BIOLOGICAL EVALUATION, TERRESTRIAL WILDLIFE

For the
Relicensing of the El Dorado Hydroelectric Project

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INTRODUCTION

Forest Service Manual (FSM) 2670.32 directs that a biological evaluation (BE) be prepared to determine the effects of proposed projects on Regional Forester designated sensitive species, in order to ensure that project decisions do not adversely affect species viability or create significant trends towards federal listing. This BE analyzes the effects of the Forest Service Terms and Conditions developed in connection with Relicensing of the El Dorado Hydroelectric Project (FERC No. 184) upon terrestrial sensitive wildlife species. As the Licensing Agency, the FERC will be responsible for following consultation procedures with the USDI Fish and Wildlife Service, as required under section 7(c) of the Endangered Species Act.

Region 5 Designated Sensitive Species

The Regional Forester's Sensitive Species for Region 5 (dated June 8, 1998), identifies the following sensitive terrestrial species that may occur on the Eldorado National Forest (ENF) or the Lake Tahoe Basin Management Unit (LTBMU):

American peregrine falcon (*Falco peregrinus anatum*)

California spotted owl (*Strix occidentalis occidentalis*)

northern goshawk (*Accipiter gentilis*)

great gray owl (*Strix nebulosa*)

willow flycatcher (*Empidonax traillii*)

pallid bat (*Antrozous pallidus*)

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

western red bat (*Lasiurus blossevillii*)

Pacific fisher (*Martes pennanti pacifica*)

California wolverine (*Gulo gulo luscus*)

American marten (*Martes americana*)

Sierra Nevada red fox (*Vulpes vulpes necator*)

CONSULTATION TO DATE

The Federal Energy Regulatory Commission (FERC), as the licensing agency, is responsible for consultation in compliance with section 7(c) of the Endangered Species Act. The sensitive species analyzed in this BE are not on the Federal list of Endangered or Threatened species, nor are they proposed for listing; the Endangered Species Act requirements for Federal agency consultations do not apply to this Biological Evaluation.

CURRENT MANAGEMENT DIRECTION

Appendix A describes current management direction that is specific to the individual species addressed in this assessment. General management direction for sensitive species on the ENF and LTBMU can be found in the following documents, available at the Eldorado National Forest Supervisor's Office:

1. Forest Service Manual and Handbooks (FSM/H 2670)

As part of the National Environmental Policy Act process, review programs and activities, through a biological evaluation, to determine their potential effect on sensitive species.

Avoid or minimize impacts to species whose viability has been identified as a concern.

If impacts cannot be avoided, analyze the significance of potential adverse effects on the population or its habitat within the area of concern and on the species as a whole.

Establish management objectives in cooperation with the States when a project on National Forest System lands may have a significant effect on sensitive species population numbers or distribution. Establish objectives for Federal candidate species, in cooperation with the FWS and the States.

2. National Forest Management Act (NFMA), and implementing regulations (CFR 219.19)

Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area.

3. Eldorado National Forest Land and Resource Management Plan (LRMP), as amended in January 2001, and Lake Tahoe Basin Management Unit Land and Resource Management Plan, as amended in January 2001.

Utilize administrative measures to protect and improve endangered, threatened, rare, and sensitive wildlife species.

Standards and guidelines from the LRMP and the Sierra Nevada Forest Plan Amendment Record of Decision (ROD) that are pertinent to this project are summarized below.

California Spotted Owl and Northern Goshawk

The Sierra Nevada-wide conservation strategy for the California spotted owl seeks to maintain habitat capable of supporting existing owl populations, stabilize current population declines, and provide increases in owl habitat over time. Standards and guidelines for the California spotted owl and northern goshawk that are relevant to this project are:

- Limited operating periods are applied within a quarter-mile of spotted owl or goshawk activity centers if activities may disturb nesting spotted owls or goshawks.
- Limited operating periods are applied within a quarter mile of spotted owl or goshawk activity centers if activites may disturb nesting spotted owls or goshawks.

Great Gray Owl and Willow Flycatcher

The Sierra Nevada Forest Plan Amendment includes a conservation strategy for willow flycatchers. There are four components to the strategy: (1) protection of riparian systems and meadows, (2) modification of grazing standards, (3) evaluation of existing uses, and (4) collection and evaluation of additional information.

The Sierra Nevada Forest Plan Amendment requires that, for known great gray owl nesting or roosting sites, 50 acres of the best available forested habitat plus adjacent meadow habitat surrounding nest site will be delineated and protected.

Pallid Bat, Townsend's Big-Eared Bat, and Western Red Bat

The LRMP does not provide specific guidelines for the management of these sensitive bat species. The species are associated with oak woodlands, snags, rock outcrops, caves, bridges, abandoned mines, and riparian habitat. Restoration of hardwood ecosystems is accomplished through standards and guidelines requiring retention of large live hardwood trees and snags and recruitment of young hardwood trees. Meadow and riparian habitats are restored and sustained through Standards and Guidelines implemented within 150- to 300-foot buffers along perennial and seasonally flowing streams, springs, lakes and meadows. Forest-wide Standards and Guidelines require retention of snags following stand-replacing events and during fuels treatments, except where removal is needed to address imminent safety hazards. These Standards and Guidelines are expected to provide habitat to support viable populations of these sensitive bat species.

California Wolverine, Pacific Fisher, American Marten, and Sierra Nevada Red Fox

The Sierra Nevada Forest Plan Amendment includes a conservation strategy for the Pacific fisher. The direction includes the following guidelines: (1) provide management direction for the Southern Sierra Fisher Conservation Area (Sierra NF and Sequoia NF) to support fisher habitat requirements, (2) provide for suitable habitat linkages between the southern and northern Sierra Nevada fisher populations, (3) provide protection for all den sites, and (4) provide suitable habitat for possible fisher reintroductions. It also states that known den sites will have 700 acres of the highest quality habitat in a compact arrangement surrounding den sites in the largest contiguous block available be delineated and protected for fishers. Management direction for Old Forest Emphasis Areas and for fuels treatments in various land allocations are expected to maintain habitat for fisher.

Conservation strategies under the Sierra Nevada Forest Plan Amendment for the California Wolverine, American Marten and Sierra Nevada Red Fox include the following: (1) recover and protect populations, (2) minimize fragmentation, and (3) protect den sites. Known den sites for martens will have 100 acres of habitat delineated and protected. In addition, meadow Standards and Guidelines mentioned previously for the great gray owl and willow flycatcher serve to provide preferred foraging habitat for the Sierra Nevada red fox and Standards and Guidelines for Old Forest Emphasis Areas and for fuels treatments in various land allocations, address habitat needs for marten and Sierra Nevada red fox.

DESCRIPTION OF THE PROPOSED PROJECT

The Federal Energy Regulatory Committee (FERC), is in the process of deciding if it will issue a new license for the continued operation of the El Dorado Hydroelectric Project, and, if so, what conditions it will impose in any license issued. In connection with this decision, the Forest Service has developed proposed 4(e) conditions based on the Land and Resource Management Plans (as amended) for the Eldorado National Forest and Lake Tahoe Basin Management Unit. The Forest Service's proposed action is to issue the project conditions described in the document entitled *Forest Service Preliminary Terms and Conditions Provided Under 18 CFR § 4.34 (b) b(1) In Connection With the Application for Relicensing of the El Dorado Hydroelectric Project (FERC No. 184)* (May 1, 2003) which shall be included in any new license the FERC may issue for the continued operation of the El Dorado project.

