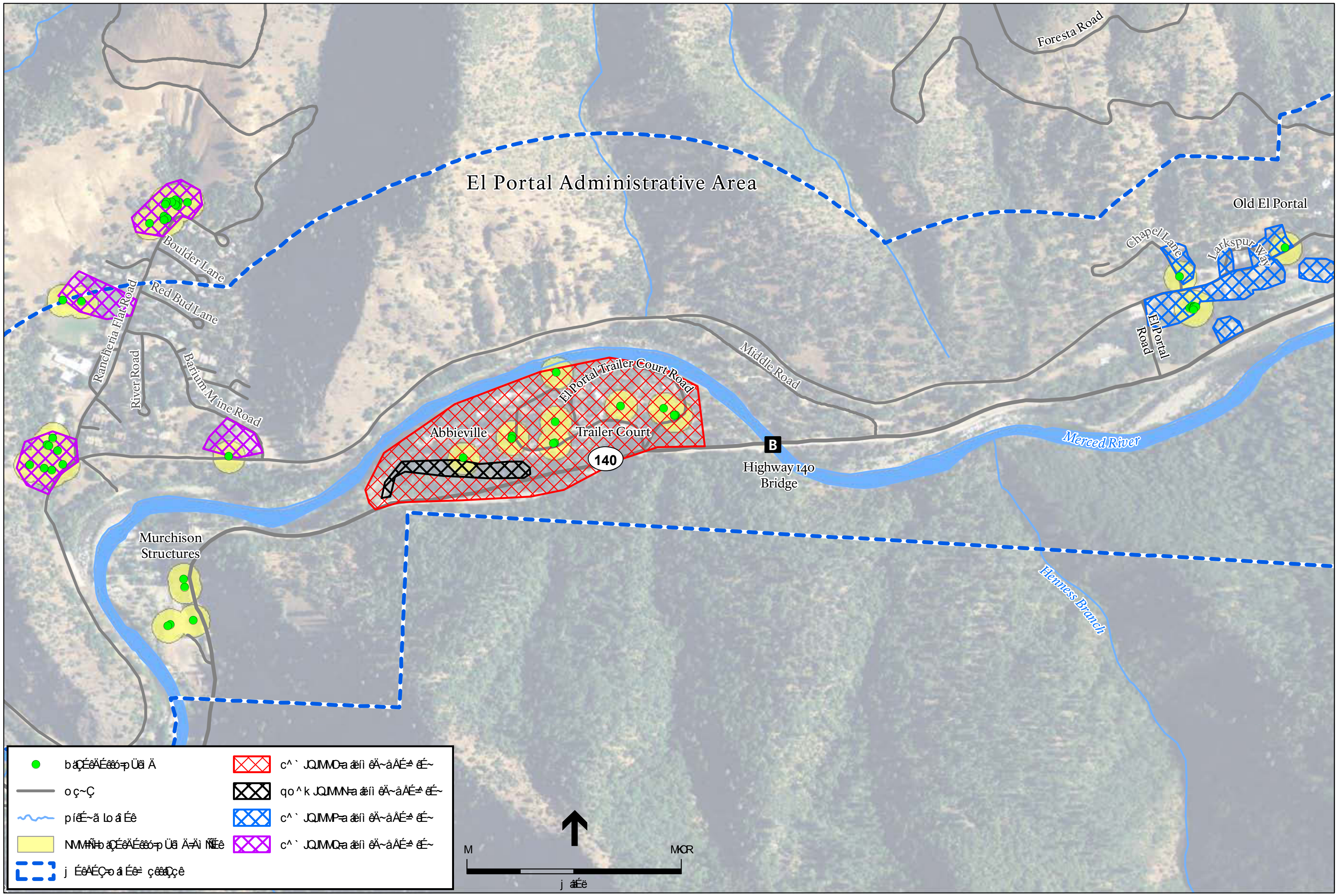
El Portal Administrative Area
Foresta Road
Old El Portal
Chapel Lane
Larkspur Way
El Portal Road
Middle Road
El Portal Trailer Court Road
Abbieville
Trailer Court
140
B
Highway 140 Bridge
Merced River
Murchison Structures
Boulder Lane
Red Bud Lane
Rancheria Flat Road
River Road
Barium Mine Road

Figure N-1

Ecological restoration actions occurring in El Portal include riparian revegetation and removal of abandoned utilities and facilities. Additionally, no new development would occur within 150 feet of the river. These actions combined would result in long-term beneficial effects to the Valley elderberry longhorn beetle, as this species' primary habitat occurs within riparian habitat.

Cumulative Effects. Foreseeable projects that could have adverse effects on the Valley elderberry longhorn beetle and its habitat include the Utilities Master Plan/East Yosemite Valley Utilities Improvement Plan and Parkwide Communication Data Network. These projects would have the potential to damage or destroy elderberry plants and directly affect local Valley elderberry longhorn beetle populations.

Long-term, beneficial effects would be expected from the Vegetation Management Plan, General Ecological Restoration, Grazing Allotment Permit Renewals (U.S. Forest Service), 2009 Fire Management Plan, Invasive Plant Management Plan Update, Fuels reductions/forest rehabilitation projects (U.S. Forest Service) because these planning efforts could lead to greater protection of elderberry plants.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on valley elderberry longhorn beetle.

Federal Candidate Species

Wildlife

Yosemite toad (*Bufo canorus*)

Direct and Indirect Effects. The areas of likely occurrence of Yosemite toads in the study area, based upon previous observations and collections, are in high-elevation meadows and lakes in Segment 1 (Merced River above Nevada Fall) and Segment 5 (South Fork Merced River above Wawona). The Yosemite toad is regarded as a high-elevation species. There is a single historic record of this species in Yosemite Valley that places it approximately 2,500 feet below its usual range. It is unlikely that this record reflects the sustainable range of Yosemite toads. The proposed actions within Segments 1 and 5 are primarily ecological restoration actions, and thus would result in direct and indirect negligible effects to the Yosemite toad. Meadow restoration, cessation of pack stock grazing, and re-routing trails outside of sensitive meadow habitat would result in long-term, beneficial effect to the Yosemite toad. Meadow restoration at the Merced Lake High Sierra Camp area would also have long-term beneficial impacts on Yosemite toads.

Overall, effect of the Preferred Alternative on Yosemite toads is expected to be long-term, local and beneficial.

Cumulative Effects. Projects that have an appreciable effect on high-elevation meadow habitats are most likely to affect the Yosemite toad. Regional and parkwide planning efforts such as the Vegetation Management Plan, General Ecological Restoration, Grazing Allotment Permit Renewals (U.S. Forest Service), 2009 Fire Management Plan, Invasive Plant Management Plan Update, Fuels reductions/forest rehabilitation projects (U.S. Forest Service), High Elevation Aquatic Resources Management Plan, Tuolumne Wild and Scenic River Comprehensive Management Plan, and Tuolumne Meadows Concept Plan could improve the size, integrity, and connectivity of suitable habitat for the Yosemite toad. These actions could have long-term, moderate to major, beneficial effects on suitable habitat, depending upon the extent of their implementation over time.

Projects that could have a potentially adverse effect on the Yosemite toad include the Parkwide Communication Data Network, Tioga Road Rehabilitation, and Tuolumne Meadows Water Treatment System Improvements.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on Yosemite toad.

Sierra Nevada yellow-legged frog (*Rana sierrae*)

Suitable habitat for this species occurs in Segments 1 (Merced River above Nevada Fall) and 5 (South Fork Merced River above Wawona) in high elevation lakes, ponds, and streams near the South Fork above Wawona. The proposed actions within these segments are primarily ecological restoration actions, and thus would result in direct and indirect negligible effects to the Sierra Nevada yellow-legged frog. Meadow restoration, cease of pack stock grazing, and re-routing trails outside of sensitive meadow habitat would result in beneficial effect to the Sierra Nevada yellow-legged frog as these habitats often form direct connections to other aquatic habitats (e.g., lakes and streams). Meadow restoration at the Merced Lake High Sierra Camp area would result in beneficial effect to Sierra Nevada yellow-legged frog.

Overall, effect of the Preferred Alternative on Sierra Nevada yellow-legged frog is expected to be long-term, local and beneficial.

Cumulative Effects. Projects that have an appreciable effect on high-elevation aquatic habitats are most likely to affect the Sierra Nevada yellow-legged frog. Regional and park-wide planning efforts such as the Vegetation Management Plan, General Ecological Restoration, Grazing Allotment Permit Renewals (U.S. Forest Service), 2009 Fire Management Plan, Invasive Plant Management Plan Update, Fuels reductions/forest rehabilitation projects (U.S. Forest Service), High Elevation Aquatic

Resources Management Plan, Tuolumne Wild and Scenic River Comprehensive Management Plan, and Tuolumne Meadows Concept Plan could improve water quality and habitat for the Sierra Nevada yellow-legged frog. These actions could have long-term, moderate to major, beneficial effects on suitable habitat, depending upon the extent of their implementation over time.

Projects that could have a potentially adverse effect on the Sierra Nevada yellow-legged frog include the Parkwide Communication Data Network, Tioga Road Rehabilitation, and Tuolumne Meadows Water Treatment System Improvements.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on Sierra Nevada yellow legged frog.

California wolverine (*Gulo gulo luteus*)

Direct and Indirect Effects. Wolverines typically inhabit semi-open terrain at or above the timberline from spring through fall, and then move to lower-elevation forests in winter. They have been seen in a variety of habitats, including treeless barrens, alpine meadows, and mixed coniferous forests (Thelander et al. 1994). The most important habitat characteristic appears to be a low level of human disturbance (Thelander et al. 1994).

The Merced River corridor supports wolverine habitat in Segments 1 and 5 (Merced River above Nevada Fall and South Fork Merced River above Wawona, respectively). Proposed actions within these two segments primarily involve ecological restoration of meadow habitat. Additionally, given existing low level of development and apparent scarcity of wolverines in the Sierra Nevada, ecological restoration activities at these two segments would be expected to result in negligible effects to the species during restoration activities. Overall, impacts on wolverines under the Preferred Alternative would be beneficial following habitat restoration.

Cumulative Effects. Regional and parkwide planning efforts such as the Vegetation Management Plan, General Ecological Restoration, Grazing Allotment Permit Renewals (U.S. Forest Service) and 2009 Fire Management Plan could provide benefits to the size, integrity, and connectivity of suitable habitat for the California wolverine. These regional plans would have a long-term, moderate, beneficial effect on suitable habitat, depending upon the extent of their implementation over time.

Given the high-elevation occurrence of wolverines and their aversion to human contact, no foreseeable projects would have an effect on this species.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would

have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on California wolverine.

Pacific fisher (*Martes pennanti*)

Direct and Indirect Effects. Fisher habitat in the Merced River Corridor is primarily conifer and mixed conifer forests in Segments 1, 2, 5, and 7 (Merced River above Nevada Fall, Yosemite Valley, South Fork Merced River above Wawona, and Wawona, respectively). Although some suitable habitat for Pacific fisher occurs in Segment 2, this species is highly sensitive to human presence and would not likely utilize habitats in Yosemite Valley. Proposed actions in Segments 1 and 5 are primarily ecological restoration actions, and thus would have a negligible effect on Pacific fishers during implementation and beneficial effect following restoration. Proposed actions in Wawona include removing select campsites and retaining current facilities and services, which would continue to affect wildlife in general. However, there are no proposed actions which would remove suitable fisher habitat (large trees and snags within coniferous or mixed forests).

Proposed actions to manage visitor use and facilities in Segment 2 would occur at Curry Village, Yosemite Village, Housekeeping Camp, Yosemite Lodge, and Camp 4. Potential foraging habitat for Pacific fisher may be affected by proposed construction and reorganization activities in the near-term in these areas, including direct loss of ponderosa pine (34.04 acres) habitat. Near-term actions in Segments 1 at the Merced Lake High Sierra Camp would retain the camp, reduce capacity of beds, and replace flush toilets with composting toilets. In Segment 7, near-term actions would remove campsites that are within the 100-year floodplain or in culturally sensitive areas at the Wawona Campground area. All of these actions would occur near currently developed areas that receive relatively high levels of human disturbance. Because, this species is sensitive to human presence, it is therefore not likely to occur in potentially affected areas Thus, these actions would not likely result in any direct or indirect effects to the Pacific fisher.

Cumulative Effects. Regional and parkwide planning efforts such as the Vegetation Management Plan, General Ecological Restoration, Grazing Allotment Permit Renewals (U.S. Forest Service), 2009 Fire Management Plan, Invasive Plant Management Plan Update, Fuels reductions/forest rehabilitation projects (U.S. Forest Service) could provide benefits to the fisher.

The Utilities Master Plan/East Yosemite Valley Utilities Improvement Plan and Parkwide Communication Data Network, projects may have an adverse effect on fisher habitat.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on Pacific fisher.

Whitebark pine (*Pinus albicaulis*)

Direct and Indirect Effects. Whitebark pine is generally found in high-elevation upper montane and subalpine forests in Segments 1 (Merced River above Nevada Fall) and 5 (South Fork Merced River above Wawona). The proposed actions in Segments 1 and 5 are primarily ecological restoration actions in meadows and wetlands that generally do not require the removal of conifers, and thus would result in no adverse effects to the whitebark pine. Meadow and wetland restoration, cessation of pack stock grazing, and re-routing trails outside of sensitive meadow and wetland habitat in Segments 1 and 5 would result in no beneficial or adverse effects to the whitebark pine as these activities generally occur outside of whitebark pine habitat (forests).

Overall, no adverse or beneficial effect on whitebark pine is expected as a result of the implementation of the Preferred Alternative.

Actions at the Merced Lake High Sierra Camp in Segment 1 would retain the camp, reduce capacity of beds, and replace flush toilets with composting toilets. It is unlikely that proposed actions in Segment 1 would affect whitebark pine because the actions would occur outside the elevation range for whitebark pine.

Cumulative Effects. Whitebark pine is rapidly declining throughout most of its range, and recent monitoring and research results suggest that whitebark pine mortality may be increasing in California due to mountain pine beetle outbreaks (Gibson et al. 2008). Other factors that contribute to whitebark pine decline include white pine blister rust from a fungal pathogen, fire suppression, and climate change (by predisposing trees to insect and pathogen attacks and enabling white pine blister rust to expand to higher elevations) (Millar et al. 2012)

Projects that have an appreciable effect on high-elevation forest habitats are most likely to affect the whitebark pine. Regional and parkwide planning efforts such as the Vegetation Management Plan, General Ecological Restoration, 2009 Fire Management Plan, Invasive Plant Management Plan Update, Fuels reductions/forest rehabilitation projects (U.S. Forest Service), and Tuolumne Wild and Scenic River Comprehensive Management Plan could improve habitat conditions for whitebark pine. Particularly, fire management designed to remove late-successional trees and favor whitebark pine may reduce competition from other conifer species for suitable openings for seed germination. These actions could have long-term, beneficial effects on whitebark pine, depending upon the extent of their implementation over time.

Projects that could have a potentially adverse effect on the whitebark pine include the Parkwide Communication Data Network and Tioga Road Rehabilitation.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on whitebark pine.

California State Endangered Species

Wildlife

Bald eagle (*Haliaeetus leucocephalus*)

Direct and Indirect Effects. Bald eagles are rarely seen within Yosemite and are not known to nest in the park. However, riparian and meadow areas of Yosemite Valley, El Portal, and Wawona may provide foraging habitat for transient eagles. Actions proposed in this plan, such as the restoration of meadow and riparian habitat, would increase the size, integrity, and connectivity of potential habitat for this species. This would have a beneficial impact on potential foraging habitat for the bald eagle. Upland habitats are not the primary habitats used by the bald eagle, and the size of the proposed new developments in Yosemite Valley, El Portal, and Wawona, are relatively small in relation to the range of the bald eagle. Therefore, development and fragmentation in upland habitats would have negligible effects on this species. There would be a relatively large amount of restoration of meadow and riparian habitat in relation to development in upland habitats; therefore, the Preferred Alternative would have an overall long-term, beneficial effect on the bald eagle.

Proposed actions to manage visitor use and facilities in Segment 2 would occur at Curry Village, Yosemite Village, Housekeeping Camp, Yosemite Lodge, and Camp 4. In Segment 7, actions would remove campsites that are within the 100-year floodplain or in culturally sensitive areas at the Wawona Campground area. The facility actions in Segments 2 and 7 would not likely directly or indirectly affect the bald eagle because this species is a rare visitor to the park. Preconstruction surveys would be conducted to ensure no active raptor nest sites are affected by the proposed actions.

Cumulative Effects. Regional and parkwide planning efforts such as the Yosemite Vegetation Management Plan, Invasive Plant Management Plan, Tuolumne Wild and Scenic River Comprehensive Management Plan, Fire Management Plan could improve the size, integrity, and connectivity of suitable habitat for the bald eagle.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on bald eagle.

Great gray owl (*Strix nebulosa*)

Direct and Indirect Effects. In the Sierra Nevada, great gray owls nest in mature red fir, mixed conifer, or lodgepole pine forests near wet meadows or other vegetated openings. Suitable great gray owl habitat occurs in forested areas near meadows within Yosemite Valley and Wawona (Segments 2 and 7, respectively). Although some suitable habitat for great gray owl occurs in Segment 2, this species is highly sensitive to human presence and would not likely utilize habitats in Yosemite Valley.

Overall, the Preferred Alternative would result in beneficial effects to great gray owl and their habitat as a result of a substantial amount of restored high-quality habitat in Yosemite Valley and Wawona.

Cumulative Effects. Projects that have an appreciable effect on mid-elevation forest and meadow habitats are most likely to affect the great gray owl. Regional and parkwide planning efforts such as the Vegetation Management Plan, General Ecological Restoration, Grazing Allotment Permit Renewals (U.S. Forest Service), 2009 Fire Management Plan, Invasive Plant Management Plan Update, Fuels reductions/forest rehabilitation projects (U.S. Forest Service), High Elevation Aquatic Resources Management Plan, Tuolumne Wild and Scenic River Comprehensive Management Plan, and Tuolumne Meadows Concept Plan could improve the size, integrity, and connectivity of suitable foraging and nesting habitat for the great gray owl. These actions could have long-term, beneficial effects on suitable habitat, depending upon the extent of their implementation over time.