The El Dorado Hydroelectric Project and its associated facilities are described in the Draft Environmental Impact Statement , El Dorado Hydroelectric Project (FERC No. 184-065), issued in March of 2003. The project occurs within the South Fork of the American River (SFAR)

watershed, on both private land and lands administered by the Eldorado National Forest and Lake Tahoe Basin Management Unit. The project boundary includes 1,334 acres of National Forest System land, occurring between about 3,400 and 8,000 feet in elevation. The El Dorado Project consists of four storage reservoirs (Lake Aloha, Echo Lake, Silver Lake, and Caples Lake), seven diversion dams (occurring on seven tributaries of the SFAR) that provide water to the El Dorado Canal. The El Dorado Canal occupies National Forest System land between the Kyburz Diversion Dam (located on the SFAR just below its confluence with the Silver Fork American River), to the western edge of the Forest boundary at Fresh Pond. Project facilities on National Forest System lands also include a 110 by 40 foot power house on the SFAR, and portions of a 2.8-mile long combination pipeline and penstock conveyance between the El Dorado Forebay and the Akin Powerhouse. Streamflow requirements specified in proposed 4e conditions are described site specifically in this BE where such conditions directly or indirectly affect one of the terrestrial species analyzed in this BE.

The proposed action identifies the following specific conditions to project sensitive terrestrial wildlife species that may occur in the project area, or may be affected by the project.

Conditions Associated with Operation of the El Dorado Canal:

To protect wildlife from the hazards of open canals and other Project facilities, the licensee for the term of a new license for the Project shall maintain and operate in working condition all devices and measures for wildlife along the El Dorado Canal that are deemed necessary by the FS *and CDFG.*

Ensure that all canal crossings and canal fencing on National Forest System lands and licensee adjoining property are maintained in functioning condition. The fencing, canal crossings, and approaches shall be inspected at least twice per year, in the spring and fall prior to deer migration. Fencing repairs or replacement necessary to prevent wildlife from entering the canal will be made and maintained in a manner that will continually allow their use by wildlife. The licensee shall report the results of inspections and maintenance at the annual review meeting described in Condition No. 45.

The licensee shall provide the FS *and ERC* by April 1 of each year an annual report describing the date, location, and species information (deer or other wildlife) found in the El Dorado Canal. In consultation with the agencies listed in Condition No. 45, the FS *and ERC* shall review these data and determine the need for additional fencing or other protective measures. The amount, kind, and location of any additional future fencing shall be decided upon at the annual meeting described in Condition No. 45.

Within 6 months of license issuance, the licensee shall reconstruct those portions of the canal fence that do not meet deer fencing specifications provided by CDFG or shall develop a schedule for completing such work that is agreed upon by the FS *and CDFG.*

Conditions Associated with New Construction or Maintenance of Project Facilities or Recreation Developments:

Before commencing any new construction or maintenance (including but not limited to proposed recreation developments) authorized by the license on National Forest System lands that may affect a FS sensitive species or its habitat, the licensee shall ensure that a biological evaluation (including necessary surveys) is completed that evaluates the potential impacts of the action on the species or its habitat and follows the recommendations in the biological evaluation determined necessary by the FS. The operations and maintenance plan referenced in Condition

No. 45 will assist the FS in determining whether a biological evaluation is necessary for any annual maintenance. The biological evaluation must be approved by the FS. In consultation with FERC, the FS may require mitigation measures for the protection of sensitive species.

Before commencing any activities to construct (including but not limited to proposed recreation developments), operate, or maintain the Project that may affect a species proposed for listing or listed under the federal Endangered Species Act, or that may affect that species' critical habitat, the licensee shall ensure that a Biological Assessment that evaluates the potential impacts of the action on the species or its critical habitat is prepared and reviewed by the FS prior to the licensee submitting the Biological Assessment to the relevant Service agency (United States Fish and Wildlife Service or National Marine Fisheries Service) for consultation or conference in accordance with the Endangered Species Act.

If occurrences of FS sensitive species are detected prior to or during ongoing construction, operation, or maintenance of the Project or during Project operations, the licensee shall immediately notify the FS. If the FS determines that the Project-related activities are adversely affecting the sensitive species, the licensee shall, in consultation with the FS, develop and implement appropriate protection measures.

Conditions requiring construction or improvement of recreation facilities:

1. Silver Lake East Campground

Within 5 years of license issuance, the licensee shall reconstruct the paved surfaces, toilets, and water system at the 62-unit Silver Lake Campground, including upgrade of this facility to meet the current FS design standards and the USDA Forest Service Region 5 accessibility standards requirements of the Americans with Disabilities Act (ADA).

2. Caples Lake Campground

Within 10 years of license issuance, the licensee shall reconstruct the paved surfaces, toilets, and water system at the 36-unit Caples Lake Campground, including upgrade of this facility to meet the most current FS design standards and the USDA Forest Service Region 5 access standards and the Americans with Disabilities Act.

3. Caples Lake Dam Parking

Within 5 years, the Caples Lake Dam Parking area shall be reconstructed and upgraded to meet the current FS design standards and the USDA Forest Service Region 5 access standards and the Americans with Disabilities Act.

Within 7 years of license issuance, the licensee shall construct a new boat launching ramp, associated parking lot, toilet facilities, access road, and picnic area at Caples Lake on land designated by the FS, located on the northeast end of the lake.

4. Information Kiosk on Highway 88

Within 5 years of license issuance, the licensee shall construct an information kiosk to FS specifications, at a location agreed to by the FS.

5. Martin Meadow Overflow Camping Area

Within 5 years of license issuance, the licensee shall make the following improvement at the Martin Meadows Overflow Camping Area to address recreation impacts: Install barrier rocks to restrict uncontrolled vehicle travel. The FS will make available the barrier rocks from a site identified by the FS.

6. Echo Lakes Upper Parking Facility

Within 10 years of licensee issuance, the licensee shall prepare existing parking facility for resurfacing by patching, scarifying, or other methods, as determined by the FS. Place asphalt overlay on parking area.

7. Pacific Crest National Scenic Trail Crossing

Within 5 years, the licensee shall construct a crossing for the Pacific Crest National Scenic Trail across the Echo Conduit, to meet current FS design standards, at a location agreed to by the FS.

SPECIES ACCOUNTS

Appendix A provides a brief summary of the habitat requirements, population status, and threats facing the sensitive species analyzed in this assessment. Appendix A also describes the type and intensity of survey effort and the habitat assumptions and data available on the Eldorado National Forest, for each species analyzed in this evaluation. Table 2 summarizes available information on sensitive species occurrence and habitat in proximity to project facilities.

Table 2. Sensitive species occurrences or habitat within in the project area.

Species	Elevation Range of Habitat (ft)	Preferred Habitat	Potential for Project to Affect this Species
American peregrine falcon	From sea level to summit	Vertical cliff habitat with large potholes or ledges	Suitable habitat occurs within the project area, but there have been no species detections.
California spotted owl	Above 2,000	Mature coniferous forest greater than 40 percent canopy cover and multi-storied conditions	Occupied habitat occurs within the project area.
Northern goshawk	Above 3,000	Older age coniferous, mixed, and deciduous forest habitats	Occupied habitat occurs within the project area.
Great gray owl	4,500 to 7,500	Coniferous forest in association with meadows or other openings with herbaceous vegetation.	Suitable habitat occurs within the project area, but there have been no confirmed species detections.
Willow flycatcher	Below 8,000	Meadows with perennial streams or standing water and willow or alders	Suitable habitat occurs within the project area, but there have been no confirmed species detections.
Pacific fisher	3,000 to 8,000	Dense (60-100% canopy cover) multi-storied, multi-species, late seral stage coniferous forests	Suitable habitat occurs within the project area, but there have been no confirmed species detections.
American marten	Above 4,000	Mature, dense mesic forests of red fir, white fir mix, lodgepole pine, and Sierran mixed conifer	Occupied habitat occurs within the project area.
Sierra Nevada	Above 5,000	Forested areas interspersed	Suitable habitat occurs within the project area,

Species	Elevation Range of Habitat (ft)	Preferred Habitat	Potential for Project to Affect this Species
red fox		with riparian and meadow habitat, and brush fields	but there have been no confirmed species detections.
Wolverine	Above 4,500	Remote areas in mixed conifer, red fir, lodgepole pine, subalpine conifer, alpine dwarf-shrub, wet meadows, and montane riparian habitats	Suitable habitat occurs within the project area, but there have been no confirmed species detections.
Pallid bat	Primarily below 6,000	Most common in open, dry habitats that contain rocky areas for roosting.	Suitable habitat occurs within the project area, but there have been no species detections.
Western red bat	Below 3,000	Riparian and wooded habitats, particularly with willows, cottonwoods, and sycamores	Suitable habitat occurs within the project area, but there have been no species detections.
Townsend's big-eared bat	Below 10,800	Edge habitats along streams and areas adjacent to and within a variety of wooded habitats	Suitable habitat occurs within the project area, but there have been no species detections.

EFFECTS OF THE PROPOSED PROJECT

Peregrine Falcon

Habitat and Occurrence within the Project Area

Potentially suitable cliff nesting sites for peregrine falcons were identified on the Eldorado National Forest in 1980 (Boyce and White 1980). Periodic surveys of the highest capability sites, however, have yielded negative results to date (1980, 1998, 2001). Based upon the 1980 habitat assessment, there are three potential cliff nesting sites that occur in proximity to the project area: Horsetail Falls and Lover's Leap above the SFAR, and Thunder Mountain about a mile from Silver Lake. Surveys in 2000 and 2001 at the Thunder Mountain site did not detect peregrine falcons.

Direct and Indirect Effects

The project will have no direct or indirect effects upon peregrine falcons or peregrine falcon habitat. Peregrine falcons have not been detected in proximity to the project area. Maintenance activities associated with the project and project induced recreation are not degrading habitat or disturbing nesting at potential cliff sites, although recreation use unassociated with the project may be (rock-climbing at Lover's Leap and public use at Horsetail Falls). In addition, license conditions provide that, "if the FS determines that the Project-related activities are adversely affecting the sensitive species, the licensee shall, in consultation with the FS, develop and implement appropriate protection measures." Under this condition, if peregrine falcons are detected in proximity to project facilities in the future, protection measures (such as limitations on the timing of maintenance activities or protections from human disturbance) would be implemented to mitigate direct disturbance or indirect effects to peregrine falcon habitat.

Cumulative Effects

Because relicensing of the El Dorado Hydroelectric Project is not expected to result in direct or indirect effects, the proposed action will not contribute to cumulative effects upon peregrine falcons.

Determination

It is my determination that the proposed action will have no effect upon the peregrine falcon.

California spotted owl

Species Occurrence and Habitat within the Project Area

The majority of the project area provides habitat suitable for spotted owl nesting or foraging and surveys of suitable habitat have occurred in the vicinity of project facilities over the past ten years. Surveys in accordance with USFS survey protocols were conducted in 2000 and 2001 surrounding Echo Lake (EIP Associates 2002, Technical Memorandum No. 1) and along the abandoned portion of the El Dorado Canal during tunnel construction activities in 2000, 2001, 2002 and 2003. Past survey efforts (primarily between 1989 and 1993) have provided information about spotted owl occurrence in proximity to other project facilities. Six spotted owl PACs occur within or adjacent to project facilities along the SFAR (adjacent to the El Dorado Canal, diversion dam and/or tunnels), and one spotted owl PAC occurs in the vicinity of the Echo Lake project reservoir. Spotted owls have not been detected in proximity to the Caples Lake, Silver Lake, or Lake Aloha project reservoirs and suitable habitat around these lakes is limited.

Direct and Indirect Effects

Construction Activities: Relicensing of the El Dorado Hydroelectric Project involves a small amount of construction, primarily occurring within existing campground or parking facilities. New construction sites include a new information kiosk on Highway 88, a new boat launch facility and parking at the NE end of Caples Lake, and the Pacific Crest trail crossing across the Echo Conduit. The trail crossing of the Echo Lake Conduit is the only new construction planned that will occur within spotted owl habitat or in proximity to a known owl site. The Echo Lake conduit occurs within spotted owl PAC ED177. Since proposed 4(e) conditions specify that the Forest Service will be consulted before commencing any new construction or maintenance activities, and that the Forest Service may identify mitigation measures to be implemented to protect sensitive species, it is anticipated that necessary protection measures such as Limited Operating Periods will be identified during site-specific planning for this construction activity.

Routine Maintenance Activities: Routine maintenance of access roads and project facilities is likely to occur at the El Dorado Canal, the existing diversion dams, the Echo Lake Conduit, the pipeline/penstock conveyance, the Akin Powerhouse, and recreation facilities surrounding project reservoirs. Maintenance of project facilities can result in habitat alteration through removal of various trees determined to pose a hazard to project facilities. This usually occurs as part of routine maintenance and site-specific locations and information on these activities is not included in the project description. Of the existing facilities, the El Dorado Canal, several diversion dams, and Echo Lake occur in proximity to spotted owl Protected Activity Centers (PACs). PACs have been mapped around each territorial owl site on the Forest, representing the best 300 acres of habitat surrounding each owl activity center.

The El Dorado Canal and/or its diversion dams occur within a quarter mile of the following spotted owl sites: ED009, ED213, ED054, ED214, ED045, ED139, and recreation facilities at Echo Lake occur within a quarter mile of ED177. Removal of hazard trees along the canal will occur within these PACs but the number of trees and affected area within each PAC is minimal and does not alter overall habitat suitability. Maintenance or repair activities along the canal during the March 1 to August 31 breeding season, could potentially disrupt breeding activities and reduce reproductive success at these sites. Proposed 4 (e) conditions address this issue by requiring "the Forest Service must be consulted before commencing any new construction or maintenance activities, and the Forest Service may require that a Biological Evaluation be

prepared and that mitigation measures be implemented to protect sensitive species" (such as the California spotted owl).

Cumulative Effects

Within the project area, vegetation treatments designed to reduce hazardous fuels are the primary future management activity likely to affect spotted owls. These activities are primarily focused within the urban intermix which includes the Highway 50 corridor, and include: the Plantation Protection Project, Ridgerunner Prescribed burning, Lincoln Log Rx burn, Simpson Prescribed Burn, and Clear Plantation Fuels Reduction. The Eldorado National Forest and Lake Tahoe Basin LRMP's as amended in 2001, (USDA Forest Service 2001) provide a conservation strategy for the spotted owl designed to conserve existing suitable habitat and minimize further habitat degradation while implementing treatments for hazardous fuels. As such, current and future vegetation management activities planned in the vicinity of the El Dorado Hydroelectric Project are unlikely to result in the loss of spotted owl sites or habitat, though some degradation of habitat may occur outside of PACs. Only one owl site occurs in proximity to a project reservoir (Echo Lake), where the growth of future recreation activity associated with the project could be an impact.

About three percent of the 203 spotted owl sites on the Eldorado National Forest occur in close proximity to project facilities (within 0.5 miles). Considering that the license conditions provide the opportunity to analyze for and mitigate impacts associated with future maintenance or construction, the potential for direct and indirect effects of the proposed action upon approximately three percent of owl sites is unlikely to contribute to substantial cumulative effects upon the California spotted owl when combined with other past, present, or reasonably foreseeable future actions. The Eldorado National Forest LRMP as amended in 2001 (USDA Forest Service 2001), provides an overall conservation strategy for the spotted owl designed to conserve existing suitable habitat and minimize further habitat degradation. As such, current and future activities planned in the vicinity of the El Dorado hydroelectric project are unlikely to cumulatively affect spotted owl sites or habitat.