Projects that could have a potentially adverse effect on the great gray owl include those that affect forest and meadow habitats, such as the Parkwide Communication Data Network, Tioga Road Rehabilitation, and Tuolumne Meadows Water Treatment System Improvements. The 2009 Fire Management Plan and Fuels reductions/forest rehabilitation projects (U.S. Forest Service) may affect great gray owls during plan implementation.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on great gray owl.

Willow flycatcher (*Empidonax traillii*)

Direct and Indirect Effects. Habitat loss and alteration is likely the greatest cause of willow flycatcher's decline in the west (NatureServe 2009). Within the Sierra Nevada, habitat degradation due to historic and/or ongoing grazing of riparian and meadow habitats appears to be associated with population declines (Siegel et al. 2008). Other threats such as climate change, altered fire regimes, and invasive species can also lead to habitat degradation indirectly. Willow flycatchers are particularly vulnerable to brood parasitism by brown-headed cowbirds (*Molothrus ater*). Willow flycatchers are at greater risk of cowbird brood parasitism where pack stations, corrals, supplemental feed, livestock holding facilities, livestock herds, campgrounds, picnic areas, rural communities or other brown-headed cowbird-associated locations occur within at least 8 km of occupied willow flycatcher sites (Rothstein et al. 1980, Verner and Rothstein 1988). Brownheaded cowbirds are frequently observed in Yosemite taking advantage of unnatural food sources at pack stations, stables, campgrounds, and in park residential areas.

Willow flycatchers have not been observed in Yosemite Valley for over 30 years, and are seen on rare occasions elsewhere in the park. The species is typically found in meadows with a lush growth of willow shrubs. Riparian and meadow restoration within Yosemite Valley and Wawona would increase

the size, integrity, and connectivity of potential habitat for this species and increase the chances for its recolonization.

Proposed actions to manage visitor use and facilities in Segment 2 would occur at Curry Village, Yosemite Village, Housekeeping Camp, Yosemite Lodge, and Camp 4. In Segment 7, actions would remove campsites that are within the 100-year floodplain or in culturally sensitive areas at the Wawona Campground area. The facility actions in Segments 2 and 7 would not likely directly or indirectly affect the willow flycatcher because this species rarely occurs in Yosemite Valley and elsewhere in the park.

Overall, these actions would result in a beneficial effect on the willow flycatcher due to the large amount of suitable habitat that would be restored in Yosemite Valley and Wawona.

Cumulative Effects. Projects that would cause degradation of meadow habitat or increased abundance of brown-headed cowbirds would adversely affect willow flycatchers through respective habitat loss and nest parasitism.

Regional and parkwide planning efforts such as the Yosemite Vegetation Management Plan, Invasive Plant Management Plan, Tuolumne Wild and Scenic River Comprehensive Management Plan, Fire Management Plan could improve the size, integrity, and connectivity of suitable habitat for the willow flycatcher. Implementation of these plans could help restore habitats, control the effects of grazing, and reduce cowbird abundance by reducing fragmentation of forest communities.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on willow flycatcher.

Sierra Nevada bighorn sheep (*Ovis Canadensis sierra*)

Refer to the Federal Endangered Species section, above.

California State Threatened Species

Wildlife

California wolverine (*Gulo gulo luteus*)

Refer to the Federal Candidate Species section, above.

Sierra Nevada red fox (*Vulpes vulpes necator*)

Direct and Indirect Effects. Expansion of non-native lowland red foxes or coyotes into high elevation areas may result in increased competition and potential transmission of harmful diseases and parasites to Sierra Nevada red foxes (Perrine et al. 2010). Interbreeding with non-native red foxes may reduce genetic adaptation to local conditions (Perrine et al. 2010) and damage genetic integrity of the native subspecies. Development and recreation, resulting in increased exposure to humans, vehicles and pets, and possibly facilitating dispersal of non-native red foxes, coyotes and other competitors are additional threats (Perrine et al. 2010). Habituation and begging habits may increase risk of mortality at roads and campgrounds, while fish poisoning disease may result from stocking infected fish for recreational fisheries (Perrine et al. 2010). Diseases from domestic animals, including rabies and distemper, and parasites, such as trematodes, can also cause significant mortality in red fox populations (Perrine et al. 2010). Rodenticides used for vegetation or livestock management purposes may result in secondary poisoning (Perrine et al. 2010). Climate change may reduce or change important habitat features in their boreal environment, such as reduced snowfall (Perrine et al. 2010).

The Merced River corridor supports Sierra Nevada red fox habitat in Segments 1 and 5 (Merced River above Nevada Fall and South Fork Merced River above Wawona). Proposed actions in Segments 1 and 5 are primarily ecological restoration actions, and thus would have negligible, direct and indirect effects on Sierra Nevada red fox during construction and beneficial effect following restoration.

Facility-related actions at the Merced Lake High Sierra Camp in Segment 1 would include reducing capacity of beds and replacing flush toilets with composting toilets. These actions would result in negligible effects on the Sierra Nevada red fox.

Cumulative Effects. Regional and parkwide planning efforts such as the Yosemite Vegetation Management Plan, Invasive Plant Management Plan, Tuolumne Wild and Scenic River Comprehensive Management Plan, Fire Management Plan could improve the size, integrity, and connectivity of suitable habitat for red foxes. These actions could have long-term, beneficial effects on suitable habitat, depending upon the alternatives chosen for implementation and the extent of their implementation over time.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on Sierra Nevada red fox.

Golden eagle (*Aquila chrysaetos*)

Direct and Indirect Effects. The greatest outside threat to golden eagle populations stems from interactions with humans and human-built structures (Steel et al. 2011). In particular, collisions with structures and electrocution by power lines cause the majority of non-natural Golden Eagle deaths (Steel et al. 2011). Such interactions could have detrimental effects to golden eagle populations in

Yosemite. Overall, the relatively intact habitats in Yosemite are beneficial to golden eagles, and recent large fires in the park have likely expanded the area of suitable foraging habitat by providing more open terrain.

Although golden eagles have been seen over most of the park, the areas of potential development under the Preferred Alternative that contain the most suitable habitat include Yosemite Valley and El Portal. The following are assessments of potential effects to golden eagles in these locations:

> ***Yosemite Valle***y – Restoration of meadow and riparian habitats would improve habitat quality for golden eagles under the Preferred Alternative. Even with this restoration, however, the terrain of Yosemite Valley would be marginal habitat for golden eagles, compared to other areas in the park (e.g., Merced River canyon). Effects in Yosemite Valley would be beneficial.
>
> ***El Portal*** – Development of housing, parking, and operations in this location would primarily affect wooded areas near the bottom of the Merced River canyon, which is not preferred golden eagle habitat. Most development would occur in or adjacent to areas with existing or previous development. These factors, coupled with the abundance of golden eagle habitat at higher elevations in the canyon, indicate that the impact on golden eagles under this alternative would be negligible.

Proposed actions to manage visitor use and facilities in Segment 2 would occur at Curry Village, Yosemite Village, Housekeeping Camp, Yosemite Lodge, and Camp 4. Proposed actions would not occur in golden eagle preferred habitat (open terrain and early successional forest and shrub habitats; large trees in open habitats or canyons) and thus would not likely affect golden eagles. Additionally, trees that would potentially serve as suitable golden eagle nesting habitat are generally located near developed sites. Thus, it is not anticipated that golden eagle nest sites would occur in proximity to areas with near-term actions. Preconstruction surveys would be conducted to ensure no active nest sites are affected by the proposed actions. Overall, effects of the Preferred Alternative on golden eagles would be beneficial, due primarily to restoration of habitats in Yosemite Valley.

Cumulative Effects. Regional and parkwide planning efforts such as the Yosemite Vegetation Management Plan, Invasive Plant Management Plan, Tuolumne Wild and Scenic River Comprehensive Management Plan, Fire Management Plan could improve the size, integrity, and connectivity of suitable habitat for golden eagles. These regional plans would have a long-term beneficial effect on golden eagles.

Foreseeable facility development projects that could have an adverse effect on golden eagles include the Crane Flat Utilities, East Yosemite Valley Utilities Improvement Plan, and Wahhoga Indian Cultural Center. These projects, in total, would have a minor, adverse effect on golden eagles, because of the limited area they would affect.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on golden eagle.

American peregrine falcon (*Falco peregrinus anatum*)

Direct and Indirect Effects. Enough high-quality habitat exists in the river corridor to sustain a healthy population of peregrine falcons; primary threats to them include predation on young by golden eagles and great horned owls and competition with ravens for nest sites. Other threats include disturbances posed by helicopters during search and rescue flights or medical evacuations and conflicts between nesting falcons and rock climbers.

The Merced River corridor supports peregrine falcon habitat in Segments 1, 2, 3, 5, and 7. Proposed actions in Segments 1, 3 and 5 are primarily ecological restoration actions, and thus would have a negligible, direct and indirect effect on peregrine falcon during implementation and a beneficial effect following restoration.

Restoration of meadow and riparian habitats in Yosemite Valley would have a beneficial impact on potential foraging habitat for the peregrine falcon. Development in Yosemite Valley associated with the preferred alternative could have a short-term adverse impact during periods of construction. Construction would not take place when the peregrine falcon is nesting or foraging in the vicinity of Cathedral Rocks. Development in forested habitats in Yosemite Valley and Wawona would have a negligible effect on peregrine falcons because this habitat type is abundant in these locations, and the falcon prefers to hunt in open areas such as along cliff faces and over meadows and water.

Proposed actions at the Merced Lake High Sierra Camp in Segment 1 would retain the camp, reduce capacity of beds, and replace flush toilets with composting toilets. Proposed actions in to manage visitor use and facilities in Segment 2 would occur at Curry Village, Yosemite Village, Housekeeping Camp, Yosemite Lodge, and Camp 4. In Segment 7, actions would remove campsites that are within the 100-year floodplain or in culturally sensitive areas at the Wawona Campground area. All of these actions would occur near currently developed areas that receive relatively high levels of human disturbance.

The proposed actions in Segment 2 and 7 would not occur in suitable nesting habitat for peregrine falcons. However, construction-related noise and human presence may cause peregrine falcons to temporarily avoid certain areas for foraging, such as wet meadow and woodland habitats. Actions in Segment 1 are not likely to affect peregrine falcon as these actions would occur outside of peregrine falcon nesting and foraging habitat. Overall, effects of the Preferred Alternative on peregrine falcons would be beneficial, due primarily to restoration of habitats in Yosemite Valley.

Cumulative Effects. Regional and parkwide planning efforts such as the Yosemite Vegetation Management Plan, Invasive Plant Management Plan, Tuolumne Wild and Scenic River Comprehensive Management Plan, Fire Management Plan could improve the size, integrity, and connectivity of suitable habitat for peregrine falcons. These actions could have long-term, beneficial effects on suitable habitat, depending upon the alternatives chosen for implementation and the extent of their implementation over time.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and

spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on peregrine falcon.

Bald eagle (*Haliaeetus leucocephalus*)

Refer to the California State Endangered Species section, above.

California State Rare Species

Plants

Thompkins' sedge (*Carex tompkinsii*)

Direct and Indirect Effects. Habitat for Thompkins' sedge occurs in Segment 4 (El Portal). There would be no direct effects on Thompkins' sedge as a result of the Preferred Alternative. Continued and increased use of the El Portal area could result in indirect adverse effects to this species as a result of increased population and associated foot traffic. Non-native species could be introduced and become established in newly developed areas and spread into Thompkins' sedge habitat. These indirect effects would have a long-term adverse impact on the species.

Cumulative Effects. The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on Thompkins' sedge.

Congdon's woolly-sunflower (*Eriophyllum congdonii*)

Direct and Indirect Effects. Habitat for Congdon's woolly-sunflower occurs in Segment 4 (El Portal). There would be no direct effects on Congdon's woolly-sunflower as a result of the Preferred Alternative. Continued and increased use of the El Portal area could result in indirect adverse effects to this species as a result of increased population and associated foot traffic. Non-native species could be introduced and become established in newly developed areas and spread into Congdon's woolly-sunflower habitat. These indirect effects would have a long-term adverse impact on the species.

Cumulative Effects. The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under

Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on Congdon's woolly sunflower.

Congdon's lewisia (*Lewisia congdonii*)

Direct and Indirect Effects. This species is known from the lower portion of the South Fork of the Merced River, El Portal, and through the lower portions of the Merced River gorge. Continued and increased use of the El Portal and Wawona areas could result in indirect adverse effects to this species through introduction and establishment of non-native species that could out-compete Congdon's lewisia, and through additional foot traffic that could result from an increased residential population. Most Congdon's lewisia plants are found in relatively inaccessible areas that have steep slopes and poison oak. These indirect effects would have a long-term adverse impact on the species.

Cumulative Effects. The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on Congdon's lewisia.

California State Species of Special Concern

Wildlife

Hardhead (*Mylopharodon conocephalus*)

Direct and Indirect Effects. In the Sierra Nevada, hardhead is a native fish that inhabit the lower reaches of the Merced River up to the vicinity of El Portal. It requires undisturbed areas of larger middle- and low-elevation streams that support clear, deep pools with sand-gravel-boulder substrates and slow water velocities. Suitable habitat for the hardhead is found in Segments 4, 6, and 7 of the Merced River corridor (El Portal, South Fork Merced River Impoundment, and Wawona, respectively).

The Preferred Alternative in the *Merced River Plan/DEIS* does not propose any actions that would result in adverse or beneficial effects to the hardhead in Segment 6 (the Impoundment area).

Actions that would potentially result in adverse effects to the hardhead and its habitat include construction of new park facilities and infrastructure (e.g., parking lots and high density employee housing) in Segments 4 and 7. These actions would have a negligible adverse impact because of the limited area that would be involved, the existing human disturbance in the area, and construction outside of suitable habitat for the hardhead (i.e., the Merced River and adjacent riparian habitat within the 100-year floodplain). Additionally, the Preferred Alternative would also restore significant

amounts of riparian habitat in Segments 4 and 7. These restorative actions would have long-term beneficial effects on hardhead due to increased productivity of the river ecosystem and enhanced water quality of the Merced River.

Cumulative Effects. Projects that have an appreciable effect on montane riparian and riverine habitats are most likely to affect the hardhead. Regional and park-wide planning efforts such as the Vegetation Management Plan, General Ecological Restoration, Grazing Allotment Permit Renewals (U.S. Forest Service), 2009 Fire Management Plan, Invasive Plant Management Plan Update, Fuels reductions/forest rehabilitation projects (U.S. Forest Service), High Elevation Aquatic Resources Management Plan, Tuolumne Wild and Scenic River Comprehensive Management Plan, and Tuolumne Meadows Concept Plan could increase the productivity of the Merced River, enhance river complexity, and maintain good water quality. These actions could have long-term beneficial effects on suitable habitat for the hardhead, depending upon the extent of their implementation over time.

Projects that could have a potentially adverse effect on the hardhead include the Parkwide Communication Data Network, Tioga Road Rehabilitation, and Tuolumne Meadows Water Treatment System Improvements.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on hardhead.

Northern goshawk (*Accipiter gentilis*)

Direct and Indirect Effects. The northern goshawk breeds in most mountain areas, where they generally remain through the winter. Their preferred habitat is moderately dense coniferous forests broken by meadows and other openings, between 5,000 and 9,000 feet elevation. Segments 1 and 5 (Merced River above Nevada Fall and South Fork Merced River above Wawona, respectively) support this species.

The Preferred Alternative would restore meadows within Segments 1 and 5 and would result in negligible adverse effects to the northern goshawk during restoration. Meadow restoration, cessation of pack stock grazing, and re-routing trails outside of sensitive meadow habitat would result in long-term beneficial effects on the northern goshawk as foraging habitat within meadows would improve over time.

Proposed actions at the Merced Lake High Sierra Camp in Segment 1 would retain the camp, reduce capacity of beds, and replace flush toilets with composting toilets. These actions would result in a negligible beneficial impact on northern goshawk in Segment 1by reducing stresses from visitor use.

Cumulative Effects. Projects that have an appreciable effect on high-elevation forest and meadow habitats are most likely to affect the northern goshawk. Regional and parkwide planning efforts such as the Vegetation Management Plan, General Ecological Restoration, Grazing Allotment Permit

Renewals (U.S. Forest Service), 2009 Fire Management Plan, Invasive Plant Management Plan Update, Fuels reductions/forest rehabilitation projects (U.S. Forest Service), High Elevation Aquatic Resources Management Plan, Tuolumne Wild and Scenic River Comprehensive Management Plan, and Tuolumne Meadows Concept Plan could improve the size, integrity, and connectivity of suitable habitat for the northern goshawk. These actions could have long-term, beneficial effects on suitable habitat, depending upon the extent of their implementation over time.

Projects that could have a potentially adverse effect on the northern goshawk include those that affect forest and meadow habitats, such as the Parkwide Communication Data Network, Tioga Road Rehabilitation, and Tuolumne Meadows Water Treatment System Improvements. The 2009 Fire Management Plan and Fuels reductions/forest rehabilitation projects (U.S. Forest Service) could temporarily affect northern goshawks during plan implementation.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on northern goshawk.

Long-eared owl (*Asio otus*)

Direct and Indirect Effects. Given the rarity of observations in Yosemite Valley, and the age of the last confirmed nesting there, it is possible that increasing human disturbance has affected use of Valley habitats by long-eared owls, especially in meadow and riparian habitats. Long-eared owl habitat is largely intact in the park, except for localized habitat destruction from roads and development. Suitable habitat for the long-eared owl is found in most segments of the Merced River corridor (Segments 2, 3, 4, 6, 7, and 8) west of Nevada Fall and the impoundment area.

The proposed actions within segments 3, 6, and 8 under the Preferred Alternative primarily involve ecological restoration or maintaining current types of uses. Thus, impacts to the long-eared owl as a result of these actions would be long-term, local, and beneficial. Additionally, the Preferred Alternative would also restore montane riparian, wet meadow, oak woodland, and aquatic habitats in Segments 2, 4, and 7. These restorative actions would have long-term, beneficial effects on long-eared owls.

Under the Preferred Alternative in the *Merced River Plan/DEIS*, actions that would have adverse effects on potential long-eared owl habitat include construction of new park facilities and infrastructure (e.g., campgrounds, roundabouts, pedestrian under-crossing, parking lots, and high density employee housing) in Segments 2, 4 and 7. Long-eared owl habitat would be affected by proposed actions to manage visitor use and facilities in Segment 2 at Curry Village, Camp 6 Yosemite Village, and Yosemite Lodge and Camp 4; and by removal of campsites that are within the 100-year floodplain or in culturally sensitive areas at the Wawona Campground in Segment 7. Construction activities in Segment 2 could indirectly affect long-eared owl due to disturbance associated with

removal, restoration, and construction of new facilities. Potential foraging habitat for long-eared owl in Segment 2 would be affected, including direct loss of ponderosa pine (34.04 acres), montane riparian (0.81 acres), and montane hardwood (1.73 acres) habitat. Tree removal associated with the construction of new facilities in Segment 2 would remove potential suitable roosts or perches for owls. However, the location of trees planned for removal are in proximity to existing developed sites, and thus would not likely serve as nest sites for long-eared owls. Heavy construction equipment and an increase in human presence in Segments 2 and 7 would temporarily cause long-eared owls to relocate or avoid the area for foraging. Pre-construction surveys for long-eared owl nests would be conducted prior to the implementation of proposed actions in Segments 2 and 7 to ensure that no active owl nest sites could be affected. Additionally, older trees and snags would be retained in Segment 2 for long-eared owl habitat where possible. In summary, proposed actions related to managing visitor use and facilities in Segments 2, 4 and 7 would have adverse effects on long-eared owls as a result of construction-related disturbances to foraging habitat.

Overall, there would be a long-term beneficial impact on the long-eared owl as a result of a substantial amount of restored high-quality habitat in Yosemite Valley, El Portal, and Wawona areas.

Cumulative Effects. Regional and park-wide planning efforts such as the Vegetation Management Plan, General Ecological Restoration, Grazing Allotment Permit Renewals (U.S. Forest Service), 2009 Fire Management Plan, Invasive Plant Management Plan Update, Fuels reductions/forest rehabilitation projects (U.S. Forest Service) could provide benefits to the long-eared owl.

The Utilities Master Plan/East Yosemite Valley Utilities Improvement Plan and Parkwide Communication Data Network projects may have an adverse effect on long-eared owl habitat.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on long eared owl.

Vaux's swift (*Chaetura vauxi*)

Direct and Indirect Effects. Vaux's swift habitat occurs in forested areas near meadows within Yosemite Valley and Wawona (Segments 2 and 7, respectively). It inhabits redwood and Douglas-fir habitats and utilizes large hollow trees and snags, and prefers tall, burned-out stubs as nest sites. Vaux's swifts forage in a variety of habitats, especially over water, including riparian habitats. The Preferred Alternative would restore a variety of habitats, including those used by Vaux's swift such as montane riparian and coniferous forest, in Segments 2 and 7. These restorative actions would have long-term, beneficial effects on Vaux's swift.

Under the Preferred Alternative in the *Merced River Plan/DEIS*, actions that would have adverse effects on potential Vaux's swift habitat include construction of new park facilities and infrastructure (e.g., campgrounds, roundabouts, pedestrian under-crossing, and parking lots) in Segment 2

(Yosemite Valley). Vaux's swift habitat would be affected by proposed actions to manage visitor use and facilities in Segment 2 at Camp 6Yosemite Village, including construction and restoration activities associated with formalizing parking lots, moving parking lots away from riparian areas, construction of new parking spaces, and construction of a pedestrian underpass and a roundabout. Indirect effects to Vaux's swift would result from disturbance associated with construction activities. Potential foraging habitat for Vaux's swift would be affected, including direct loss of montane riparian habitat (0.81 acres). Habitat and tree removal associated with the construction of new facilities would remove potential suitable perches for swifts. However, the location of trees planned for removal is typically located in proximity to existing developed sites that receive relatively high levels of human disturbance. Heavy construction equipment and an increase in human presence would temporarily cause Vaux's swifts to relocate or avoid the area for foraging. Pre-construction surveys for Vaux's swift nests would be conducted prior to the implementation of proposed actions in Segment 2 to ensure that no active nest sites could be affected. In summary, proposed actions related to managing visitor use and facilities in Segment 2 would have long-term, adverse effects on Vaux's swifts as a result of construction-related disturbances to foraging habitat. Overall, there would be a long-term beneficial impact on the Vaux's swift as a result of a substantial amount of restored high-quality habitat in Yosemite Valley and Wawona.

Cumulative Effects. Projects that have an appreciable effect on mid-elevation forest and meadow habitats are most likely to affect the Vaux's swift. Regional and parkwide planning efforts such as the Vegetation Management Plan, General Ecological Restoration, Grazing Allotment Permit Renewals (U.S. Forest Service), 2009 Fire Management Plan, Invasive Plant Management Plan Update, Fuels reductions/forest rehabilitation projects (U.S. Forest Service), High Elevation Aquatic Resources Management Plan, Tuolumne Wild and Scenic River Comprehensive Management Plan, and Tuolumne Meadows Concept Plan could improve the size, integrity, and connectivity of suitable foraging habitat for the Vaux's swift. These actions could have long-term, beneficial effects on suitable habitat, depending upon the extent of their implementation over time.

Projects that could have a potentially adverse effect on the Vaux's swift include those that affect forest, meadow, and aquatic habitats, such as the Parkwide Communication Data Network, Tioga Road Rehabilitation, and Tuolumne Meadows Water Treatment System Improvements. The 2009 Fire Management Plan and Fuels reductions/forest rehabilitation projects (U.S. Forest Service) may affect Vaux's swift during plan implementation.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on Vaux's swift.

Northern harrier (*Circus cyaneus*)

Direct and Indirect Effects. Northern harrier habitat occurs in open grassland, meadows, and wetlands within segments 2 and 7 (Yosemite Valley and Wawona, respectively). The Preferred

Alternative would restore large areas of habitat suitable for northern harrier, including wet meadows in Yosemite Valley and Wawona. These restorative actions would have beneficial effects on northern harrier as foraging and nesting habitat for this species would improve (in size, integrity, and continuity) over time.

Under the Preferred Alternative in the *Merced River Plan/DEIS*, actions that would have adverse effects on potential northern harrier habitat include construction of new park facilities and infrastructure (e.g., campgrounds, roundabouts, pedestrian under-crossing, and parking lots) in Segments 2 and 7 (Yosemite Valley and Wawona, respectively). The proposed actions in Segment 2 and 7 would not occur in suitable nesting habitat for northern harrier. However, construction-related noise and human presence may cause northern harriers to temporarily avoid certain areas for foraging, causing negligible adverse impacts on this species.

Overall, there would be a long-term beneficial impact on the northern harrier as a result of a substantial amount of restored high-quality habitat in Yosemite Valley and Wawona.

Cumulative Effects. Projects that have an appreciable effect on meadow and grassland habitats are most likely to affect the northern harrier. Regional and parkwide planning efforts such as the Vegetation Management Plan, General Ecological Restoration, Grazing Allotment Permit Renewals (U.S. Forest Service), 2009 Fire Management Plan, Invasive Plant Management Plan Update, Fuels reductions/forest rehabilitation projects (U.S. Forest Service), High Elevation Aquatic Resources Management Plan, Tuolumne Wild and Scenic River Comprehensive Management Plan, and Tuolumne Meadows Concept Plan could improve the size, integrity, and connectivity of suitable foraging habitat for the northern harrier. These actions could have long-term, beneficial effects on suitable habitat, depending upon the extent of their implementation over time.

Projects that could have a potentially adverse effect on the northern harrier include those that affect meadows, wetlands, and grassland habitats, such as the Parkwide Communication Data Network, Tioga Road Rehabilitation, and Tuolumne Meadows Water Treatment System Improvements.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on northern harrier.

Olive-sided flycatcher (*Contopus cooperi*)

Direct and Indirect Effects. Olive-sided flycatcher habitat occurs in forest and woodland habitats below 9,000 feet. It prefers mixed conifer, montane hardwood-conifer, Douglas-fir, redwood, red fir, and lodgepole pine habitats for nesting. Olive-sided flycatchers prefer unobstructed airspace within openings and over forest canopies with exposed perches for foraging. Suitable habitat for this species occurs in Segments 1, 2, 5, and 7 (Merced River above Nevada Fall, Yosemite Valley, South Fork Merced River above Wawona, and Wawona, respectively).

The proposed actions in Segments 1 and 5 are primarily ecological restoration actions in meadows and wetlands that would result in negligible adverse effects to the olive-sided flycatcher during construction as these restoration activities occur outside of preferred flycatcher nesting habitat. Meadow and wetland restoration, cessation of pack stock grazing, and re-routing trails outside of sensitive meadow habitat would result in long-term beneficial impacts to foraging habitat for the olive-sided flycatcher.

The Preferred Alternative would restore large areas of suitable foraging habitat for the olive-sided flycatcher in Segments 2 (Yosemite Valley) and 7 (Wawona), including meadows within forest openings. These restorative actions would have beneficial effects on olive-sided flycatcher as foraging habitat for this species would improve (in size, integrity, and continuity) over time.

Under the Preferred Alternative in the *Merced River Plan/DEIS*, actions that would have adverse effects on potential olive-sided flycatcher habitat include construction of new park facilities and infrastructure (e.g., campgrounds, roundabouts, pedestrian under-crossing, and parking lots) in Segments 2 and 7 (Yosemite Valley and Wawona, respectively).Olive-sided flycatcher foraging habitat would be affected by proposed actions to manage visitor use and facilities in Segment 2 at Yosemite Village Day-use Parking Area, including construction and restoration activities associated with formalizing parking lots, moving parking lots away from riparian areas, construction of new parking spaces, and construction of a pedestrian underpass and a roundabout. Indirect effects to olive-sided flycatcher would result from disturbance associated with construction activities. Potential foraging habitat for olive-sided flycatcher would be affected, including direct loss of montane riparian habitat (0.81 acres). Habitat and tree removal associated with the construction of new facilities would remove potential suitable perches for flycatchers. However, the location of trees planned for removal is typically located in proximity to existing developed sites that receive relatively high levels of human disturbance. Heavy construction equipment and an increase in human presence would temporarily cause olive-sided flycatchers to relocate or avoid the area for foraging. Pre-construction surveys for olive-sided flycatcher nests would be conducted prior to the implementation of proposed actions in Segment 2 to ensure that no active nest sites could be affected. In summary, proposed actions related to managing visitor use and facilities in Segment 2 would have adverse effects on olive-sided flycatcher as a result of construction-related disturbances to foraging habitat.

Overall, the Preferred Alternative would result in long-term beneficial effects on olive-sided flycatcher as a result of a substantial amount of restored high-quality habitat in Yosemite Valley and Wawona.

Cumulative Effects. Projects that have an appreciable effect on forest, woodland, and meadow habitats are most likely to affect the olive-sided flycatcher. Regional and parkwide planning efforts such as the Vegetation Management Plan, General Ecological Restoration, Grazing Allotment Permit Renewals (U.S. Forest Service), 2009 Fire Management Plan, Invasive Plant Management Plan Update, Fuels reductions/forest rehabilitation projects (U.S. Forest Service), High Elevation Aquatic Resources Management Plan, Tuolumne Wild and Scenic River Comprehensive Management Plan, and Tuolumne Meadows Concept Plan could improve the size, integrity, and connectivity of suitable foraging habitat for the olive-sided flycatcher. These actions could have long-term, beneficial effects on suitable habitat, depending upon the extent of their implementation over time.

Projects that could have a potentially adverse effect on the olive-sided flycatcher include those that affect forest, woodland, and open meadow habitats, such as the Parkwide Communication Data Network, Tioga Road Rehabilitation, and Tuolumne Meadows Water Treatment System Improvements.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on olive-sided flycatcher.

Black swift (*Cypseloides niger*)

Direct and Indirect Effects. Black swift nest sites are located in moist crevices, caves or on cliffs behind or adjacent to waterfalls in deep canyons. The Preferred Alternative would not result in direct or indirect adverse effects on nesting habitat for the black swift. It forages in various habitats. Suitable foraging habitat for this species occurs in Segment 2 (Yosemite Valley).

The Preferred Alternative would restore large areas of suitable foraging habitat for the black swift in Segment 2 (Yosemite Valley), including meadows and riparian habitats. These restorative actions would have beneficial effects on black swift as foraging habitat for this species improves over time (in size, integrity, and continuity).

Under the Preferred Alternative in the *Merced River Plan/DEIS*, actions that would have potential adverse effects on foraging habitat for black swift include construction of new park facilities and infrastructure (e.g., campgrounds, roundabouts, pedestrian under-crossing, and parking lots) in Yosemite Valley. These actions would have a negligible adverse impact because of the limited area that would be involved, the existing human disturbance in the area, and the large area of suitable, unaffected habitat that would continue to exist in surrounding areas. Additionally, all actions occur outside of black swift preferred nesting habitat (behind waterfalls).

Overall, the Preferred Alternative would result in long-term beneficial effects on black swift as a result of a substantial amount of restored high-quality habitat in Yosemite Valley.

Cumulative Effects. Projects that have an appreciable effect to meadow, wetlands, and riparian habitats are most likely to affect the black swift as they forage in a variety of habitats. However, most actions would not affect black swift nesting habitat due to their specialized requirements. Regional and parkwide planning efforts such as the Vegetation Management Plan, General Ecological Restoration, Grazing Allotment Permit Renewals (U.S. Forest Service), 2009 Fire Management Plan, Invasive Plant Management Plan Update, Fuels reductions/forest rehabilitation projects (U.S. Forest Service), High Elevation Aquatic Resources Management Plan, Tuolumne Wild and Scenic River Comprehensive Management Plan, and Tuolumne Meadows Concept Plan could improve the size, integrity, and connectivity of suitable foraging habitat for the black swift. These actions could have long-term, beneficial effects on suitable habitat, depending upon the extent of their implementation over time.

Projects that could have a potentially adverse effect on the black swift include those that affect meadow, wetlands, and riparian/woodland habitats, such as the Parkwide Communication Data Network, Tioga Road Rehabilitation, and Tuolumne Meadows Water Treatment System Improvements.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on black swift.

Yellow warbler (*Setophaga petechia*)

Direct and Indirect Effects. The yellow warbler prefers riparian woodlands, but also breeds in chaparral, ponderosa pine, and mixed conifer habitats with substantial amounts of brush. Suitable habitat for the yellow warbler occurs in all segments (Segments 1-8) within the Merced River corridor.

The Preferred Alternative would restore large tracts of previously disturbed meadow, riparian, coniferous and broadleaf forest, and Valley oak woodland habitats, primarily in Yosemite Valley, El Portal, and Wawona, totaling approximately 203 acres of habitat. Removal of campgrounds and park facilities located within 100 feet of the river and restoring these areas would increase the amount, integrity, and contiguity of habitat for this species. This would improve suitable habitat for the yellow warbler. These restorative actions would have beneficial effects on yellow warbler as foraging habitat for this species improves over time (in size, integrity, and continuity).

Under the Preferred Alternative in the *Merced River Plan/DEIS*, actions that would have potential adverse effects to yellow warbler include construction of new park facilities and infrastructure (e.g., campgrounds, roundabouts, pedestrian under-crossing, employee housing, and parking lots) in Yosemite Valley, El Portal, and Wawona.

Yellow warbler habitat would be affected by proposed actions to manage visitor use and facilities in Segment 2 at Yosemite Village Day-use Parking Area, including construction and restoration activities associated with formalizing parking lots, moving parking lots away from riparian areas, construction of new parking spaces, and construction of a pedestrian underpass and a roundabout. Indirect effects to yellow warbler would result from disturbance associated with construction activities. Potential foraging habitat for yellow warbler would be affected, including direct loss of montane riparian habitat (0.81 acres). Habitat and tree removal associated with the construction of new facilities would remove potential suitable perches for warblers. However, the location of trees planned for removal is typically located in proximity to existing developed sites that receive relatively high levels of human disturbance. Heavy construction equipment and an increase in human presence would temporarily cause yellow warblers to relocate or avoid the area for foraging. Pre-construction surveys for yellow warbler nests would be conducted prior to the implementation of proposed actions in Segment 2 to ensure that no active nest sites could be affected. In summary, proposed actions related to managing

visitor use and facilities in Segment 2 would have adverse effects on yellow warbler as a result of construction-related disturbances to foraging habitat.

The overall, long-term effect on yellow warblers under the Preferred Alternative in the *Merced River Plan/DEIS* would be beneficial, primarily due to the restoration of highly suitable riparian habitat and the prohibition of new development within the 100-year floodplain of the Merced River.

Cumulative Effects. Projects that substantially affect riparian woodland, chaparral, ponderosa pine, and mixed conifer habitats would likely affect the yellow warbler. Regional and parkwide planning efforts such as the Vegetation Management Plan, General Ecological Restoration, Grazing Allotment Permit Renewals (U.S. Forest Service), 2009 Fire Management Plan, Invasive Plant Management Plan Update, Fuels reductions/forest rehabilitation projects (U.S. Forest Service), High Elevation Aquatic Resources Management Plan, Tuolumne Wild and Scenic River Comprehensive Management Plan, and Tuolumne Meadows Concept Plan could improve the size, integrity, and connectivity of suitable foraging and nesting habitat for the yellow warbler. These actions could have long-term, beneficial effects on suitable habitat, depending upon the extent of their implementation over time.

Projects that could have a potentially adverse effect on the yellow warbler include those that affect riparian/woodland and forest habitats, such as the Parkwide Communication Data Network and Tioga Road Rehabilitation Project.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on yellow warbler.