Determination

It is my determination that the proposed action may affect individual spotted owls but is not likely to result in a trend toward Federal listing or loss of viability.

Northern goshawk

Habitat and Occurrence within the Project Area

The majority of the project area provides habitat suitable for goshawk nesting or foraging. Surveys in accordance with USFS goshawk survey protocols were conducted in 2000 and 2001 in suitable habitat occurring within a half-mile of Silver Lake, Caples Lake, and Echo Lake (EIP Associates 2002, Technical Memorandum No 1). These surveys detected goshawks adjacent to Silver Lake (PAC G30-01), but not in proximity to the other project reservoirs. Two previously located goshawk nest stands (G22-13 and G27-06 occur within 0.5 miles of the El Dorado canal (the canal occurs within the PAC for G22-13). also occur ast surveys have located goshawks The El Dorado canal occurs within the protected activity center (PAC) land allocation for goshawk site G22-13.

Direct and Indirect Effects

Construction Activities: None of the new construction activities identified in the proposed action or in proposed 4(e) conditions occur in proximity to known goshawk sites. If new sites are discovered, however, 4(e) conditions allow for developing and implementing appropriate protection measures.

Maintenance Activities: Routine maintenance of access roads and project facilities, including the El Dorado Canal, the existing diversion dams, the pipeline/penstock conveyance and the Akin Powerhouse, and dams at project reservoirs, will occur. Maintenance of project facilities can result in habitat alteration through removal of various trees determined to pose a hazard to project facilities. This usually occurs as part of routine maintenance and site-specific locations and information on these activities is not included in the project description. Goshawk Protected Activity Centers (PACs) have been mapped around each known goshawk nest site on the Forest, representing the best 200 acres of habitat surrounding the nest site. The El Dorado Canal bisects goshawk PAC G22-13. Removal of hazard trees along the canal will continue to occur within the PAC, but the number of trees and affected area within the PAC is minimal and is unlikely such activity is unlikely to alter habitat suitability.

Maintenance activities have the potential to disrupt goshawk nesting if occurring during the March 1 to September 30 breeding season. The El Dorado Canal occurs within a quarter mile of the nest stand for goshawk site G22-13. Maintenance or repair activities along the canal during the March 1 to September 30 breeding season could potentially disrupt breeding activities and reduce reproductive success at the site. Proposed 4 (e) conditions require that "the Forest Service must be consulted before commencing any new construction or maintenance activities, and the Forest Service may require that a Biological Evaluation be prepared and that mitigation measures be implemented to protect sensitive species." This provision reduces the likelihood of any direct effects to goshawks occurring from the project.

Indirect Effects Associated with Recreation Use: Recreation use at project reservoirs likely discourages goshawk nesting in close proximity to campgrounds and use areas. Plasses' Resort at Silver Lake occurs in close proximity to goshawk PAC G30-01. At present there is no information indicating that human activity is affecting goshawks nesting at this site, but the potential for disturbance is high.

Cumulative Effects

The direct and indirect effects of the proposed action are unlikely to contribute to substantial cumulative effects upon the northern goshawk. As described for the spotted owl, vegetation treatments designed to reduce hazardous fuels are the primary management activity likely to affect goshawks in the vicinity of the project areas. These activities are primarily focused within the urban intermix which includes the Highway 50 corridor but not most of the other project facility sites. Current and future vegetation treatments planned in accordance with standards and guidelines in the LRMP are unlikely to result in the loss of goshawk nest sites or habitat, though some degradation of potential nesting habitat may occur outside of PACs.

Three of the 76 goshawk sites on the Forest occur in close proximity to El Dorado Hydroelectric Project facilities (within 0.5 miles). Considering that the license conditions provide the opportunity to analyze for and mitigate impacts associated with future maintenance or construction, the potential direct and indirect effects of the proposed action upon approximately four percent of the known goshawk sites on the Forest is unlikely to result in substantial cumulative effects. The Eldorado National Forest LRMP as amended in 2001 (USDA Forest Service 2001), provides an overall conservation strategy designed to conserve existing suitable habitat and minimize further habitat degradation. As such, current and future activities planned in the vicinity of the El Dorado Hydroelectric Project are unlikely to cumulatively affect goshawk sites or habitat.

Determination

It is my determination that the proposed action may affect individual northern goshawks but is not likely to result in a trend toward Federal listing or loss of viability.

Great Gray Owl

Species Occurrence and Habitat within the Project Area

Great gray owls are found in mixed coniferous forest from 2,400 to 9,000 feet in elevation where such forests occur in combination with meadows or other vegetated openings. Great gray owl habitat occurring within a quarter mile of project facilities included Plasses' meadow (adjacent to Silver Lake) and meadow habitat northeast of Caples Lake. The high elevation of these meadows and their heavy snow depth may reduce the likelihood of great gray owls occupying these sites. Great gray owl surveys have not been conducted in this habitat; currently, however, there is only one known great gray owl occurrence on the Forest, in a low elevation meadow.

Direct and Indirect Effects

Operation of the El Dorado Hydroelectric Project will not result in direct effects to great gray owls or great gray owl habitat. If suitable habitat in close proximity to Silver Lake or Caples Lake is occupied, there could potentially be indirect effects associated with disturbance

Cumulative Effects

Riparian and meadow areas of the Sierra Nevada have been extensively affected by direct removal or inundation of riparian vegetation, particularly in the central Sierra Nevada (SNEP 1996). Whether such habitat loss has affected great gray owls is uncertain given their historically low numbers and spotty distribution in the Sierra Nevada. Inundation of riparian habitat by the El Dorado hydroelectric project has contributed to cumulative losses of meadow habitat but the proposed action is unlikely to result in additional direct or indirect impacts to great gray owls or their habitat, and us therefore unlikely to contribute to additional cumulative effects.

Determination

It is my determination that the proposed action will have no effect upon the great gray owl.

Willow Flycatcher

Species Occurrence and Habitat within the Project Area

Willow flycatcher habitat occurring within a half mile of project facilities and habitat that might be affected by project-associated streamflows, was also mapped. Habitat was identified and mapped at a meadow west of Caples Maintenance station, at the confluence of Caples Creek and Kirkwood creek, at Plasses' meadow, and at the unnamed meadow along Kirkwood Creek, directly east of Kirkwood Inn. Surveys of this habitat were conducted in the summer of 2001, in accordance with USFS willow flycatcher survey protocols dated June 6, 2000 (EIP Associates Technical Memorandum No. 13, 2002). Willow flycatchers were not detected. The closest willow flycatcher population is at Red Lake, about four miles from the Caples Lake portion of the project area.

Direct, Indirect, or Cumulative Effects

Direct impacts to willow flycatchers are not expected to occur from the project since willow flycatchers were not detected during project surveys. Analysis of historic vegetation that likely occurred in the areas inundated by project reservoirs indicates that about 182 acres of meadow vegetation was inundated by Silver Lake and Caples Lake Reservoirs for the El Dorado Hydroelectric Project (EIP Associates Technical Memorandum No. 5, 2002). Historically the large meadows adjacent to the pre-project Silver Lake and Twin Lakes, may have provided habitat for willow flycatchers. Assuming this, the project has resulted in a loss of about 182 acres of willow flycatcher habitat. Suitable, but unoccupied, meadow habitat is affected by operation of Caples Lake. In dry years the project has resulted in a loss or reduction of peak flows from

mid-April to mid-May (EIP Associated Technical Memorandum No. 12, 2002) potentially reducing the wetness of the meadow in the summer, and its associated quality as habitat for willow flycatchers. The condition of the channel below the Caples Lake spillway suggests that there have been major spills in the past that have caused losses of riparian vegetation due to scouring. Proposed 4(e) condition Number 34 requires spring pulse flows from Caples Lake and limits fall release flows in the Caples Creek channel. This requirement is intended to restore a more natural hydrograph in Caples Creek. Assuming this increases meadow wetness in the early summer months and improves willow recruitment, the project is likely to result in improvement of willow flycatcher habitat in the meadows below Caples Lake.