Harlequin duck (*Histrionicus histrionicus*)

Direct and Indirect Effects. Harlequin ducks are very rarely seen in Yosemite, possibly due to human disturbance in riparian areas that provide cover for nest sites and broods. Nests are established near swift rivers or streams in recesses sheltered overhead by stream banks, rocks, woody debris, or low shrubs. Nests are usually within 7 feet of the water, but can be up to 90 feet away. Although they are rare within Yosemite, potential suitable habitat for the harlequin duck occurs in all segments (Segments 1-8) within the Merced River corridor.

The Preferred Alternative would restore large tracts of previously disturbed meadow, riparian, coniferous and broadleaf forest, and Valley oak woodland habitats, primarily in Yosemite Valley, El Portal, and Wawona, totaling approximately 203 acres of habitat. Restoration of riparian habitat would improve and increase the amount of suitable habitat for the harlequin duck. Removal of campgrounds and park facilities located within 100 feet of the river and restoring these areas would increase the amount, integrity, and contiguity of habitat for this species. These restorative actions would have beneficial effects on the harlequin duck as nesting and foraging habitat for this species improves over time (in size, integrity, and continuity).

Under the Preferred Alternative in the *Merced River Plan/DEIS*, actions that would have potential adverse effects to the harlequin duck include construction of new park facilities and infrastructure (e.g., campgrounds, roundabouts, pedestrian under-crossing, employee housing, and parking lots) in Yosemite Valley, El Portal, and Wawona. These actions would have a negligible adverse impact because of the limited area that would be involved, the existing human disturbance in the area, and the large area of suitable, unaffected habitat that would continue to exist in surrounding areas. Additionally, proposed new campgrounds and park facilities would be constructed outside of the 100-year floodplain to further avoid impacts to intact riparian habitat.

The overall, long-term effect on the harlequin duck under the Preferred Alternative in the *Merced River Plan/DEIS* would be beneficial, primarily due to the restoration of highly suitable riparian habitat and the prohibition of new development within the 100-year floodplain of the Merced River.

Cumulative Effects. Foreseeable projects that could have beneficial effects on the harlequin duck and its habitat include regional and parkwide planning efforts such as the Vegetation Management Plan, General Ecological Restoration, Grazing Allotment Permit Renewals (U.S. Forest Service), 2009 Fire Management Plan, Invasive Plant Management Plan Update, Fuels reductions/forest rehabilitation projects (U.S. Forest Service), High Elevation Aquatic Resources Management Plan, Tuolumne Wild and Scenic River Comprehensive Management Plan, and Tuolumne Meadows Concept Plan. These actions could have long-term, beneficial effects on suitable habitat for harlequin duck, depending upon the extent of their implementation over time.

Projects that could have a potentially adverse effect on the harlequin duck include those that affect riparian woodland habitat, such as the Parkwide Communication Data Network and Tioga Road Rehabilitation Projects.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on harlequin duck.

California spotted owl (*Strix occidentalis occidentalis*)

Direct and Indirect Effects. California spotted owl occurs in oak and ponderosa pine forests to lower elevation red fir forests up to 7,600 feet in elevation; preferred elevation is ranges between 3,000 and 7,000 feet. Tree cavities, broken-off trees and snags, abandoned nests of other species, or mistletoe clumps are used as nesting sites. California spotted owl requires dense forest, with a canopy closure of greater than 70%. The presence of black oak in the canopy also enhances habitat quality. In the Merced River corridor, suitable spotted owl habitat occurs in mature and old forests with dense canopies in segments 1, 2, 5, and 7 (Merced River above Nevada Fall, Yosemite Valley, South Fork Merced River above Wawona, and Wawona, respectively).

The Preferred Alternative in the *Merced River Plan/DEIS* would restore meadows within Segments 1 and 5, which would result in no effects to the spotted owl as these activities are not conducted within preferred spotted owl habitat. The Preferred Alternative would restore large areas of habitat in Segments 2 (Yosemite Valley) and 7 (Wawona). These restorative actions would have beneficial effects on the spotted owl by potentially increasing the quality and extent of suitable foraging habitat.

Under the Preferred Alternative in the *Merced River Plan/DEIS*, actions that may result in adverse effects to spotted owl habitat include construction of new park facilities and infrastructure (e.g., campgrounds, roundabouts, pedestrian under-crossing, and parking lots) in forest habitats within Segments 2 and 7 (Yosemite Valley and Wawona). California spotted owl habitat would be affected by proposed actions to manage visitor use and facilities in Segment 2 at Curry Village, Yosemite Village, Housekeeping Camp, Yosemite Lodge, and Camp 4. Construction and reorganization activities at these locations could indirectly affect long-eared owl due to disturbance associated with construction activities. Potential habitat for spotted owl would be affected, including direct loss of ponderosa pine (34.04 acres) and montane hardwood (1.73 acres) habitat. Tree removal associated with the construction of new facilities would remove potential suitable roosts or perches for owls. However, the location of trees planned for removal are in proximity to existing developed sites that receive relatively high levels of human disturbance, and thus would not likely serve as nest sites for spotted owls. Heavy construction equipment and an increase in human presence would temporarily cause spotted owls to relocate or avoid the area for foraging. Pre-construction surveys for spotted owl nests would be conducted prior to the implementation of proposed actions in Segment 2 to ensure that no active owl nest sites could be affected. Additionally, older trees and snags would be retained for spotted owl habitat where possible. In summary, proposed actions related to managing visitor use and facilities in Segment 2 would have long-term, adverse effects on spotted owls as a result of construction-related disturbances to foraging and nesting habitat.

Overall, the Preferred Alternative would result in long-term beneficial effects to California spotted owl and their habitat as a result of a substantial amount of restored high-quality habitat in Yosemite Valley and Wawona.

Cumulative Effects. Projects that have an appreciable effect on intermediate to late successional forests with dense canopy closure are most likely to affect the California spotted owl. Regional and parkwide planning efforts such as the Vegetation Management Plan, General Ecological Restoration, 2009 Fire Management Plan, Invasive Plant Management Plan Update, Fuels reductions/forest rehabilitation projects (U.S. Forest Service), and Tuolumne Wild and Scenic River Comprehensive Management Plan, could improve the size, integrity, and connectivity of suitable foraging and nesting habitat for the spotted owl. These actions could have long-term, beneficial effects on suitable habitat, depending upon the extent of their implementation over time.

Projects that could have a potentially adverse effect on the California spotted owl include those that affect forest habitats, such as the Parkwide Communication Data Network and Tioga Road Rehabilitation Projects. The 2009 Fire Management Plan and Fuels reductions/forest rehabilitation projects (U.S. Forest Service) may affect spotted owls during plan implementation.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on California spotted owl.

Pallid bat (*Antrozous pallidus*)

Direct and Indirect Effects. Pallid bats occurs in a variety of habitats including oak woodlands, coniferous forests, riparian woodland, and meadows. This species is quite versatile in its choice of roosting sites and has been documented using tree hollows, rock crevices, caves, abandoned mines, and structures. Suitable habitat for this species occurs in all segments (Segments 1-8) within the Merced River corridor.

The Preferred Alternative would restore approximately 203 acres of previously disturbed meadow, riparian, wetland, coniferous and broadleaf forest, and Valley oak woodland habitat, primarily in Segments 2, 4, and 7. Minor restoration actions would also occur in Segments 1 and 5. These restorative actions would have long-term, beneficial effects on the pallid bat by improving foraging habitat for this species.

Under the Preferred Alternative in the *Merced River Plan/DEIS*, actions that would have potential adverse effects to the pallid bat include construction of new park facilities and infrastructure (e.g., campgrounds, roundabouts, pedestrian under-crossing, employee housing, and parking lots) in Yosemite Valley, El Portal, and Wawona. Pallid bat habitat would be affected by proposed actions to manage visitor use and facilities in Segment 2 at Curry Village, Yosemite Village, Housekeeping Camp, Yosemite Lodge, and Camp 4. Construction and reorganization activities at these locations could indirectly affect pallid bat due to disturbance associated with construction activities. Potential foraging and roosting habitat for pallid bat would be affected, including direct loss of ponderosa pine (34.04 acres), montane hardwood (1.73 acres), montane riparian (0.81 acres), and wet meadow (0.31 acres) habitat. Removal of mature trees with cavities or structures associated with the construction of new facilities would remove potential suitable roosting habitat for pallid bats. Heavy construction equipment and an increase in human presence would temporarily cause pallid bats to relocate or avoid the area for foraging. Pre-construction surveys for pallid bat roosting colonies would be conducted prior to the implementation of proposed actions in Segment 2 to ensure that no colony sites could be affected. Additionally, older trees and snags would be retained for pallid bat habitat where possible. In summary, proposed actions related to managing visitor use and facilities in Segment 2 would have adverse effects on pallid bats as a result of construction-related disturbances to foraging and roosting habitat.

Overall, the Preferred Alternative would result in long-term beneficial impacts on the pallid bat from actions to restore large areas of potential bat foraging habitat in Segments 2, 4, and 7, and to protect bat roosting habitat (trees) within the Merced River floodplain by restricting new development.

Cumulative Effects. Projects that substantially affect riparian woodland, ponderosa pine, and mixed conifer habitats would likely affect the pallid bat. Regional and parkwide planning efforts such as the Vegetation Management Plan, General Ecological Restoration, Grazing Allotment Permit Renewals (U.S. Forest Service), 2009 Fire Management Plan, Invasive Plant Management Plan Update, Fuels reductions/forest rehabilitation projects (U.S. Forest Service), High Elevation Aquatic Resources Management Plan, Tuolumne Wild and Scenic River Comprehensive Management Plan, and Tuolumne Meadows Concept Plan could improve the size, integrity, and connectivity of suitable foraging and roosting habitat for the pallid bat. These actions could have long-term, beneficial effects on suitable habitat, depending upon the extent of their implementation over time.

Projects that could have a potentially adverse effect on the pallid bat include those that affect riparian/woodland and forest habitats, such as the Parkwide Communication Data Network and Tioga Road Rehabilitation Project.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on pallid bat.

Sierra Nevada mountain beaver (*Aplodontia rufa californica*)

Direct and Indirect Effects. Mountain beavers occur in moist meadows and riparian zones near small perennial streams and creeks within the montane zone and require abundant riparian plants for harvesting. Potential suitable habitat for this species occurs in segments 1 and 5 (Merced River above Nevada Fall and South Fork Merced River above Wawona). Proposed actions in Segments 1 and 5 are primarily ecological restoration actions, and thus would have negligible, direct and indirect effects on Sierra Nevada red fox during construction and beneficial effect following restoration.

Cumulative Effects. Projects that substantially affect high elevation riparian woodland and meadow habitats would likely affect the mountain beaver. Regional and parkwide planning efforts such as the Vegetation Management Plan, General Ecological Restoration, Grazing Allotment Permit Renewals (U.S. Forest Service), 2009 Fire Management Plan, Invasive Plant Management Plan Update, Fuels reductions/forest rehabilitation projects (U.S. Forest Service), High Elevation Aquatic Resources Management Plan, Tuolumne Wild and Scenic River Comprehensive Management Plan, and Tuolumne Meadows Concept Plan could improve the size, integrity, and connectivity of suitable foraging and breeding habitat for the mountain beaver. These actions could have long-term, beneficial effects on suitable habitat, depending upon the extent of their implementation over time.

Projects that could have a potentially adverse effect on the mountain beaver include those that affect riparian/woodland and wet meadow habitats, such as the Parkwide Communication Data Network, Tioga Road Rehabilitation, and Tuolumne Meadows Water Treatment System Improvements Projects.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on Sierra Nevada mountain beaver.

Townsend's big-eared bat (*Corynorhinus townsendii townsendii*)

Direct and Indirect Effects. Previous mist-net surveys indicate that the Townsend's big-eared bat occurred in several locations within and adjacent to the Merced River corridor, namely in Yosemite Valley (Mirror Lake), Wawona (near the South Fork of the Merced River), and El Portal (in a barium mine on U.S. Forest Service land). It requires caves, mines, or buildings for roosting and mesic habitats with brush or trees along habitat edges for foraging. Potential suitable habitat for this species occurs in Segments 2, 3, 4, 7, and 8.

The Preferred Alternative would restore approximately 203 acres of previously disturbed meadow, riparian, wetland, coniferous and broadleaf forest, and Valley oak woodland habitats, primarily within Segments 2, 4, and 7. These restorative actions would have long-term, beneficial effects on Townsend's big-eared bat by improving foraging habitat for this species. The proposed actions within segments 3 and 8 under the Preferred Alternative primarily involve ecological restoration or maintaining current types of uses. Thus, impacts to the Townsend's big-eared bat as a result of these actions would be negligible, long-term, local, and beneficial.

Under the Preferred Alternative, actions that would potentially result in adverse effects to the Townsend's big-eared bat and its habitat include removal of select park facilities and construction of new park facilities and infrastructure (e.g., roundabouts, pedestrian under-crossing, parking lots and high density employee housing) in Segments 2, 4 and 7. Townsend's big-eared bat habitat would be affected by proposed actions to manage visitor use and facilities in Segment 2 at Curry Village, Yosemite Village, Housekeeping Camp, Yosemite Lodge, and Camp 4. Construction and reorganization activities at these locations could indirectly affect Townsend's big-eared bat due to disturbance associated with construction activities (removal, restoration, and construction of new facilities). Potential foraging and roosting habitat for Townsend's big-eared bat would be affected, including direct loss of ponderosa pine (34.04 acres), montane hardwood (1.73 acres), montane riparian (0.81 acres), and wet meadow (0.31 acres) habitat. Removal of mature trees with cavities or structures associated with the construction of new facilities would remove potential suitable roosting habitat for Townsend's big-eared bats. Heavy construction equipment and an increase in human presence would temporarily cause bats to relocate or avoid the area for foraging. Pre-construction surveys for Townsend's big-eared bat roosting colonies would be conducted prior to the implementation of proposed actions in Segment 2 to ensure that no colony sites could be affected. Additionally, older trees and snags would be retained for Townsend's big-eared bat habitat where possible. In summary, proposed actions related to managing visitor use and facilities in Segment 2 would have adverse effects on Townsend's big-eared bats as a result of construction-related disturbances to foraging and roosting habitat.

Overall, the Preferred Alternative would result in long-term beneficial impacts on Townsend's big-eared bat from actions to restore large areas of potential bat foraging habitat in Segments 2, 4, and 7, and to protect bat roosting habitat (trees) within the Merced River floodplain by restricting new development.

Cumulative Effects. Regional and park-wide planning efforts such as the Vegetation Management Plan, General Ecological Restoration, Grazing Allotment Permit Renewals (U.S. Forest Service), 2009 Fire Management Plan, Invasive Plant Management Plan Update, Fuels reductions/forest rehabilitation projects (U.S. Forest Service) could provide benefits to the Townsend's big-eared bat.

Foreseeable projects that could have adverse effects on suitable habitat for Townsend's big-eared bats include the Utilities Master Plan/East Yosemite Valley Utilities Improvement Plan and Parkwide Communication Data Network Project.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on Townsend's big-eared bat.

Spotted Bat (*Euderma maculatum*)

Direct and Indirect Effects. There is a significant population of spotted bats in Yosemite Valley that uses meadow and wetland habitats exclusively (as indicated by acoustic data/auditory surveys). It is also present in Wawona. Preferred roosting habitat include high cliff faces, likely on Half Dome and El Capitan. Foraging habitat is primarily meadows and forest edges, or in open coniferous woodland. Suitable habitat for this species occurs in segments 1, 2, 5, and 7 (Merced River above Nevada Fall, Yosemite Valley, South Fork Merced River above Wawona, and Wawona, respectively).

The Preferred Alternative would restore significant amounts of meadow, wetland, coniferous and broadleaf forest, and riparian habitats in Segments 1, 2, 5 and 7. These restorative actions would have long-term, beneficial effects on the spotted bat by improving foraging habitat and enhancing habitat complexity for this species.

Under the Preferred Alternative in the *Merced River Plan/DEIS*, actions that would have potential adverse effects to the spotted bat include construction of new park facilities and infrastructure (e.g., campgrounds, roundabouts, pedestrian under-crossing, and parking lots) primarily in Yosemite Valley and retaining certain services in Wawona. Spotted bat habitat would be affected by proposed actions to manage visitor use and facilities in Segment 2 at Curry Village, Yosemite Village, Housekeeping Camp, Yosemite Lodge, and Camp 4. Construction and reorganization activities at these locations could indirectly affect spotted bat due to disturbance associated with construction activities. Potential foraging habitat for spotted bat would be affected, including direct loss of ponderosa pine (34.04 acres), montane riparian (1.73 acres), and wet meadow (0.31 acres) habitat.

Roosting habitat (cliffs and caves) for spotted bat would not be impacted. Heavy construction equipment and an increase in human presence would temporarily cause bats to avoid the area for foraging. In summary, proposed actions related to managing visitor use and facilities in Segment 2 would have adverse effects on spotted bats as a result of construction-related disturbances to foraging and roosting habitat.

Overall, the Preferred Alternative would result in long-term beneficial impacts on the spotted bat from actions to restore large areas of potential bat foraging habitat in Segments 1, 2, 5, and 7, and to protect bat roosting habitat (trees) within the Merced River floodplain by restricting new development.

Cumulative Effects. Projects that substantially affect coniferous woodland and meadow habitats would likely affect the spotted bat. Regional and parkwide planning efforts such as the Vegetation Management Plan, General Ecological Restoration, Grazing Allotment Permit Renewals (U.S. Forest Service), 2009 Fire Management Plan, Invasive Plant Management Plan Update, Fuels reductions/forest rehabilitation projects (U.S. Forest Service), High Elevation Aquatic Resources Management Plan, Tuolumne Wild and Scenic River Comprehensive Management Plan, and Tuolumne Meadows Concept Plan could improve the size, integrity, and connectivity of suitable foraging habitat for the spotted bat. These actions could have long-term, beneficial effects on suitable habitat, depending upon the extent of their implementation over time.

Projects that could have a potentially adverse effect on the spotted bat include those that affect coniferous woodland and wet meadow habitats, such as the Parkwide Communication Data Network, Tioga Road Rehabilitation, and Tuolumne Meadows Water Treatment System Improvements Projects.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on spotted bat.

Western mastiff bat (*Eumops perotis*)

Direct and Indirect Effects. There is a significant population of western mastiff bats in Yosemite Valley, representing the highest population of the western mastiff bat in any localities surveyed in California. It is also present in Wawona. It roosts in rocky cliffs and canyons and forages in a variety of habitats, primarily meadows and coniferous forests. Suitable foraging habitat for the greater western mastiff bat occurs in Segments 1, 2, 5, and 7.

The Preferred Alternative would restore significant amounts of meadow, wetland, coniferous and broadleaf forest, and riparian habitats in Segments 1, 2, 5 and 7. These restorative actions would have long-term, beneficial effects to the western mastiff bat by improving foraging habitat and enhancing habitat complexity for this species.

Under the Preferred Alternative in the *Merced River Plan/DEIS*, actions that would have potential adverse effects to the western mastiff bat include construction of new park facilities and infrastructure

(e.g., campgrounds, roundabouts, pedestrian under-crossing, and parking lots) primarily in Yosemite Valley and retaining certain services in Wawona. Western mastiff bat habitat would be affected by proposed actions to manage visitor use and facilities in Segment 2 at Curry Village, Yosemite Village, Housekeeping Camp, Yosemite Lodge, and Camp 4. Construction and reorganization activities at these locations could indirectly affect western mastiff bat due to disturbance associated with construction activities. Potential foraging and roosting habitat for western mastiff bat would be affected, including direct loss of ponderosa pine (34.04 acres) and montane hardwood (1.73 acres) habitat. Roosting habitat (rock features) for western mastiff bat would not be impacted. Heavy construction equipment and an increase in human presence would temporarily cause bats to avoid areas for foraging. In summary, proposed actions related to managing visitor use and facilities in Segment 2 would have adverse effects on western mastiff bats as a result of construction-related disturbances to foraging habitat.

Overall, the Preferred Alternative would result in long-term beneficial impacts on the western mastiff bat from actions to restore large areas of potential bat foraging habitat in Segments 1, 2, 5, and 7.

Cumulative Effects. Projects that substantially affect coniferous woodland and meadow habitats would likely affect the greater western mastiff bat. Regional and parkwide planning efforts such as the Vegetation Management Plan, General Ecological Restoration, Grazing Allotment Permit Renewals (U.S. Forest Service), 2009 Fire Management Plan, Invasive Plant Management Plan Update, Fuels reductions/forest rehabilitation projects (U.S. Forest Service), High Elevation Aquatic Resources Management Plan, Tuolumne Wild and Scenic River Comprehensive Management Plan, and Tuolumne Meadows Concept Plan could improve the size, integrity, and connectivity of suitable foraging habitat for the greater western mastiff bat. These actions could have long-term, beneficial effects on suitable habitat, depending upon the extent of their implementation over time.

Projects that could have a potentially adverse effect on the greater western mastiff bat include those that affect coniferous woodland and wet meadow habitats, such as the Parkwide Communication Data Network, Tioga Road Rehabilitation, and Tuolumne Meadows Water Treatment System Improvements Projects.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on western mastiff bat.

Western Red Bat (*Lasiurus blossevillii*)

Direct and Indirect Effects. Western red bats are strongly associated with riparian habitats, but they also occur over a wide variety of habitats including grasslands, shrublands, open woodlands and forests. They roost in trees and less often in shrubs often located in edge habitats adjacent to streams, fields, or urban areas. Potential suitable habitat for the western red bat occurs in all segments of the

Merced River corridor, in trees, hedgerows, and forest edges. However, their occurrence is rare within the Sierra Nevada because the majority of western red bats are concentrated at lower elevations.

The Preferred Alternative would restore approximately 203 acres of previously disturbed meadow, riparian, wetland, coniferous and broadleaf forest, and Valley oak woodland habitat, primarily in Segments 2, 4, and 7. Minor restoration actions would also occur in Segments 1 and 5. This would improve suitable habitat for the western red bat. Removal of campgrounds and park facilities located within 100 feet of the river and restoring these areas would increase the amount, integrity, and contiguity of habitat for the western red bat. These restorative actions would have long-term, beneficial effects on western red bat as foraging habitat for this species improves over time (in size, integrity, and continuity).

Under the Preferred Alternative in the *Merced River Plan/DEIS*, actions that would have potential adverse effects to western red bat include construction of new park facilities and infrastructure (e.g., campgrounds, roundabouts, pedestrian under-crossing, employee housing, and parking lots) in Yosemite Valley, El Portal, and Wawona. Western red bat habitat would be affected by proposed actions to manage visitor use and facilities in Segment 2 at Curry Village, Yosemite Village, Housekeeping Camp, Yosemite Lodge, and Camp 4. Construction and reorganization activities at these locations could indirectly affect western red bat due to disturbance associated with construction activities. Potential foraging and roosting habitat for western red bat would be affected, including direct loss of ponderosa pine (34.04 acres) and montane riparian (0.81 acres) habitat. Removal of mature trees with cavities associated with the construction of new facilities would remove potential suitable roosting habitat for western red bats. Heavy construction equipment and an increase in human presence would temporarily cause western red bats to relocate or avoid the area for foraging. Pre-construction surveys for Western red bat active roosting sites would be conducted prior to the implementation of proposed actions in Segment 2 to ensure that no active roosting sites could be affected. Additionally, older trees and snags would be retained for western red bat habitat where possible. In summary, proposed actions related to managing visitor use and facilities in Segment 2 would have adverse effects on western red bats as a result of construction-related disturbances to foraging and roosting habitat.

Overall, the Preferred Alternative would result in long-term beneficial impacts on the western red bat from actions to restore large areas of potential bat foraging habitat, primarily in Segments 2, 4, and 7, and to protect bat roosting habitat (trees) within the Merced River floodplain by restricting new development. **Cumulative Effects.** Projects that substantially affect riparian woodland habitat would likely affect the western red bat. Regional and park-wide planning efforts such as the Vegetation Management Plan, General Ecological Restoration, Grazing Allotment Permit Renewals (U.S. Forest Service), 2009 Fire Management Plan, Invasive Plant Management Plan Update, Fuels reductions/forest rehabilitation projects (U.S. Forest Service), High Elevation Aquatic Resources Management Plan, Tuolumne Wild and Scenic River Comprehensive Management Plan, and Tuolumne Meadows Concept Plan could improve the size, integrity, and connectivity of suitable foraging and roosting habitat for the western red bat. These actions could have long-term, beneficial effects on suitable habitat, depending upon the extent of their implementation over time.

Projects that could have a potentially adverse effect on the western red bat include those that affect riparian/woodland and forest habitats, such as the Parkwide Communication Data Network and Tioga Road Rehabilitation Project.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on western red bat.

Sierra Nevada snowshoe hare (*Lepus americanus tahoensis*)

Direct and Indirect Effects. Sierra Nevada snowshoe hares are relatively scarce in Yosemite, since this area is apparently at the southern extreme of their range. It occurs in boreal riparian habitats, within thickets of deciduous trees in riparian and conifer forests. Segments 1 and 5 (Merced River above Nevada Fall and South Fork Merced River, respectively) provide suitable habitat for the Sierra Nevada snowshoe hare at high elevations.

The Preferred Alternative would restore meadows and wetlands within Segments 1 and 5, which would result in no adverse or beneficial effects to the Sierra Nevada snowshoe hare as these activities are conducted outside of the preferred foraging and breeding habitat. However, meadow habitats are ecologically linked to adjacent habitats, such as riparian woodland, a suitable habitat for the snowshoe hare. Restoration activities to enhance meadow habitat and improve habitat connectivity would enhance foraging habitat for the snowshoe hare and other wildlife in general.

Overall, effect of the Preferred Alternative on Sierra Nevada snowshoe hare is expected to be negligible, long-term, local and beneficial.

Cumulative Effects. Projects that have an appreciable effect on high-elevation riparian woodland and coniferous forests are most likely to affect the Sierra Nevada snowshoe hare. Regional and park-wide planning efforts such as the Vegetation Management Plan, General Ecological Restoration, Grazing Allotment Permit Renewals (U.S. Forest Service), 2009 Fire Management Plan, Invasive Plant Management Plan Update, Fuels reductions/forest rehabilitation projects (U.S. Forest Service), High Elevation Aquatic Resources Management Plan, Tuolumne Wild and Scenic River Comprehensive Management Plan, and Tuolumne Meadows Concept Plan could improve the size, integrity, and connectivity of suitable habitat for the snowshoe hare. These actions could have long-term, beneficial effects on suitable habitat, depending upon the extent of their implementation over time.

Projects that could have a potentially adverse effect on the snowshoe hare include those that affect riparian and coniferous forest habitats, such as the Parkwide Communication Data Network, Tioga Road Rehabilitation, and Tuolumne Meadows Water Treatment System Improvements.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably

foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on Sierra Nevada snowshoe hare.

Western white-tailed jackrabbit (*Lepus townsendii townsendii*)

Direct and Indirect Effects. Although habitats for the western white-tailed jackrabbit are relatively intact in Yosemite, reported observations of white-tailed jackrabbits are rare. Important foraging habitat for this species includes open alpine and mountain meadows, and open stands of trees with some brush and an herbaceous understory. Segments 1 and 5 (Merced River above Nevada Fall and South Fork Merced River above Wawona) likely provide suitable habitat for the western white-tailed jackrabbit.

The Preferred Alternative would restore meadows and wetlands within Segments 1 and 5 and would result in negligible adverse effects to the white-tailed jackrabbit during restoration. Overgrazing by livestock has been identified as a principal factor in the decline of jackrabbits. Meadow restoration, cessation of pack stock grazing, and re-routing trails outside of sensitive meadow habitat would result in long-term beneficial impacts to the jackrabbit as foraging habitat within meadows would improve over time.

Cumulative Effects. Projects that have an appreciable effect on mid-elevation forest and meadow habitats are most likely to affect the white-tailed jackrabbit. Regional and park-wide planning efforts such as the Vegetation Management Plan, General Ecological Restoration, Grazing Allotment Permit Renewals (U.S. Forest Service), 2009 Fire Management Plan, Invasive Plant Management Plan Update, Fuels reductions/forest rehabilitation projects (U.S. Forest Service), High Elevation Aquatic Resources Management Plan, Tuolumne Wild and Scenic River Comprehensive Management Plan, and Tuolumne Meadows Concept Plan could improve the size, integrity, and connectivity of suitable foraging habitat for the jackrabbit. These actions could have long-term, beneficial effects on suitable habitat, depending upon the extent of their implementation over time.

Projects that could have a potentially adverse effect on the jackrabbit include those that affect forest and meadow habitats, such as the Parkwide Communication Data Network, Tioga Road Rehabilitation, and Tuolumne Meadows Water Treatment System Improvements.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on western white-tailed jackrabbit.

Mount Lyell shrew (*Sorex lyellii*)

Direct and Indirect Effects. The Mount Lyell shrew occurs in wetland and riparian communities and moist habitats near streams, in grass, or under willows. Its limited distribution makes it vulnerable to extirpation. Suitable habitat occurs in wetland communities within segments 1 and 5 (Merced River above Nevada Fall and South Fork Merced River above Wawona, respectively).

The Preferred Alternative would restore meadows and wetlands within Segments 1 and 5 and would result in negligible adverse effects to the Mount Lyell shrew during restoration. However, meadow restoration, cessation of pack stock grazing, and re-routing trails outside of sensitive meadow habitat would result in long-term beneficial impacts to the Mount Lyell shrew as foraging habitat within meadows and wetlands would improve over time.

Cumulative Effects. Projects that have an appreciable effect on high-elevation riparian and meadow habitats are most likely to affect the Mount Lyell shrew. Regional and park-wide planning efforts such as the Vegetation Management Plan, General Ecological Restoration, Grazing Allotment Permit Renewals (U.S. Forest Service), 2009 Fire Management Plan, Invasive Plant Management Plan Update, Fuels reductions/forest rehabilitation projects (U.S. Forest Service), High Elevation Aquatic Resources Management Plan, Tuolumne Wild and Scenic River Comprehensive Management Plan, and Tuolumne Meadows Concept Plan could improve the size, integrity, and connectivity of suitable habitat for the shrew. These actions could have long-term, beneficial effects on suitable habitat, depending upon the extent of their implementation over time.

Projects that could have a potentially adverse effect on the Mount Lyell shrew include those that affect riparian, wetland, and meadow habitats, such as the Parkwide Communication Data Network, Tioga Road Rehabilitation, and Tuolumne Meadows Water Treatment System Improvements.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on Mount Lyell shrew.

American Badger (*Taxidea taxus*)

Direct and Indirect Effects. The American badger occurs in drier open stages of most shrub, forest, and herbaceous habitats, with friable soils. Suitable habitat for the badger occurs in Wawona (Segment 7).

The Preferred Alternative would restore approximately two acres of riparian habitat in Segment 7. These restorative actions would have long-term, beneficial effects on the badger by improving foraging habitat for this species.

Cumulative Effects. Projects that have significant effects on shrub, forest, and other herbaceous habitats are most likely to affect the American badger. Regional and park-wide planning efforts such

as the Vegetation Management Plan, General Ecological Restoration, Grazing Allotment Permit Renewals (U.S. Forest Service), 2009 Fire Management Plan, Invasive Plant Management Plan Update, Fuels reductions/forest rehabilitation projects (U.S. Forest Service), High Elevation Aquatic Resources Management Plan, Tuolumne Wild and Scenic River Comprehensive Management Plan, and Tuolumne Meadows Concept Plan could improve the size, integrity, and connectivity of suitable habitat for the American badger. These actions could have long-term, beneficial effects on suitable habitat, depending upon the extent of their implementation over time.

Projects that could have a potentially adverse effect on the American badger include those that affect forest and shrub habitats, such as the Park-wide Communication Data Network, Tioga Road Rehabilitation, and 2009 Fire Management Plan and Fuels reductions/forest rehabilitation projects (U.S. Forest Service).

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on American badger.

Western pond turtle (*Emys marmorata*)

Direct and Indirect Effects. The western pond turtle requires permanent ponds, rivers, streams, and irrigation ditches that typically have rocky or muddy bottoms and are overgrown with vegetation. Basking areas are required by this species and include partially submerged logs, rocks, mats of vegetation, or open mud banks. Park records show sightings of the western pond turtle in Yosemite Valley and El Portal. Suitable habitat for this species occurs in Yosemite Valley, El Portal, and Wawona (Segments 2, 4, and 7, respectively). However, this species is believed to be extirpated from the Merced River corridor in Yosemite National Park.

Overall, the Preferred Alternative in the *Merced River Plan/DEIS* would have a beneficial impact to the western pond turtle from actions to restore large areas of meadow and riparian habitats in Segments 2, 4, and 7, and to further protect riparian and meadow habitat within the Merced River floodplain by restricting new development. These habitats form direct ecological linkages to suitable western turtle habitat (ponds, rivers, streams, and ditches); thus, actions to restore meadow and riparian habitats would result in beneficial, long-term effects to the western pond turtle.

Cumulative Effects. Projects that substantially affect riparian woodland, meadow, and other aquatic habitats would likely affect the western pond turtle. Regional and parkwide planning efforts such as the Vegetation Management Plan, General Ecological Restoration, High Elevation Aquatic Resources Management Plan, Tuolumne Wild and Scenic River Comprehensive Management Plan, and Tuolumne Meadows Concept Plan could improve the integrity and connectivity of suitable foraging and basking habitat for the western pond turtle. These actions could have long-term, beneficial effects on suitable habitat, depending upon the extent of their implementation over time.

Projects that could have a potentially adverse effect on the western pond turtle include those that affect riparian, wet meadow, and aquatic habitats, such as the Parkwide Communication Data Network, Tioga Road Rehabilitation, and Tuolumne Meadows Water Treatment System Improvements Projects.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on western pond-turtle.

Mount Lyell salamander (*Hydromantes platycephalus*)

Direct and Indirect Effects. Mount Lyell salamander occurs in wet habitats above 4,000 feet. It requires rock fissures or similar crevices for shelter, seeps from streams or melting snow, shade, and low-growing vegetation. Records indicate this species occur in Yosemite Valley in the vicinity of Vernal Fall and Curry Village, at the top of Vernal Fall, near the top of Half Dome, and various parts of Lyell Canyon. Suitable habitat for the Mount Lyell salamander occurs in Segments 1, 2, and 5.

The Preferred Alternative would restore significant amounts of meadow, wetland, and riparian habitats throughout Yosemite Valley. Minor meadow and wetland restoration actions would also occur in Segments 1 and 5. These restorative actions may result in negligible, direct and indirect effects on o the Mount Lyell salamander during restoration; however, in the long-term, these actions would result in beneficial effects to the salamander by improving foraging and breeding habitat for this species.

Under the Preferred Alternative in the *Merced River Plan/DEIS*, actions that would have potential adverse effects to the Mount Lyell salamander include construction of new park facilities and infrastructure (e.g., campgrounds, roundabouts, pedestrian under-crossing, and parking lots) in Yosemite Valley. These actions would have negligible adverse impacts because of the limited amount of habitat impacted, the existing human disturbance in the area, and the large area of suitable, unaffected habitat that would continue to exist in surrounding areas. Additionally, proposed new campgrounds and park facilities would be constructed outside wetlands, meadows, and riparian woodland habitat.

Overall, the Preferred Alternative in the *Merced River Plan/DEIS* would have a beneficial impact to the Mount Lyell salamander from actions to restore large areas of suitable foraging and breeding habitat, and to further protect meadow, wetland, and riparian habitats within the Merced River floodplain by restricting new development.