Cumulative Effects
Riparian areas of the Sierra Nevada have been extensively affected by direct removal or inundation of riparian vegetation, particularly in the central Sierra Nevada (SNEP 1996). Inundation of riparian habitat by the El Dorado Hydroelectric Project has contributed to cumulative losses of meadow habitat within the Sierra Nevada. The proposed action does not result in additional direct or indirect impacts to willow flycatchers or their habitat, and is likely to improve the condition of existing habitat below Caples Lake. The proposed action is not expected to contribute to additional cumulative effects to willow flycatcher habitat, beyond those that resulted from its initial construction.

Determination
It is my determination that the proposed action will have no effect upon the willow flycatcher. The project may beneficially affect habitat for this species.

Townsend's Big-Eared Bat

Habitat and Occurrence within the Project Area

Townsend's big-eared bats are highly selective in their choice of roost locations which include old buildings, mines, or caves that remain undisturbed (Appendix A). The El Dorado Tunnel, and especially the portion of this tunnel abandoned following construction of the Mill to Bull Tunnel, and the Akin Powerhouse could provide habitat for Townsend's big-eared bats. The tunnel was visually surveyed for roosting bats on June 29, 1999, with none detected. Acoustic surveys in 1999 and 2000 at the powerhouse detected a number of bat species and could not rule out use by Townsend's big-eared bats. The de-watered portion of the El Dorado Tunnel, was identified as providing excellent potential habitat for Townsend's big-eared bats.

Direct, Indirect, or Cumulative Effects

Direct, indirect, or cumulative effects to Townsend's big-eared bats are not expected to result from the project since the species was not detected at potentially suitable roost locations identified in the project area, and since suitable habitat will not be eliminated.

Determination
It is my determination that the proposed action will have no effect upon the Townsend's big-eared bat.

Recommendations

1. The de-watered portion of the El Dorado Tunnel should be managed to provide access and habitat for bats. If the tunnel opening is closed, a bat gate designed to maintain bat access and habitat, should be used.

Pallid Bat

Habitat and Occurrence within the Project Area

A pallid bat was detected during 2001 surveys along the Silver Fork American River, but little additional information exists about the species presence and distribution on the ENF. Pallid bats are considered to be a roosting habitat generalist utilizing many different natural and man-made structures. Rock crevices and cavities in broken branches of oaks are commonly used as roost locations. Foraging occurs most commonly within edges, open stands, and particularly within hardwood or hardwood-conifer stands (Appendix A). Several sites identified as potential roosting habitat for pallid bats were surveyed during the fall of 1999 and spring of 2000 (EIP Associates 2002, Technical Memorandum No. 3). These were identified as potential roosting habitat where maintenance work was currently occurring or anticipated to occur in the future. The El Dorado Tunnel, the Alder Creek tailings pile, Bull Creek portal site, and the Akin Powerhouse were surveyed. The El Dorado Tunnel was visually surveyed for roosting bats on June 29, 1999 with none detected. Acoustic surveys of the Alder Creek tailings pile detected foraging bats but were inconclusive about whether roosting was occurring. Habitat assessment in the vicinity of the Bull Creek portal determined that rock outcrops in the area include numerous crevices that could provide proosting sites for pallid bats; acoustic surveys were inconclusive. Surveys of the Akin Powerhouse concluded that a number of bat species, possibly including the pallid bat, may be in the area.

Direct and Indirect Effects

Removal of hazard trees, and particularly of large oaks, could remove roosts utilized by the pallid bat. Hazard tree removal would be limited to such a small fraction of the species available habitat that it would be unlikely to have any measurable effect. Displaced bats would be likely to find replacement habitat in the area.

Cumulative Effects

Urban expansion and private harvest of hardwoods have removed large amounts of foraging habitat available to pallid bats. Conservation measures considered important to pallid bats include promoting development of hardwood stands and maintaining existing oaks, creation of open understories that allow for flight, reducing overstocked conditions, and maintaining a mosaic of shrub cover as opposed to dense, continuous stands (USDA Forest Service, 2001). Future actions on National Forest System lands are likely to be complementary to these measures. Neither snags nor oaks are targeted for removal under current Forest Plan direction, except where they are hazard trees within recreational sites, administrative sites, and along important roadways. Cumulative effects to the pallid bat from activities on National Forest System lands should therefore be quite limited. In the absence of additional activities cumulatively impacting the species on National Forest System lands, the direct and indirect effects associated with the proposed action will not contribute to substantial cumulative impacts.

Determination

It is my determination that the proposed action may affect individuals but is not likely to lead to a trend toward Federal listing or loss of viability for the pallid bat.

Recommendations

1. The de-watered portion of the El Dorado Tunnel should be managed to provide access and habitat for bats. If the tunnel opening is closed, a bat gate designed to maintain bat access and habitat, should be used.

Western Red Bat

Habitat and Occurrence within the Project Area

Little information exists about the presence and distribution or the western red bat on the ENF. Western red bats are found primarily in riparian and wooded habitats, particularly with willows, sycamores, and cottonwoods, and generally below 3,000 (Appendix A). The species roosts singly in trees or leaf litter. Habitat could occur along the SFAR; the species was not detected during acoustic surveys conducted at the powerhouse in 1999 and 2000 (EIP Associates 2002, Technical Memorandum No. 3).

Direct and Indirect Effects

It is unknown whether the species occurs within the project area. Hazard tree removal for protection of project facilities (the Akin Powerhouse and penstock conveyance) would be limited to such a small fraction of the available habitat that it would have no more than minimal effect.

Cumulative Effects

Threats and cumulative impacts to this species are largely unstudied and unknown. Wildfire and prescribed burning may result in loss of habitat elements, and cumulative effects to the species may occur with increasing fuels reduction and prescribed burning activities. The project is unlikely to result in direct or indirect effects to the red bat, and will therefore not contribute to cumulative effects.

Determination

It is my determination that the proposed action will have no effect upon the western red bat.

Pacific Fisher

Species Occurrence and Habitat within the Project Area

As described in Appendix A, various surveys conducted over the past ten years have not detected fisher on the Eldorado National Forest, and indications are that they either occur in very low numbers or are absent from the forest. Suitable habitat occurs within the project area where mature to old forest conditions, with moderate to high canopy cover, exist. Approximately 5,153 acres of suitable fisher habitat was mapped within a quarter mile of project facilities (the four project reservoirs and the El Dorado Canal) (EIP Associated Technical Memorandum No. 8, 2002). (The following CWHR size and density classes in forested types were defined as suitable habitat 4M, 4D, 5M, 5D and 6). Much of this mapped habitat is at high elevations that are probably marginal as fisher habitat.

Direct and Indirect Effects

If fisher were present, the limited and localized activities that occur for project maintenance at the Akin Powerhouse, along the El Dorado Canal, and at project reservoirs and diversion dams, would be unlikely to result in substantial disturbance or displacement of animals. Portions of the El Dorado Canal occurring outside the Cleveland wildfire, occur within suitable fisher habitat and the presence of the canal could reduce upslope and downslope movement of fisher if this habitat were occupied, though it is hoped that crossing structures adequately mitigate this effect. Since fisher in the Sierra Nevada appear to prefer the mixed conifer and conifer-oak habitat that occurs below the elevation of the project reservoirs (Carroll et al. 1999), the indirect effects of recreation use at project reservoirs have probably been minor.