Cumulative Effects. Projects that substantially affect rocky slopes, seeps adjacent to streams, meadow and wetland habitats would likely affect the Mount Lyell salamander. Regional and parkwide planning efforts such as the Vegetation Management Plan, General Ecological Restoration, 2009 Fire

Management Plan, Invasive Plant Management Plan Update, Fuels reductions/forest rehabilitation projects (U.S. Forest Service), High Elevation Aquatic Resources Management Plan, Tuolumne Wild and Scenic River Comprehensive Management Plan, and Tuolumne Meadows Concept Plan could improve the size, integrity, and connectivity of suitable foraging and breeding habitat for the salamander. These actions could have long-term, beneficial effects on suitable habitat, depending upon the extent of their implementation over time.

Projects that could have a potentially adverse effect on the Mount Lyell salamander include those that affect rocky areas, seeps, talus slopes, and granitic areas adjacent to streams and waterfalls such as the Parkwide Communication Data Network and Tioga Road Rehabilitation Projects. However, due to the specialized habitat needs of this species, most projects would likely not affect the species.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on Mount Lyell salamander.

Foothill yellow-legged frog (*Rana boyllii*)

Direct and Indirect Effects. The few remaining populations of foothill yellow-legged frogs live in or near permanent freshwater rocky streams and rivers in a variety of habitats, including valley-foothill hardwood and conifer, chaparral, and wet meadow types. Recent surveys found no foothill yellow-legged frogs in Yosemite National Park (Fellers and Freel 1995; Fellers 1997) However, potential suitable habitat for this species occurs in Segments 2, 3, 4, 6, 7, and 8. This species is believed to be extirpated from the Merced River corridor in Yosemite National Park.

Overall, the Preferred Alternative in the *Merced River Plan/DEIS* would have a beneficial impact to the foothill yellow-legged frog from actions to restore large areas of suitable foraging and breeding habitat in Segments 2, 4, and 7, and to further protect riparian and meadow habitat within the Merced River floodplain by restricting new development.

Cumulative Effects. Projects that substantially affect riparian woodland and meadow habitats would likely affect the foothill yellow-legged frog. Regional and parkwide planning efforts such as the Vegetation Management Plan, General Ecological Restoration, Grazing Allotment Permit Renewals (U.S. Forest Service), 2009 Fire Management Plan, Invasive Plant Management Plan Update, Fuels reductions/forest rehabilitation projects (U.S. Forest Service), High Elevation Aquatic Resources Management Plan, Tuolumne Wild and Scenic River Comprehensive Management Plan, and Tuolumne Meadows Concept Plan could improve the size, integrity, and connectivity of suitable foraging and breeding habitat for the foothill yellow-legged frog. These actions could have long-term, beneficial effects on suitable habitat, depending upon the extent of their implementation over time.

Projects that could have a potentially adverse effect on the foothill yellow-legged frog include those that affect riparian/woodland and wet meadow habitats, such as the Parkwide Communication Data Network, Tioga Road Rehabilitation, and Tuolumne Meadows Water Treatment System Improvements Projects.

The actions under the Preferred Alternative would have long-term, beneficial effects on special-status species in the Merced River corridor. However, in relation to past, present, and reasonably foreseeable future actions throughout the Sierra Nevada and larger region, (e.g., introduction and spread of nonnative species, direct displacement of habitat) the actions under Alternative 5 would have a minimal beneficial effect. Overall, in conjunction with actions proposed in Alternative 5, cumulative actions on special status species would result in long-term, adverse effects on foothill yellow-legged frog.

Park Rare Species

Plants

Segment 1: Merced River Above Nevada Fall

There are ten park rare plant species that are potentially found in Segment 1: California bolandra (*Bolandra californica*), Mono Hot Springs evening primrose (*Camissonia sierrae* ssp. *alticola*), cleft sedge (*Carex fissuricola*), Yosemite sedge (*Carex sartwelliana*), Bolander's woodreed (*Cinna bolanderi*), common mare's tail (*Hippuris vulgaris*), redray alpinegold (*Hulsea heterochroma*), western quillwort (*Isoetes occidentalis*), Coleman's piperia (*Piperia colemanii*), and Oregon saxifrage (*Saxifraga oregona*).

Special status plants may be adversely affected in the short term by construction/removal, restoration, and monitoring activities associated with management actions proposed in the Preferred Alternative in Segment 1. Proposed actions in the near-term at the Merced Lake High Sierra Camp in Segment 1 would retain the Merced Lake High Sierra Camp, reduce the camp capacity, and replace flush toilets with composting toilets. Potential adverse impacts include temporary disturbance and loss of habitat, potential loss of individual plants or populations, and the potential introduction and spread of invasive nonnative species. Adhering to proposed mitigation measures presented in Appendix I and avoiding the removal of vegetation, where possible, would minimize these short-term impacts. Overall, the Preferred Alternative would result in long-term, beneficial impacts on special status plants in Segment 1 by reducing stresses from visitor use.

Segment 2: Yosemite Valley

There are 26 park rare plant species that are potentially found in Yosemite Valley: Lemmon's wild ginger (*Asarum lemmonii*), threadleaf beakseed (*Bulbostylis capillaris*), Sierra suncup (*Camissonia sierrae* ssp. *sierrae*), Buxbaum's sedge (*Carex buxbaumii*), Yosemite sedge (*Carex sartwelliana*), short-bracted bird's beak (*Cordylanthus rigidus* ssp. *brevibracteatus*), stream orchid (*Epipactis gigantea*), purple fawnlily (*Erythronium purpurascens*), northern mannagrass (*Glyceria borealis*), redray alpinegold (*Hulsea heterochroma*), Sierra laurel (*Leucothoe davisiae*), false pimpernel (*Linderia dubia*

var. *anagallidea*), tanoak (*Lithocarpus densiflorus* var. *echinoides*), small flowered monkeyflower (*Mimulus inconspicuus*), cutleaf monkeyflower (*Mimulus lacinatus*), yellowlip pansy monkeyflower (*Mimulus pulchellus*), California bog asphodel (*Narthecium californicum*), azure penstemon (*Penstemon azureus* ssp. *angustissimus*), Purdy's foothill penstemon (*Penstemon heterophyllus* var. *purdyi*), tansy leafed phacelia (*Phacelia tanacetifolia*), Torrey's popcornflower (*Plagiobothrys torreyi* var. *torreyi*), Nutall's pondweed (*Potamogeton epihydrus* ssp. *nuttallii*), wood saxifrage (*Saxifraga mertensiana*), Oregon saxifrage (*Saxifraga oregona*), small bur reed (*Sparganium natans*), and narrowpetal wakerobin (*Trillium angustipetalum*).

The Preferred Alternative would restore significant amounts of meadow, wetland, coniferous and broadleaf forest, and riparian habitats in Segment 2. Restoration of these habitats would have a beneficial impact on park rare plant species that occur in those communities. Special status plants may be adversely affected in the short term by construction/removal, restoration, and monitoring activities associated with management actions proposed in the Preferred Alternative in Segment 2. Potential adverse impacts include temporary disturbance and loss of habitat, potential loss of individual plants or populations, and the potential introduction and spread of invasive nonnative species. Adhering to proposed mitigation measures presented in Appendix I and avoiding the removal of vegetation, where possible, would minimize these short-term impacts. Proposed actions to manage visitor use and facilities in Segment 2 would occur at Curry Village, Yosemite Village, Housekeeping Camp, Yosemite Lodge, and Camp 4. It is unlikely that any park rare plant species occur in these areas due to the high levels of visitation and human-related impacts such as vegetation trampling and soil compaction. In addition, no park rare plants were found during rare plant surveys conducted in 2010 in the areas listed above. Therefore, it is unlikely that park rare plant species will be affected by actions to manage visitor use and facilities in the Curry Village, Yosemite Village, Housekeeping Camp, Yosemite Lodge, and Camp 4 areas.

Vegetation removed under the Preferred Alternative would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities in Segment 2 because new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient, upland habitat. Special status plant species would be avoided during construction activities. Adhering to proposed mitigation measures presented in Appendix I and avoiding the removal of vegetation, where possible, would minimize short-term impacts. Non-native plant species would continue to invade undeveloped areas in Yosemite Valley. New construction can promote non-native species because it creates conditions, such as disturbed soil, that are favored by many non-native plants. An increase in non-native plants could result in habitat loss and a competition for resources (i.e., light, water, and nutrients) for the rare plants in Segment 2.

Overall, the Preferred Alternative would result in long-term beneficial impacts on special status plants in Segment 2.

Segments 3 and 4: Merced Gorge and El Portal

There are eight park rare plant species that are potentially found in the Merced Gorge and El Portal: Thompkins' sedge (*Carex tompkinsii*), narrowleaf collinsia (*Collinsia linearis*), mountain lady's slipper (*Cypripedium montanum*), tanoak (*Lithocarpus densiflorus* var. *echinoides*), northern bugleweed

(*Lycopus uniflorus*), small flowered monkeyflower (*Mimulus inconspicuus*), valley oak (*Quercus lobata*), and Sierra bladdernut (*Staphylea bolanderi*).

The Preferred Alternative would restore nine acres of riparian and valley oak woodland habitats in Segment 4. Restoration of these habitats would have a beneficial impact on park rare plant species that occur in those communities. Special status plants may be adversely affected in the short term by construction/removal, restoration, and monitoring activities associated with management actions proposed in the Preferred Alternative in Segment 4. Potential adverse impacts include temporary disturbance and loss of habitat, potential loss of individual plants or populations, and the potential introduction and spread of invasive nonnative species. Adhering to proposed mitigation measures presented in Appendix I and avoiding the removal of vegetation, where possible, would minimize these short-term impacts.

Vegetation removed under the Preferred Alternative would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities in Segment 4 because new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient, upland habitat. Special status plant species would be avoided during construction activities. Adhering to proposed mitigation measures presented in Appendix I and avoiding the removal of vegetation, where possible, would minimize short-term impacts. There could be indirect effects on these species as a result of the increased human population in El Portal, which could promote additional foot traffic and possible trampling of these species. Non-native plant species would continue to invade undeveloped areas in El Portal. New construction can promote non-native species because it creates conditions, such as disturbed soil, that are favored by many non-native plants. An increase in non-native plants could result in habitat loss and a competition for resources (i.e., light, water, and nutrients) for the rare plants in El Portal. Currently, vehicles park under the dripline of the 38 valley oak trees that are designated as a biological ORV. This practice compacts soil under the trees and impacts root health, water uptake, and soil aeration. Additionally, existing development and trampling in the vicinity of these trees limits the area where oak seedlings can be recruited. Under the Preferred Alternative, oak protection areas would be designated in the Odgers' fuel transfer center as well as the adjacent parking lots. Parking within 10 feet of the base of oak trees and parking and new building construction within the oak protection area would be prohibited. Nonnative fill would be removed and soils decompacted. Appropriate native understory plant species would be planted. Overall, these actions would result in long-term beneficial impacts on valley oaks in Segments 4.

Overall, the Preferred Alternative would result in long-term beneficial impacts on special status plants in Segments 3 and 4.

Segments 5-8: South Fork Merced River

There are 18 park rare plant species that are potentially found in the South Fork Merced River corridor: spurred snapdragon *(Antirrhinum leptaleum)*, Lemmon's wild ginger (*Asarum lemmonii*), silvery sedge (*Carex canescens*), Yosemite sedge (*Carex sartwelliana*), Bolander's woodreed (*Cinna bolanderi*), narrowleaf collinsia (*Collinsia linearis*), mountain lady's slipper (*Cypripedium montanum*), California sunflower (*Helianthus californicus*), yellow and white monkeyflower (*Mimulus bicolor*), small flowered

monkeyflower (*Mimulus inconspicuus*), Sierra sweet-bay *(Myrica hartwegii),* Sierra skullcap *(Scutellaria bolanderi* ssp. *bolanderi),*Clark's ragwort (*Senecio clarkianus*), small bur reed (*Sparganium natans*), Sierra bladdernut (*Staphylea bolanderi*), narrowpetal wakerobin (*Trillium angustipetalum*), California red huckleberry (*Vaccinum parvifolium*), and Hall's mule ears (*Wyethia elata*).

Proposed facilities actions in the near-term in the Wawona Campground area would involve removal of 13 sites that are either within the 100-year floodplain or in culturally sensitive areas. The Preferred Alternative would restore two acres of riparian habitat in Segment 7. Restoration of this habitat would have a beneficial impact on park rare plant species that occur in riparian areas. Special status plants may be adversely affected in the short term by construction/removal, restoration, and monitoring activities associated with management actions proposed in the Preferred Alternative in Segment 7. Potential adverse impacts include temporary disturbance and loss of habitat, potential loss of individual plants or populations, and the potential introduction and spread of invasive nonnative species. Adhering to proposed mitigation measures presented in Appendix I and avoiding the removal of vegetation, where possible, would minimize these short-term impacts.

Vegetation removed under the Preferred Alternative would not substantially fragment existing native vegetation communities, reduce species diversity, or substantially reduce the overall size or quality of native plant communities in Segment 7 because new construction would primarily occur in or adjacent to previously disturbed locations or in more resilient, upland habitat. Special status plant species would be avoided during construction activities. Adhering to proposed mitigation measures presented in Appendix I and avoiding the removal of vegetation, where possible, would minimize short-term impacts. New construction can promote non-native species because it creates conditions, such as disturbed soil, that are favored by many non-native plants. An increase in non-native plants could result in habitat loss and a competition for resources (i.e., light, water, and nutrients) for the rare plants in Wawona.

Overall, the Preferred Alternative would result in long-term beneficial impacts on special status plants in Segments 5 through 8.

CHAPTER VI. DETERMINATION OF EFFECTS ON FEDERALLY LISTED OR CANDIDATE SPECIES

The impact on listed or candidate species are analyzed in accordance with USFWS guidelines. Federal agencies must consult with the Fish and Wildlife Service to ensure their actions would not jeopardize the continued existence of any federally listed or proposed threatened or endangered species, or adversely modify designated or proposed critical habitat (Endangered Species Act, section 7(a)(2)). If listed species or their critical habitat are present, the federal agency must determine if the action would have "no effect," "may effect, not likely to adversely affect," or "may effect, likely to adversely affect" those species or their habitat. The National Park Service makes the determination of effect for the alternatives following guidance outlined in the *Endangered Species Act Consultation Handbook: Procedures for Conducting Section 7 Consultations and Conference Activities* (USFWS and NMFS 1998). The following guidance is used to determine impacts whether the species is protected under the Endangered Species Act, listed or identified as sensitive by the state, or identified as sensitive by the park, another federal agency (e.g., BLM or USFS) or a local agency.

This determination of effects is based solely on the Preferred Alternative in the *Draft Merced River Plan* as described in Chapter III of this document, and does not assume any potential mitigation measures. Mitigation measures are recommended in Chapter VII. The following criteria were used to develop determinations:

- ***No Effect*** – The project (or action) is located outside suitable habitat **and** there would be no disturbance or other direct or indirect impacts on the species. The action would not affect the listed species or its designated critical habitat.

- ***May Affect, Not Likely to Adversely Affect*** – The project (or action) occurs in suitable habitat or results in indirect impacts on the species, but the effect on the species is likely to be beneficial, discountable, or insignificant. The action may pose effects on listed species or designated critical habitat but given circumstances or mitigation conditions, the effects may be discounted, insignificant, or completely beneficial.

    a. ***Beneficial effects*** – contemporaneous positive effects without any adverse effects.

    b. ***Insignificant effects*** – relate to the size of the impact and should never reach the scale where take would occur.

    c. ***Discountable effects*** – those that are extremely unlikely to occur. Based on best judgment, a person would not (1) be able to meaningfully measure, detect, or evaluate insignificant effects or (2) expect discountable effects to occur.

- ***May Affect, Likely to Adversely Affect*** – The project (or action) would have an adverse effect on a listed species as a result of direct, indirect, interrelated, or interdependent actions, and the effect is not discountable, insignificant, or beneficial.

Determinations for Federally Listed Threatened or Endangered Species

Sierra Nevada bighorn sheep (*Ovis canadensis sierrae*)

It is the determination of the National Park Service that actions that are proposed in the *Merced River Plan/DEIS* will have no effect on the Sierra Nevada bighorn sheep. The following conclusions have led to this determination:

- There would be no direct or indirect effects on the Sierra Nevada bighorn sheep or its preferred habitat.

Valley elderberry longhorn beetle (*Desmocerus californicus*)

It is the determination of the National Park Service that the actions proposed in the *Merced River Plan/DEIS* may affect, and are likely to adversely affect, the Valley elderberry longhorn beetle. The following conclusions have led to this determination:

- Elderberry plants grow within the project area. Based on the foregoing analysis, there is a likelihood that "take," as defined in the Endangered Species Act, may occur.

Elderberry plants, the sole foodplant and habitat for the Valley elderberry longhorn beetle, are abundant in the Merced River canyon in the elevation range of the beetle, especially in the El Portal area. Elderberry plants would be avoided during construction wherever practicable.

Determinations for Federal Candidate Species

Whitebark pine (*Pinus albicaulis*)

It is the determination of the National Park Service that actions that are proposed in the *Merced River Plan/DEIS* will have no effect on the whitebark pine. The following conclusions have led to this determination:

- There would be no direct or indirect effects on the whitebark pine or its habitat.

Yosemite toad (*Anaxyrus canorus*)

It is the determination of the National Park Service that actions that are proposed in the *Merced River Plan/DEIS* may affect, but are not likely to adversely affect, the Yosemite toad. The following conclusions have led to this determination:

- Yosemite toads utilize higher elevation wet meadows, small ponds, and flooded shallow grassy areas in Segments 1 and 5.

- Actions proposed in Segments 1 and 5 are generally habitat restoration projects that would ultimately benefit Yosemite toad.

Sierra Nevada yellow-legged frog (*Anaxyrus canorus*)

It is the determination of the National Park Service that actions that are proposed in the *Merced River Plan/DEIS* may affect, but are not likely to adversely affect, the Sierra Nevada yellow-legged frog. The following conclusions have led to this determination:

- Sierra Nevada yellow-legged frogs utilize aquatic habitats in Segments 1 and 5.
- Actions proposed in Segments 1 and 5 are generally habitat restoration projects that would ultimately benefit Sierra Nevada yellow-legged frog.