Cumulative Effects

The loss of structurally complex forest (SNEP 1996) and the loss and fragmentation of suitable habitat by roads and residential development has likely played a significant role in both the loss

of fishers from the central Sierra Nevada and its failure to re-colonize areas (USDA Forest Service 2001). Recreational development, increases in road density and traffic levels, and increases in human access to fisher habitat have resulted in cumulative impacts that have affected fisher habitat in the vicinity of the project, as well as throughout much of the central Sierra Nevada. Restoration of sufficient habitat and habitat connectivity in the Sierra Nevada is considered essential to conserving fisher (USDA Forest Service 2001). Since the project will not remove or degrade existing fisher habitat it will not contribute to these cumulative effects.

Determination

It is my determination that the proposed action may affect individual fisher but is not likely to result in a loss of viability or trend toward Federal listing.

American Marten

Species Occurrence and Habitat within the Project Area

Marten have been detected at numerous locations on the Eldorado National Forest from track plate surveys, snow surveys, and visual observations, all above 5,000 feet in elevation, and at a number of locations on the Lake Tahoe Basin Management Unit. Detections have been recorded within a half-mile of Silver Lake and Caples Lake. In the project area, marten habitat occurs in the mixed fir, red fir, lodgepole pine, or subalpine conifer habitat types which typically occur above 5,000 feet in elevation. These habitats are prevalent surrounding the four project reservoirs and it is likely that marten occur in the vicinity of the reservoirs. Approximately 3,954 acres of marten habitat was mapped within a quarter mile of project facilities that occur above 5,000 feet in elevation (the four project reservoirs) (EIP Associated Technical Memorandum No. 8, 2002). (The following CWHR size and density classes in forested types were defined as suitable habitat 4M, 4D, 5M, 5D and 6).

Direct and Indirect Effects

Construction Activities: New construction sites include a new information kiosk on Highway 88, a new boat launch facility and parking at the NE end of Caples Lake, and the Pacific Crest trail crossing across the Echo Conduit. Improvements to a number of existing facilities at Silver Lake, Caples Lake, and Echo Lakes, are also planned. The high level of recreation activity and human presence at these project sites probably discourages regular use of the areas by marten, at least during the summer months. The construction of a new parking lot and boat launch facility at Caples Lake will remove marten habitat, but, given the proximity to Highway 88, the habitat quality is low.

Routine Maintenance Activities: Removal of hazard trees for developed recreation sites and project facilities would not have any substantial effect upon marten habitat given its limited scope and extent in relation to a marten home range area.

Indirect Effects Associated with Recreation Use: Recreation use at project reservoirs probably discourages marten from establishing den sites or regular foraging areas in close proximity to the reservoirs.

Cumulative Effects

Sufficient amounts and connectivity of habitat at the home range and landscape scale is important for maintaining marten populations (Hargis et al. 1995). The higher elevation habitats occupied by marten have been less affected by past timber harvest and habitat alteration (USDA Forest Service 2001). Future vegetation treatments in these habitats are likely to be fairly limited under current Forest Plan direction (USDA Forest Service 2001). Higher elevation habitat is

cumulatively affected by recreation use and activities, such as OHV and snowmobile use, ski resorts, camping and day use. The project boundary includes a total of 3,954 acres of habitat. This represents less than two percent of the 227,000 acres of habitat estimated to occur forest wide (based upon the forest vegetation inventory). It is therefore unlikely that the indirect effects associated with recreation use at project reservoirs, would be likely to substantially affect marten.

Determination

It is my determination that the proposed action may affect individual marten but is not likely to result in a loss of viability or trend toward Federal listing.

Sierra Nevada Red Fox

Species Occurrence and Habitat within the Project Area

There have been no confirmed sightings of the Sierra Nevada red fox on the ENF or LTBMU since the 1970's although there have been a few unconfirmed sightings. Although thought to be a habitat generalist, the Sierra Nevada red fox prefers forests interspersed with open meadow areas used for hunting and forested habitats for cover and reproduction.

Direct and Indirect Effects

Caples, Silver and Echo Lakes occur in proximity to meadows. The high levels of localized disturbance surrounding these lakes would most likely result in avoidance of the immediate area surrounding the reservoir by Sierra Nevada red fox. Additional actions that result in habitat alteration (hazard tree removal or other vegetation clearing) are unlikely to add further impact beyond that already caused by development and human use at these sites.

Cumulative Effects

In combination with past disturbances and future activities, indirect effects of the project are unlikely to The approximately 4,000 acres of habitat occurring within a quarter mile of project facilities, does not represent a substantial impact upon the amount, availability of quality of habitat for this species.

Determination

It is my determination that the proposed action may affect individual Sierra Nevada red fox but is not likely to result in a loss of viability or trend toward Federal listing.

California Wolverine

Species Occurrence and Habitat Within the Project Area

Several incidental sightings of wolverine have been reported on the ENF and the LTBMU in recent years, but surveys have failed to detect the species. Remote areas above 4500 feet in elevation may provide habitat for wolverine on the ENF and LTBMU. With the exception of Lake Aloha, the project reservoirs and other areas containing project facilities are too heavily affected by roads and human activity to provide habitat likely to be occupied by wolverine.

Direct, Indirect, and Cumulative Effects

Suitable habitat for wolverine, present only in the vicinity of Lake Aloha, will not be affected by the project. The proposed action will not result in additional public access or disturbance to wolverine habitat.

Determination

It is my determination that the proposed action will have no effect upon the wolverine.

DETERMINATIONS

The proposed action will have no effect upon the following species:

Peregrine falcon
great gray owl
willow flycatcher
Townsend's big-eared bat
California wolverine

The proposed action may affect individuals but is not likely to result in a trend toward Federal listing or loss of viability for the following species:

California spotted owl

Northern goshawk

Pallid bat

Western red bat

Pacific fisher

American marten

Sierra Nevada red fox

LITERATURE CITED

Carroll, C., W.J. Zielinski and R.F. Noss. 1999. Using presence-absence survey data to build and test spatial habitat models for mesocarnivores: the fisher (Martes pennanti) in the Klamath region, U.S.A. Conservation Biology. 13:1344-1359Ebert, J. 1999. Bald Eagle Habitat Management Plan, Eldorado National Forest. Pacific Southwest Region, USDA Forest Service.

EIP Associates. 2002. Technical Memorandum No. 1: Summary Report for Northern Goshawk, California spotted owl, Peregrin Falcon, Bald Eagle, and Willow Flycatcher Surveys. April 2, 2002.

EIP Associates. 2002. Technical Memorandum No. 3: Summary of Field Surveys for Bats. April 2, 2002.

EIP Associates. 2002. Technical Memorandum No. 5: Pre-project habitat analysis maps for Silver Lake, Caples Lake, Echo Lake, and Lake Aloha. April 23, 2002.

EIP Associates. 2002. Technical Memorandum No. 8: Habitat Maps for Wolverine, Fishe, Pine marten, Sierra Nevada snowshoe hared, and Sierra Nevada red fox. April 2 2002.

EIP Associates. 2002. Technical Memorandum No. 12: Riparian Vegetation Studies Status. August 26, 2002.

EIP Associates. 2002. Technical Memorandum No. 13: 2001/2002 willow flycatcher surveys. April 2 2002.

Hargis, C.D. and J.A. Bissonette. 1995. The effect of forest fragmentation on American marten populations and prey availability. Final report for the Utah Division of Wildlife Resources, Wasatch-Cache National Forest, Ashley National Forest, Utah Wilderness Association (Contract No. 91-9166). December 31, 1995. 96pp.

Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, L.J. Lyon and W.J. Zielinski, tech. eds. 1994. The Scientific Basis for Conserving Forest Carnivores: American Marten, Fisher, Lynx, and Wolverine in the United States. Gen. Tech. Rep. RM-254. Ft. Collins, CO: U. S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 184 pp.

SNEP 1996. Sierra Nevada Ecosystem Project, Final Report to Congress. Status of the Sierra Nevada, Volume II. Centers for Water and Wildand Resources, University of California , Davis, Wildand Resources Center Report NO. 37. July 1996.

USDA Forest Service. 2001. Sierra Nevada Forest Plan Amendment. Final Environmental Impact Statement and Record of Decision. Pacific Southwest Region, USDA Forest Service.

USDA Forest Service. 1989. Eldorado National Forest Land and Resource Management Plan. Pacific Southwest Region, USDA Forest Service.

APPENDIX A
Species Accounts

Bald Eagle *Updated May 2000*

Status and Management Direction

The bald eagle was listed by the FWS as a federally endangered species in 1978. On July 12, 1995, this species was reclassified to Threatened status in the lower 48 states. It was proposed for de-listing on July 6, 1999. Following de-listing, the species will be placed on the Region 5 Regional Forester's Sensitive Species List (USDA Forest Service 1999). The species' status as "Sensitive" in Region 5 will be re-evaluated at the end of the five-year monitoring period that is identified in the U.S. Fish and Wildlife Service's Final Rule for de-listing the species, as published in the Federal Register; or if there is a change in the species' status under the ESA during this period (for example, if the FWS initiated re-listing due to information gathered from monitoring).

Bald eagles will continue to be protected under the Migratory Bird Treaty Act of 1918 and the Bald and Golden Eagle Protection Act. Measures currently being taken to minimize disturbance at nesting sites should be maintained in future management for this species. The FWS is currently preparing a de-listing monitoring plan.

A recovery plan has been prepared for the Pacific States. Critical habitat is not currently mapped or proposed for bald eagle in the Sierra Nevada. Bald eagle habitat (nesting or winter) occurs throughout the Pacific Southwest Region, which includes both the Sierra Nevada and Klamath Provinces. The Eldorado LRMP directs us to manage nesting and wintering habitats for target populations as specified in the species recovery plan. A draft Bald Eagle Habitat Management Plan, tied to the Pacific Bald Eagle Recovery Plan, has been written for the ENF and is currently being reviewed by the FWS (El Dorado National Forest, 1999).

Population Status

Both wintering and summer nesting surveys have occurred annually on the ENF since the early 1980s (Eldorado National Forest, 1999). Wintering bald eagle use occurs at all major reservoirs on the Forest that remain unfrozen. A single pair of bald eagles has nested at Union Valley Reservoir since the mid-1980s. Suitable nesting habitat also occurs around Caples Lake, Silver Lake, Bear River Reservoir, Salt Springs Reservoir, Jenkinson Lake, Lake @ but nesting eagles have not been located at these sites.

Life History and Habitat Requirements

Nesting territories are normally associated with lakes, reservoirs, rivers or large streams (Lehman 1979). Bald eagle nests are usually located in uneven-aged (multi-storied) stands with old growth components (Anthony et al. 1982). Most nests in California are located in predominantly coniferous stands. Factors such as relative tree height, diameter, species, position on the surrounding topography, distance from water, and distance from disturbance also appear to influence nest site selection (Grubb 1976, Lehman et al. 1980, Anthony and Isaacs 1981).

Trees selected for nesting are characteristically one of the largest in the stand or at least codominant with the overstory. Nest trees usually provide an unobstructed view of the associated water body

and are often prominently located on the topography. Live, mature trees with deformed tops are occasionally selected for nesting. Of the nest trees identified in California, about 71 percent were ponderosa pine, 16 percent were sugar pine, and 5 percent were incense cedar. The remaining 8 percent were distributed among five other coniferous species. Nest tree characteristics in California have been defined by Lehman (1980) as being 41 to 46 inches in diameter at breast height and in excess of 100 feet tall.

In California, 73 percent of the nest sites were within 0.5 mile of a body of water, and 89 percent within 1 mile. No nests were known to be over 2 miles from water. Bald eagles often construct several nests within a territory and alternate between them from year to year. Up to 5 alternative nests may be constructed within a single territory (U. S. Fish and Wildlife Service 1986).

Snags, trees with exposed lateral limbs, or trees with dead tops are often present in nesting territories and are used for perching or as points of access to and from the nest. Such trees also provide vantage points from which territories can be guarded and defended.

Breeding is initiated as early as January 1 via courtship, pair bonding, and territory establishment, and normally ends approximately August 31, as the fledglings are no longer attached to the immediate nest site. This time frame may vary with local conditions and knowledge. Incubation may begin in late February to mid-March, with the nestling period extending to as late as the end of June. From June through August, the fledglings remain restricted to the nest until they are able to move around within their environment.

Effective breeding area management should avoid a flight response which is typically induced by disturbance at 200 to 300 m (Grubb et al. 1992). In their study of breeding bald eagle responses to human activities, Grubb et al. (1992) recommend a no activity primary zone of 500 to 600 m from nest sites, followed by a secondary zone of 1000 to 1200 m.

Wintering habitat is associated with open bodies of water, primarily in the Klamath Basin (Detrich 1981, 1982). Smaller concentrations of wintering birds are found at most of the larger lakes and man-made reservoirs in the mountainous interior of the north half of the state and at scattered reservoirs in central and southwestern California. Some of the state's breeding birds winter near their nesting territories.

Two winter habitat characteristics appear to play a significant role in habitat selection in the cold months: diurnal perches and communal night roost areas. Perches are normally located in close proximity to a food source. Most tree perches selected by eagles provide a good view of the surrounding area (USDI Fish and Wildlife Service 1986), often utilizing the highest perch sites available (Stalmaster 1976).

Habitat requirements for communal night roosting are different from those for diurnal perching. Communal roosts are invariably near a rich food resource. In forest stands that are uneven-aged, communal roosts have at least a remnant of old-growth forest components (Anthony et al. 1982). Most communal winter roosts used by bald eagles throughout the recovery areas offer considerably more protection from the weather than diurnal habitat. Keister and Anthony (1983) found that bald eagles used old-growth forest stands as far as 9.6 miles from the food source in the Klamath Basin.

The most common food sources for bald eagle in the Pacific region are fish, waterfowl, jackrabbits, and various types of carrion (USDI Fish and Wildlife Service 1986). Diurnal perches are used during foraging; these usually have a good view of the surrounding area and are often the highest perch sites available (Stalmaster 1976).

Literature Cited

Alt, K.L. 1980. Ecology of the nesting bald eagle and osprey in the Grand Teton-Yellowstone National Parks Complex. M.S. Thesis, Montana State Univ., Bozeman. 95 pp.

Anthony, R.G., R.L. Knight, G.T. Allen, B.R. McClelland and J.I. Hodges. 1982. Habitat use by nesting and roosting bald eagles in the Pacific Northwest. Trans. A. Am. Wildl. Natural Res Conf. 47:332-342.

Detrich, P.J. 1981. Historic range of breeding bald eagles in California. Unpublished manuscript. Redding, CA. 17 pp.

Detrich, P.J. 1982. Results of California winter bald eagle survey--1982. U. S. Dept. Int. Fish Wildl. Serv., Sacramento, CA. 16 pp.

Grubb, T.G. 1976. A survey and analysis of bald eagle nesting in Western Washington. M.S. Thesis, Univ. Washington, Seattle. 87 pp.