California wolverine (*Gulo gulo*)

It is the determination of the National Park Service that actions that are proposed in the *Merced River Plan/DEIS* may affect, but are not likely to adversely affect, the California wolverine. The following conclusions have led to this determination:

- California wolverines have not been verified in Yosemite National Park since 1915; unconfirmed sightings have been reported in 1959 and 1990. However, California wolverine could utilize a variety of habitats in Segments 1 and 5, including wet meadows.
- Actions proposed in Segments 1 and 5 are generally habitat restoration projects that would ultimately benefit California wolverine.

Pacific fisher (*Martes pennant pacifica*)

It is the determination of the National Park Service that actions that are proposed in the *Merced River Plan/DEIS* may affect, but are not likely to adversely affect, the Pacific fisher. The following conclusions have led to this determination:

- Pacific fisher may utilize coniferous forests in Segments 1, 2, 5, and 7.
- Actions proposed in Segments 1 and 5 are generally habitat restoration projects that would ultimately benefit Pacific fisher.
- Although suitable foraging habitat for this species would be impacted by proposed actions in Segments 2 and 7, this species is sensitive to human presence and is not likely to utilize habitats in these areas.

CHAPTER VII. REFERENCES

Acree, Lisa Nemzer

1994 *The Plant Communities of Yosemite Valley – A Map and Descriptive Key*. Technical Report NPS/WRUC/NRTR-94-01. Western Region Cooperative National Park Studies Unit. University of California. Davis, California.

Altman, B.

1999 Olive-sided Flycatchers in western North America: Status review. Unpublished report to U.S. Fish & Wildlife Service, Portland, Oregon.

Altman, B., and Sallabanks, R.

2000 Olive-sided Flycatcher (Contopus cooperi), in The Birds of North America (A. Poole and F. Gill, eds.), no. 502. Birds N. Am., Philadelphia.

American Ornithologists' Union (AOU)

1983 Checklist of North American Birds, 6th ed. American Ornithologists' Union, Washington, D.C.

Apfelbaum, S. I., and P. Seelbach

1983 Nest tree, habitat selection and productivity of seven North American raptor species based on the Cornell University nest record card program. Raptor Res. 17:97 - 113.

Arjo, W. M.

2007 Mountain beaver: A primitive fossorial rodent. In Subterranean Rodents: News from Underground S. Begall, H. Burda, C.E. Schleich (Eds.). Wildlife Damage Management, Internet Center for USDA National Wildlife Research Center, http://digitalcommons.unl.edu/icwdm_usdanwrc/675/

Aubry, K. B.

1983 The Cascade red fox: Distribution, morphology, zoogeography and ecology. Seattle: University of Washington; 151 p. Ph.D. dissertation.

Bailey, V.

1931 Mammals of New Mexico. U.S. Dep. Agric., North Am. Fauna No. 53. 412 pp.

Barbour, R. W., and W. H. Davis

1969 Bats of America. University of Kentucky Press, Lexington, KY. 286 pp.

Barr, Cheryl B.

1991 "The distribution, habitat, and status of the Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*." U.S. Fish and Wildlife Service, Sacramento, California.

Beedy, E. C.

2008 Harlequin Duck (*Histrionicus histrionicus*). Pages 91-95 in W. D. Shuford and T. Gardali, editors. California bird species of special concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Western Field Ornithologists and California Department of Fish and Game, Camarillo & Sacramento, California.

Behler, J. L., and F. W. King

2002 National Audubon Society: Field Guide to North American Reptiles and Amphibians. Chanticleer Press, New York.

Beier, P., and J. E. Drennan

1997 Forest structure and prey abundance in foraging areas of Northern Goshawks. Ecol. Applications 7:564-571.

Blakesley, J. A., B. R. Noon, and D. R. Anderson

2005 Site occupancy, apparent survival, and reproduction of California spotted owls in relation to forest stand characteristics. Journal of Wildlife Management 69:1554-1564.

Bolster, B. C. (ed)

1998 Terrestrial Mammal Species of Special Concern in California. Draft Final Report prepared by P. V. Brylski, P. W. Collins, E. D. Pierson, W. E. Rainey and T. E. Kucera. Report submitted to California Department of Fish and Game Wildlife Management Division, Nongame Bird and Mammal Conservation Program for Contract No.FG3146WM.

Bolster, B. C.

2005 Species Account for western red bat (*Lasiurus blossevillii*) updated at the 2005 Western Bat Working Group Portland Biennial Meeting, http:www.wbwg.org. Chambers, C. L. and M. J. Herder. 2005 Species Account for spotted bat (*Euderma maculatum*) updated at the 2005 Western Bat Working Group Portland Biennial Meeting, http:www.wbwg.org.

Brown, L., and D. Amadon.

1968 Eagles, hawks and falcons of the world. 2 Vols. Country Life Books, London. 945pp.

Buehler, David A.

2000 Bald Eagle (*Haliaeetus leucocephalus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/506

Bull, E. L., and C. T. Collins

2007 Vaux's Swift (*Chaetura vauxi*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu.oca.ucsc.edu/bna/species/077.

Bury, R. B., and D. J. Germano

2008 *Actinemys marmorata* (Baird and Gerard 1852) – Western Pond Turtle, Pacific Pond Turtle. Chelonian Research Monographs No. 5: 001.1-001.9.

Buskirk, S. W., and R. A. Powell

1994 Habitat ecology of American martens and fishers. In S. W. Buskirk, A. S. Harestad, M. G. Raphael, & R. A. Powell (Eds.), Martens, sables and fishers: biology and conservation (pp. 297-315). Ithaca, NY: Cornell University Press.

CDFG (California Department of Fish and Game)

1996 The status of rare, threatened and endangered animals and plants of California. Sacramento: California Department of Fish and Game, p. 17.

Cech, J. J., S. J. Mitchell, D. T. Castleberry, and M. McEnroe

1990 Distribution of California stream fishes: influence of environmental temperature and hypoxia. Env. Biol. Fish. 29:95-105.

Chambers, C. L., and M. J. Herder

2005 Species Account for spotted bat (*Euderma maculatum*) updated at the 2005 Western Bat Working Group Portland Biennial Meeting, http:www.wbwg.org.

Chambers, C. L., M. J. Herder, M. L. Painter, and D. G. Mikesic

2005 [ABS]. Foraging and roosting sites for male spotted bats (*Euderma maculatum*), northern Arizona. Western Bat Working Group Conference, Portland, OR.

Chow, Leslie Stephen

2000 Personal communication. Research Wildlife Biologist. U.S. Geological Survey. Yosemite National Park, California.

2009 A survey for fisher in Yosemite National Park 1992-1994. Transactions of the Western Section of the Wildlife Society 45:27-44.

Collopy, M. W. and K. L. Bildstein

1987 Foraging behavior of Northern Harriers wintering in southeastern salt and freshwater marshes. Auk 104:11-16.

Constantine, D. G.

1998 Range extensions of ten species of bats in California. Bulletin Southern California Academy of Sciences 97:49-75.

Cryan, P. M., M. A. Bogan, and J. S. Altenbach

2000 Effect of elevation on distribution of female bats in the Black Hills, South Dakota. Journal of Mammalogy 81:719-725.

Dalquest, W. W., and V. B. Scheffer

1945 The systematic status of the races of the mountain beaver (*Aplodontia rufa*) in Washington. Murrelet 26:34–37.

Davis, J. N., and G. I. Gould, Jr.

2008 Black Swift (*Cypseloides niger*). Pages 249-253 in W. D. Shuford and T. Gardali, editors. California bird species of special concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Western Field Ornithologists & California Department of Fish and Game, Camarillo & Sacramento, California.

DeForge, J. R.

1980 Population biology of desert bighorn sheep in the San Gabriel Mountains of California. Desert Bighorn Counc. Trans. 24:29-32.

Dekker, D.

1985 Hunting behavior of Golden Eagles, *Aquila chrysaetos*, migrating in southwestern Alberta. Can. Field-Nat. 99: 383–385.

Drost, C.A., and G.M. Fellers.

1996 Collapse of a regional frog fauna in the Yosemite area of the California Sierra Nevada, USA. Conservation Biology 10: 414-425.

Dunstan, T. C., J. H. Harper, and K. B. Phipps

1978 Habitat use and hunting strategies of Prairie Falcons, Red-tailed Hawks, and Golden Eagles, Fin. Rep. Western Illinois Univ., Macomb.

Edwards, C. C.

1969 Winter behavior and population dynamics of American eagles in western Utah. Ph.D. diss., Brigham Young Univ., Provo, UT.

Ettinger, A.O., and J.R. King

1980 "Time and energy budgets of the willow flycatcher (*Empidonax trailii*) during the breeding season." *Auk* 97: 533-546.

Feldhamer, G. A., J. A. Rochelle, and C. D. Rushton

2003 Mountain beaver. In: Feldhamer, G. A., B. C. Thompson, J. A. Chapman (eds). Wild mammals of North America: biology, management, and economics. John Hopkins Univ Press, Baltimore, MD pp 179–187.

Fellers, Gary M.

1997 "Aquatic Amphibian Surveys – Yosemite National Park." Biological Resources Division, U.S. Geological Survey. Point Reyes National Seashore. Point Reyes, California.

Fellers, Gary M. and Kathleen L. Freel

1995 *A Standardized Protocol for Surveying Aquatic Amphibians*. Technical Report NPS/WRUC/NRTR-95-01. Western Region Cooperative National Park Studies Unit. University of California. Davis, California

Fellers, G. M., and E. D. Pierson

2002 Habitat use and foraging behavior of Townsend's big-eared bat (*Corynorhinus townsendii*) in coastal California. Journal of Mammalogy 83:167-177.

Foerster, K. S.

1987 The distribution and breeding biology of the Black Swift (*Cypseloides niger*) in southern California. M.S. thesis, Calif. State Univ., Long Beach.

Fryer, Janet L.

2002 *Pinus albicaulis*. Fire Effects Information System, U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. Available at: http://www.fs.fed.us/database/feis [September 27, 2012].

Gaines, D.

1992 Birds of Yosemite and the East Slope, 2nd ed. Artemisia Press, Lee Vining, CA.

Geist, V.

1971 *Mountain Sheep, a Study in Behavior and Evolution*. University of Chicago Press, Chicago, Illinois. 383 pp.

Gibson, K.E., et al.

2008 Mountain pine beetle impacts in high-elevation five-needle pines: current trends and challenges. U.S. Department of Agriculture, Forest Service, Forest Health Protection.

Greene, C.

1995 Habitat Requirements of Great Gray Owls in the Central Sierra Nevada. Master's thesis. School of Natural Resources and Environment. University of Michigan.

Grinnell, J.

1933 Review of the recent mammal fauna of California. University of California Publication in Zoology 40:71-234.

Grinnell, J., J.S. Dixon, and J.M. Linsdale

1937 *Furbearing mammals of California. Vol. I.* University of California Press, Berkeley. 777 pp.

Grinnell, J. and A. H. Miller

1944 "The distribution of the birds of California." *Pacific Coast Avifauna*. 27: 1-608.

Grinnell, Joseph and Tracy I. Storer

1924 *Animal life in the Yosemite.* University of California Press. Berkeley, California.

Hacker, A. L., and B. E. Coblenz

1993 Habitat selection by mountain beavers recolonizing Oregon Coast Range clearcuts. Journal of Wildlife Management 57:847–853.

Hall, E. R.

1946 Mammals of Nevada. Univ. Calif. Press, Berkeley, CA. pp. 701.

Hall, E. R.

1981 The mammals of North America. John Wiley and Sons, New York, New York. 1:1-600 + 90, 2:601-1181 + 90. 2nd ed.

Harris, J.H.

1982 Mammals of the Mono Lake-Tioga Pass Region. David Gaines/Kutsavi Books, Lee Vining, CA. 55 pp.

Harris, J. H., S. D. Sanders, and M. A. Flett

1988 The status and distribution of the Willow Flycatcher in the Sierra Nevada: Results of the survey. Calif. Dept. Fish Game Wildlife Mgmt. Div. Admin. Rep. 88- 1.

Hayes, M.P., and M.R. Jennings.

1988 "Habitat correlates of distribution of the California red-legged frog (*Rana aurora draytonii*) and the foothill yellow-legged frog (*Rana boylii*): Implications for

management." In *Management of Amphibians, Reptiles, and Small Mammals in North America.* USDA Forest Service, Rocky Mountain Forest and Range Experiment Station, Gen. Tech. Rep. RM-166.

1996. Status of Amphibians. In Sierra Nevada Preservation Project, Final report to Congress. Vol. 2, Assessments for Management Options. Davis: University of California, Centers for Water and Wildland Resources.

Hemphill, D. V.

1952 The vertebrate fauna of the boreal areas of the southern Yolla Bolly Mountains, California. Ph.D. dissertation. Oregon State College, Corvallis, Oregon.

Hermanson, J. W., and T. J. O'Shea

1983 *Antrozous pallidus*. Mammalian Species, 213:1-8.

Hickman, James C., editor

1993 *The Jepson Manual – Higher Plants of California*. University of California Press. Berkeley and Los Angeles, California. 1,400 pp.

Holland, D.C.

1994 The western pond turtle: habitat and history. Oregon Department of Fish and Game final report.

Hornocker, M. G., and H. S. Hash.

1981 Ecology of the wolverine (Gulo gulo) in northwestern Montana, USA. Can. J. Zool. 59:1286-1301. Hull, J. M., J. J. Keane, L. Tell, and H. B. Ernest

2010 West Nile Virus Antibody Surveillance in Three Sierra Nevada Raptors of Conservation Concern. Condor 112:168-172.

Hunting, K.

2008 Long-eared Owl (*Asio otus*). Pages 234-241 *in* W. D. Shuford and T. Gardali, editors. California bird species of special concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Western Field Ornithologists & California Department of Fish and Game, Camarillo & Sacramento, California.

Ingles, L.G.

1965 *Mammals of the Pacific States*. Stanford University Press, Stanford, California. 506 pp.

Jennings, Mark R. and M. P. Hayes

1994 "Amphibian and reptile species of special concern in California." Prepared for the California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, California. Contract #8023 Final Report. 255 pp.

Kagarise Sherman, C., and M. L. Morton

1993 Population declines of Yosemite toads in the eastern Sierra Nevada of California. Journal of Herpetology 27:186-198.

Kantrud, H. A. and K. F. Higgins

1992 Nest and nest site characteristics of some ground-nesting, nonpasserine birds of northern grasslands. Prairie Nat. 24:67-84.

Karlstrom, E. L.

1962 The toad genus *Bufo* in the Sierra Nevada of California. In: Ecology and Systematic Relationships. University of California Publications in Zoology, No. 62, Berkeley.

Keane, J. J.

1999 Ecology of the Northern Goshawk in the Sierra Nevada, California. Ph.D. dissertation, Univ. Calif., Davis.

Keane, J. J., H. B. Ernest, and J. M. Hull

2011 Conservation and Management of the Great Gray Owl 2007-2009: Assessment of Multiple Stressors and Ecological Limiting Factors. Draft Report to Yosemite National Park, Interagency Acquisition Agreement Number F8813-07-0611.

Knapp, R. A.

2003 Yosemite Lakes Survey: 2000-2002. Final Report to the National Park Service. Sierra Nevada Aquatic Research Laboratory, U.C. Santa Barbara.

2005 Effects of nonnative fish and habitat characteristics on lentic herpetofauna in Yosemite National Park, USA. Biological Conservation 121:265-279.

Kucera, T. E.

1993 The Sierra Nevada red fox. Outdoor California. October-November: 4-5.

1995 Recent photograph of a Sierra Nevada red fox. California Fish & Game 81: 43-44.

Kupferberg, S. J.

1996a Hydrologic and geomorphic factors affecting conservation of a river-breeding frog (*Rana boylii*). Ecological Applications 6:1322–1344.

Kus, B., P. Beck, and J. Wells

2000 Southwestern Willow Flycatcher Populations in Southern California: Distribution, Abundance, and Potential for Conservation. Conference on the Ecology and Conservation of the Willow Flycatcher, Arizona State University, Phoenix, Arizona, October 24-26, 2000.

Lannoo, M. (ed)

2005 Amphibian declines: the conservation status of United States Species. University of California Press, Berkeley, CA.

Lewis, S. E.

1996 Low roost-site fidelity in pallid bats: Associated factors and effect on group stability. Behavioral Ecology and Sociobiology 39:335-344.

Loomis, R. B.

1965 The yellow-legged frog, *Rana boylii*, from the Sierra San Pedro Martir, Baja California Norte, Mexico. Herpetologica 21:78-80.

Lowther, P. E., and C. T. Collins

2002 Black Swift (*Cypseloides niger*). In The Birds of North America, No. 676 (A. Poole and F. Gill, eds.). The Birds of North America, Inc., Philadelphia, PA.

MacWhirter, R. B. and K. L. Bildstein

1996 Northern harrier (*Circus cyaneus*). In The Birds of North America, No. 210, edited by A. Poole and F. Gill. Philadelphia: The Birds of North America, Inc.

Marin, M.

1999 Food, foraging, and timing of breeding of the Black Swift in southern California. Wilson Bull. 111:30–37.

Marks, J. S., D. L. Evans, and D. W. Holt

1994 Long-eared Owl (*Asio otus*). Available on the Internet at: <http://bna.birds.cornell.edu.oca.ucsc.edu/bna/species/133>.

Marshall, J.T.

1988 Birds lost from a giant sequoia forest during fifty years. Condor 90:359–372.

Maurer, J.R.

2006 Final Report: Great Gray Owl Survey in Yosemite National Park. Submitted to Yosemite National Park, under USDI NPS YNP Contract No. P8826-05-0058, including Modification No. 0001.

Messick, J. P. and M. G. Hornocker

1981 Ecology of the badger in southwestern Idaho. Wildlife Monographs 76: 1-53.

Millar, C.I., et al.

2012 Forest mortality in high-elevation whitebark pine (*Pinus albicaulis*) forests of eastern California, USA; influence of environmental context, bark beetles, climatic water deficit, and warming. Canadian Journal of Forest Research **42**:749-765.

Monk, G.

1981 California peregrine falcon reproductive outcome and management efforts in 1981. U.S. Dep. Inter., Fish and Wildl. Serv., Sacramento. Endang. Spec. Rep. 27pp.

Monson, G., and L. Sumner (eds)

1980 The desert bighorn: its life history, ecology, and management. Univ. Arizona Press, Tucson. 370pp.

Moritz, C.

2007 Final Report: A resurvey of the historic Grinnell-Storer vertebrate transect in Yosemite National Park, California. Submitted to the Sierra Nevada Network Inventory and Monitoring Program, Sequoia & Kings Canyon National Parks. In partial fulfillment of Cooperative Agreement H8C073001 and task Agreement J8C07040003. 108 pp.

Moore, Peggy

1991 "Forage site characteristics of reintroduced mountain sheep in the Sierra Nevada, California." Technical Report. Western Region Cooperative National Park Studies Unit. University of California. Davis, California.

Moyle P.B. et al.,

1995 Fish Species of Special Concern in California. Second Edition. Department of wildlife & Fisheries Biology, University of California, Davis. Davis, CA.

NPS (National Park Service)

1980 *General Management Plan.* Yosemite National Park, California.

1988 *Management Policies,* National Park Service, Washington DC.

1990 *Fire Management Plan*, Yosemite National Park.

1991 NPS-77 *Natural Resource Management Guideline.* National Park Service, Washington D.C.

1994 *Natural Resources Management Plan for Yosemite National Park*. Yosemite National Park, California.

2000a *Draft Yosemite Valley Plan/Supplemental Environmental Impact Statement*. National Park Service, California.

2000b *Draft Merced River Plan/Supplemental Environmental Impact Statement*. National Park Service, California.

Natural Resources Defense Council (NRDC)

2008 *A Petition to List the Whitebark Pine,* Pinus albicaulis*, as an Endangered Species under the Endangered Species Act*. Washington, DC.

Nowak, R.M.

2005 Walker's Carnivores of the World, John Hopkins University Press, Baltimore, USA and London, UK.

Numgesser, W. and E. Pfeiffer

1965 "Water balance and the maximum concentrating capacity in the primitive rodent, *Aplondontia rufa." Comparative Biochemical Physiology* 14:289-297.

Orr, R. T.

1937 Systematics and natural history of Californian hares and rabbits (Family Leporidae). Ph.D. Thesis, Univ. California, Berkeley. 302pp.

1940 The rabbits of California. Occas. Papers Calif. Acad. Sci., 19:1-227.

1954 Natural history of the pallid bat, *Antrozous pallidus* (LeConte). Proceedings of the California Academy of Sciences, 28:165-246.

Palmer, Ralph S.

1988 *Handbook of North American Birds – Volume 5 – Diurnal Raptors*, Part 2. Yale University.

Perrine, J. D.

2005 Ecology of red fox (*Vulpes vulpes*) in the Lassen Peak region of California, USA. Berkeley: University of California; 236 p. Ph.D. dissertation.

Perrine, J. D., and J. F. Arnold

2001 A new wildlife sighting reporting and database system for Lassen Volcanic National Park. Transactions of the Western Section of The Wildlife Society 37: 8-15.

Perrine, J. D., L. A. Campbell, and G. A. Green

2010 Sierra Nevada red fox (*Vulpes vulpes necator*): A Conservation Assessment. USDA, R5-FR-101. August 2010.

Pierson, E.D.

1997 Bat Surveys, El Portal Road, Yosemite National Park. Project Report prepared for Ted Mullen, Science Applications International Corporation (SAIC).

2000 Personal communication. Research mammologist with Conservation, Biology, and Systematics.

Pierson, Elizabeth D. and Gary M. Fellers

1998 "Distribution of the Big-Eared Bat, *Corynorhinus (=Plecotus) townsendii* in California." Prepared for the U.S. Geological Survey Biological Resources Division Species at Risk Program.

Pierson, E. D., and P. A. Heady

1996 Bat Surveys: Giant Forest Village and Vicinity, Sequoia National Park. Prepared for the National Park Service. January.

Pierson, Elizabeth D., and William E. Rainey

1993 "Bat Surveys: Yosemite Valley and Hetch Hetchy Reservoir, July 1993." On file at Yosemite National Park, Yosemite, California: 18 pp.

1995 "Bat Surveys: Yosemite National Park 1994." Unpublished report. On file at Yosemite National Park, Yosemite, California: 23 pp.

1996 "Habitat Use by Two Cliff-Dwelling Bat Species, the Spotted Bat, *Euderma maculatum*, and the Mastiff Bat, *Eumops perotis*, in Yosemite National Park, 1995." On file at Yosemite National Park, Yosemite, California: 28 pp.

1998a Distribution, habitat associations, status and survey methodologies for three molossid bat species (*Eumops perotis, Nyctinomops femorosaccus, Nyctinomops macrotis*) and the vespertilionid (*Euderma maculatum*). California Dept. of Fish and Game. Bird and Mammal Conservation Program. No. 61, 56 pp.

1998b Distribution of the spotted bat, Euderma maculatum, in California. Journal of Mammalogy, 79:1296-1305.

Pierson, E. D., W. E. Rainey, and L. S. Chow

2006 Bat use of the giant sequoia groves in Yosemite National Park, project report prepared for The Yosemite Fund, Yosemite, California.

Pierson, E. D., W. E. Rainey, and C. J. Corben

1999 [ABS] The western red bat, Lasiurus blossevillii - implications of distribution for conservation. Bat Research News 40:187.

2000 Distribution and status of red bats, Lasiurus blossevillii in California. Report to Species Conservation and Recovery Program, Habitat Conservation Planning Branch, California Department of Fish and Game, Sacramento, CA, 37 pp.

2001 Seasonal Patterns of Bat Distribution along and Altitudinal Gradient in the Sierra Nevada. January.

Polite, C., and J. Pratt

1990 California Wildlife Habitat Relationships System -B129 Peregrine Falcon-1988-1990. http://www.dfg.ca.gov/whdab/B129.html

Powell, R. A., and W. J. Zielinski

1994 Fisher. Pp. 38-73, In: The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the western United States. (L. F. Ruggiero, K. B. Aubry, S. W. Buskirk, L. J. Lyon, and W. J. Zielinski, eds). U.S.D.A. Forest Service Gen. Tech. Rep. RM-254.

Pyle, P., N. Nur, and D. F. DeSante

1994 Trends in nocturnal migrant landbird populations at Southeast Farallon Island, California, 1968-1992. Studies in Avian Biology 15:58-74.

Rahme, A. H., A. S. Harestad, and F. Bunnell

1995 Status of the badger in British Columbia. Wildlife Working Report WR-72. British Columbia Ministry of the Environment, Land, and Parks.

Rainey, W. E., and E. D. Pierson

1996 Cantara spill effects on bat populations of the upper Sacramento River, 1991-1995. Report to California Department of Fish and Game, Redding, CA, (Contract # FG2099R1). 98 pp.

Rainey, W. E., E. D. Pierson, M. Colberg, and J. H. Barclay

1992 [ABS] Bats in hollow redwoods: seasonal use and role in nutrient transfer into old growth communities. Bat Research News, 33:71.

Raphael, M. G., K. V. Rosenberg, and B. G. Marcot

1988 Large-scale changes in bird populations of Douglas-fir forests, northwestern California. Bird Conservation 3:63-83.

Reynolds, R.T., R.T. Graham, M.H. Reiser, R.L. Bassett, P.L. Kennedy, D.A. Boyce, Jr., G. Goodwin, R. Smith, and E.L. Fisher

1992 "Management recommendations for the northern goshawk in the southwestern United States." USDA Forest Service General Technical Report RM-127. 90 pp.

Rich, A.

2000 Great Gray Owl (*Strix nebulosa*) DRAFT Species Account: California Partners in Flight Coniferous Forest Bird Conservation Strategy. Unpublished Report. Stanislaus National Forest, CA.

Richardson, F.

1954 Nevada mammal records. J. Mammal., 35:578-579.

Robards, R.C., and J. G. King

1966 Nesting and productivity of bald eagles, southeast Alaska, 1966. U.S. Fish and Wildlife Service; Juneau, Alaska.

Roberson, D., and C. T. Collins

2008 Black Swift (*Cypseloides niger*). Pages 249-253 in W. D. Shuford and T. Gardali, editors. California bird species of special concern: A ranked assessment of species, subspecies, and distinct populations of birds of immediate conservation concern in California. Western Field Ornithologists & California Department of Fish and Game, Camarillo & Sacramento, California.

Roberts, S. L.

2008 The effects of fire on California spotted owls and their mammalian prey in the central Sierra Nevada, California. Dissertation, University of California, Davis, USA.

Robertson, G. J., and R. I. Goudie

1999 Harlequin Duck (*Histrionicus histrionicus*), in The Birds of North America (A. Poole and F. Gill, eds.), no. 466. Birds N. Am., Philadelphia.

Ross, A.

1961 Notes on food habits of bats. Journal of Mammalogy 42:66-71.

Rothstein, Stephen I., Jared Verner, and Ernest Stevens

1980 "Range Expansion and Diurnal Changes in Dispersion of the Brown-headed Cowbird in the Sierra Nevada." *The Auk* (April): 253-267.

Rovito 2009

Rudalevige, A. D., D. L. A. Underwood, and C. T. Collins

2003 Diet of breeding White-throated and Black Swifts in southern California. W. Birds 34:209–215.

Sanders, S. D., and M. A. Flett

1989 Ecology of the Sierra Nevada population of Willow Flycatcher (*Empidonax traillii*), 1986–1987. Calif. Dept. Fish Game Wildl. Mgmt. Div., Sacramento.

Sauer, J. R., Hines, J. E., and Fallon, J.

2005 The North American Breeding Bird Survey, results and analysis 1966–2004, version 2005.2. USGS Patuxent Wildl. Res. Ctr., Laurel, MD. Available at www.mbr-pwrc.usgs.gov/bbs/bbs.html.

Seamans, M. E.

2005 Population biology of the California spotted owl in the central Sierra Nevada. PhD Dissertation for the University of Minnesota.

Serena, Melody

1982 "The Status and Distribution of the Willow Flycatcher (*Empidonax trailii*) in Selected Portions of the Sierra Nevada, 1982." State of California. The Resources Agency, Department of Fish and Game. Wildlife Management Branch. Administrative Report 82-5.

Sherwin, R.

2005 Species Account for Townsend's big-eared bat (*Corynorhinus townsendii*) updated at the 2005 Western Bat Working Group Portland Biennial Meeting, http:www.wbwg.org.

Shump, K. A., Jr. and A. U. Shump.

1982 Lasiurus cinereus. American Society of Mammalogists, Lawrence, KS. Mammalian Species No. 185:1-5.

Sibley, C. G.

1952 The birds of the south San Francisco Bay region. Mimeo by the author, available at PRBO Conserv. Science, 3820 Cypress Dr., #11, Petaluma, CA 94954.

Siders, M. S.

2005 Species Account for western mastiff bat (*Eumops perotis*) updated at the 2005 Western Bat Working Group Portland Biennial Meeting, http:www.wbwg.org.

Siegel, R. B.

2006 Surveying Great Gray Owl on the Carson and Bridgeport Ranger Districts of the Humboldt-Toiyabe National Forest during the 2006 breeding season. The Institute for Bird Populations, Point Reyes Station, California.

Siegel, R. B. and D. F. DeSante

1999 Version 1.0. The draft avian conservation plan for the Sierra Nevada Bioregion: conservation priorities and strategies for safeguarding Sierra bird populations. A report to California Partners in Flight. The Institute for Bird Populations, Point Reyes Station, California.

Siegel, R. B., R. L. Wilkerson, and D. F. DeSante

2008 Extirpation of the Willow Flycatcher from Yosemite National Park. Western Birds 39:8-21. 2008.

Sierra Nevada Ecosystem Project (SNEP)

1996 *Final Report to Congress* (Davis: University of California, Centers for Water and Wildland Resources).

Squires, J. R., and R. T. Reynolds

1997 Northern Goshawk (*Accipiter gentilis*). In The Birds of North America, No. 298, edited by A. Poole and F. Gill. The Academy of Natural Sciences, Philadelphia, PA, and the American Ornithologists' Union, Washington, D.C.

Stafford, M. D., and B. E. Valentine

1985 A preliminary report on the biology of the willow flycatcher in the central Sierra Nevada. CAL-NEVA Wildlife Transactions 1985:66-77.

Stebbins, R.C.

1985 *A Field Guide to Western Reptiles and Amphibians*. Second Edition, revised. Houghton Mifflin, Boston.

Stillwater Sciences

2008 The Merced River Alliance Project Final Report. Volume II: Biological monitoring and assessment report. Prepared by Stillwater Sciences, Berkeley, California.

Szewczak, J. M., S. M. Szewczak, M. L. Morrison, and L. S. Hall

1998 Bats of the White and Inyo Mountains of California Nevada. Great Basin Naturalist 58:66-75.

Temeles, E. J.

1986 Reversed sexual size dimorphism: effect on resource defense and foraging behaviors of nonbreeding Northern Harriers. Auk 103:70-78.

Thelander, Carl G., ed.

1994 *Life on the Edge: A Guide To California's Endangered Natural Resources*. Biosystems Books. Santa Cruz, California.

Todd, Paul A.

1990 "Mountain beavers in Yosemite: Habitat use and management implications of a rare species." In *Yosemite Centennial Symposium Proceedings – Natural Areas and Yosemite: Prospects for the Future*. October 13-20, 1990.

1992 Mountain beaver habitat use and management implications in Yosemite National Park, Nat Areas Journal 12:26-31

Toland, B.

1986 Hunting success of some Missouri raptors. Wilson Bull. 98:116-125.

USFWS (U.S. Fish and Wildlife Service)

1999 *Conservation Guidelines for the Valley Elderberry Longhorn Beetle*. Sacramento Fish and Wildlife Office.

2007 Recovery Plan for the Sierra Nevada Bighorn Sheep. Sacramento, California. xiv + 199 pages.

Verner, J., and A. S. Boss

1980 California wildlife and their habitats: Western Sierra Nevada. U.S.D.A. Forest Service, Gen. Tech. Rep. PSW-37. 439 pp.

Verner, J. K., S. McKelvey, B. R. Noon, R. J. Gutiérrez, G. I. Gould, T. W. Beck, technical coordinators

1992 The California spotted owl: a technical assessment of its current status. USDA Forest Service, Pacific Southwest Research Station, General Technical Report PSW-GTR-133, Albany, California.

Wai-Ping, V., and M. B. Fenton

1989 Ecology of spotted bat (*Euderma maculatum*): roosting and foraging behavior. Journal of Mammalogy 70:617-622.

Wehausen, J. D.

1980 Sierra Nevada bighorn sheep: history and population ecology. Ph.D. Diss. Univ. Michigan, Ann Arbor. 240 pp.

White, Clayton M., Nancy J. Clum, Tom J. Cade and W. Grainger Hunt

2002. Peregrine Falcon (*Falco peregrinus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/660

Wehausen, J.D.

1980 "Sierra Nevada bighorn sheep: History and population ecology." Ph.D. dissertation, University of Michigan, Ann Arbor.

White, Clayton M., Nancy J. Clum, Tom J. Cade and W. Grainger Hunt

2002. Peregrine Falcon (*Falco peregrinus*), The Birds of North America Online (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology; Retrieved from the Birds of North America Online: http://bna.birds.cornell.edu/bna/species/660

Williams, D.F.

1984 Habitat associations of some rare shrews (Sorex) from California. J. Mamm., 65:325-328.

1986 "Mammalian species of special concern in California." California Department of Fish and Game, Sacramento. Admin. Report 86-1. 122 pp.

Winter, Jon

1986 "Status, Distribution and Ecology of the Great Gray Owl (*Strix nebulosa*) in California." Masters thesis submitted to San Francisco State University.

Wolff, J. O.

1980 The role of habitat patchiness in the population dynamics of snowshoe hares. Ecol. Monogr. 50:111-130.

Yosemite Wildlife Observation Database

2011 Yosemite National Park. U:\EP Resources\00. Wildlife Branch\Wildlife Obs\Current DataBase. Retrieved April 2011.

Younk, J. V., and M. J. Bechard

1994 Breeding ecology of the Northern Goshawk in high-elevation aspen forests of northern Nevada. Studies Avian Biology 16:119-121.

Zabel, C. J., G. N. Steger, K. S. McKelvey, G. P Eberlein, B. R. Noon, and J. Verner

1992 Home-range size and habitat-use patterns of California Spotted Owls in the Sierra Nevada, in The California Spotted Owl: a technical assessment of its current status (J. Verner, K. S. McKelvey, B. R. Noon, R. J. Gutiérrez, G. I. Gould, T. W. Beck, eds.), pp. 149 -163. U. S. Forest Service, Pacific Southwest Res. Sta. PSW-GTR-133.

Zeiner, D. C., W. F. Laudenslayer, Jr., K. E. Mayer, and M. White (eds)

1988 *California's Wildlife, Volume I, Amphibians and Reptiles*. State of California, The Resources Agency, Department of Fish and Game. Sacramento. 272 pp.

1990 California's wildlife. Volume 2. Birds. California Statewide Wildlife Habitat Relationships System, Calif. Depart. Fish and Game, Sacramento, CA. 731 pp.

1990 California's wildlife. Volume 3. Mammals. California Statewide Wildlife Habitat Relationships System, Calif. Depart. Fish and Game, Sacramento, CA. 1-407 pp.

Zielinski, W. J., T. E. Kucera, and R. H. Barrett

1995 Current distribution of the fisher in California. Calif. Fish and Game 81:104-112.

Zielinski, W. J., R. L. Truex, G. A. Schmidt, F. V. Schlexer, K. N. Schmidt, and R. H. Barrett

2004a Resting habitat selection by fishers in California. Journal of Wildlife Management 68:475-492.

2004b Home range characteristics of fishers in California. Journal of Mammalogy 85:649-657.