Grubb, T.G., W.W. Bowerman, J.P. Giesy and G.A. Dawson. 1992. Responses of breeding bald eagles, *Haliaeetus leucocephalus*, to human activities in northcentral Michigan. Canadian Field-Naturalist 106(4):443-453.

Keister, G.P. and R.G. Anthony. 1983. Characteristics of bald eagle communal roosts in the Klamath Basin, Oregon and California. J. Wildl. Manage. 47:1072-1079.

Lehman, R.N. 1979. A survey of selected habitat features of 95 bald eagle nest in California. Calif. Dept. Fish and Game. Wildl. Manage. Branch Admin. Rep. 79-1, Sacramento. 23 pp.

Lehman, R.N., D.E. Craigie, P.L. Colins and R.S. Griffen. 1980. An analysis of habitat requirements and site selection criteria for nesting bald eagle in California. Report by Wilderness Research Institute, Arcata, CA. for U.S. Forest Service. Region 5, San Francisco, CA. 106 pp.

Stalmaster, M.V. 1976. Winter ecology and effects of human activity on bald eagles in the Nooksack River Valley, Washington. M.S. Thesis. West. Washington State Coll. Bellingham, WA. 100 pp.

USDI Fish and Wildlife Service. 1986. Recovery Plan for the Pacific Bald Eagle. U. S. Fish and Wildlife Service, Portland, Oregon. 160 pp.

California Red-legged Frog *(updated Jan. 2001)*

Management Status and Direction: On June 24, 1996, the California red-legged frog, Rana aurora draytonii, was listed as federally threatened (Federal Register May 23, 1996). USFWS identified proposed critical habitat in a draft recovery plan (USFWS 2000). On March, 2001 the Federal Register designated critical habitat for the California red-legged frog (USFWS 2001).

Critical Habitat for the California Red-legged Frog: On March 13, 2001, the final determinations of critical habitat for the California red-legged frog were published in the Federal Register (USFWS 2001). Unit 3, the Weber Creek-Cosumnes Unit, is the area designated as critical habitat that is applicable to this project. These drainages are found within portions of the Weber Creek and the North Fork Cosumnes River watersheds of El Dorado County. This includes the following streams: Weber Creek and its South and North Forks, the North Fork Cosumnes River and its major tributaries including Sly Park Creek, Camp Creek, and Steely Fork Cosumnes River from approximately 3,500 feet elevation to the 5,000 foot contour. Clear Creek, a lower elevation Cosumnes River tributary adjacent to the Weber Creek drainage is also part of Unit 3.

Within the Weber Creek-Cosumnes Unit, critical habitat must meet primary constituent elements which consist of three components: a) essential aquatic habitat; b) associated uplands; and c) suitable dispersal habitat connecting suitable aquatic habitat. At a minimum, this will include two (or more) suitable breeding locations, a permanent water source, associated uplands surounding these water bodies up to 90 m (300 ft) from the water's edge, all within 2 km (1.25 miles) of one another and connected by barrier-free dispersal habitat that is at least 90 m (300 ft) in width (USFWS 2001). When these elements are all present, all other essential aquatic habitat within 2 km (1.25 mi), and free of dispersal barriers, is also considered critical habitat.

Essential aquatic habitat consists of low-gradient water bodies including ponds and calm backwaters within streams. Aquatic habitat used for breeding must have a minimum deep water depth of 20 inches and maintain water during the entire tadpole rearing season (at least March through July). Streams that increase in flow from snow melt in late spring do not provide breeding habitat because still or slack water utilized for egg deposition is not available during the breeding season.

Habitat Account: Along the west slope of the Sierra Nevada, California red-legged frogs (Rana aurora) are assumed to occur at elevations below 4,500 feet. Breeding occurs from November through March with earlier records occurring in southern localities (Storer 1925). Egg mass detections in Spivey Pond (see "existing surveys and sightings" below) indicate the breeding season extends into April in the central Sierra Nevada foothills. Temperature does not seem to be a limiting factor for successful reproduction (Jennings, in litt., 1996). Egg masses containing 2,000 to 5,000 eggs are laid during or shortly after large rainfall events in late winter or early spring (Hayes and Miyamoto 1984). Eggs are typically attached to vertical emergent vegetation such as bulrushes or cattails (Jennings et al. 1992) so that the egg mass floats on the surface of the water (Hayes and Miyamoto 1984). Eggs hatch in 6 to 14 days (Storer 1925). Larvae undergo metamorphosis 3.5 to 7 months after hatching between July and September (Storer 1925, Wright and Wright 1949, Jennings and Hayes 1994). Sexual maturity by males can be attained at 2 years of age by males and 3 years of age by females (USFWS 2000), and CRLF may live 8 to 10 years (Jennings et al. 1992).

CRLF are most commonly associated with deep-water pools (>0.7 m deep) with dense stands of overhanging willows (Salix spp.) and an intermixed fringe of cattails (Typha latifolis), bulrushes (Scirpus spp.), or sedges (Carex spp.) (Hayes and Jennings 1988). Adults require dense, shrubby, or emergent riparian vegetation which is an important source of cover (Hayes and Jennings 1988, Fellers and Freel 1996). For breeding, the aquatic habitat must have a minimum water depth of 20 cm (8 in) and maintain water during the entire tadpole rearing season (at least March through July)(USFWS 2000). These are not limiting factors, as CRLF have also been observed inhabiting stock ponds and artificial pools completely devoid of vegetation. The key to the presence of red-legged frogs in all of these habitats is the presence of perennial or near perennial standing water (still or slackwater) and the general lack of introduced aquatic predators such as centrarchid

fishes, crayfish, and bullfrogs (Rana catesbeiana) (Jennings, in litt., 1996). Continued survival of red-legged frogs in all aquatic habitats seems to be based on the continued presence of ponds, springs, or pools that are disjunct from perennial streams. Such habitats provide the continued basis for successful reproduction and recruitment into nearby drainages that may lose frog populations due to stochastic events such as extreme flooding and droughts or from loss caused by introduced aquatic predators (Jennings, in litt., 1996).

CRLF disperse upstream and downstream from their breeding habitat and have been observed at distances exceeding 2.9 km (1.8 miles) (USFWS 2000). Low gradient streams with dense riparian vegetation may be favorable to long distance movements. They have been found further than 100 m (328 feet) from water in adjacent dense riparian vegetation (USFWS 2000). Newly metamorphosed juveniles tend to disperse locally July through September and then disperse away from the breeding habitat during warm rain events (USFWS 2000). This dispersal is important for the long term suvival and recovery of the species as the dispersing individuals can recolonize areas subjected to localized extinctions (USFWS 2000).

Sheltering habitat for the CRLF is potentially all aquatic and riparian areas within the range of the species and includes any landscape features that provide cover and moisture during the dry season up to 300 feet from breeding habitat. This could include boulders or rocks and organic debris such as downed trees or logs; industrial debris; and agricultural features, such as spring boxes, abandoned sheds, or hay-ricks. Incised stream channels with portions narrower than 18 inches and depths greater than 18 inches may also provide sheltering habitat (USFWS 1996a). California red-legged frogs also shelter in small rodent burrows and moist leaf litter (Jennings and Hayes 1994). CRLF found in coastal drainages are rarely inactive (Jennings et al. 1992), whereas those found in interior sites may hibernate (Storer 1925).

The diet of CRLF is highly variable. Larvae probably eat algae (Jennings et al. 1992). Hayes and Tennant (1986) found invertebrates to be the most common food items of adult frogs. Vertebrates, such as Pacific tree frogs (Hyla regilla) and California mice (Peromyscus californicus), represented over half of the prey mass eaten by larger frogs (Hayes and Tennant 1986). Hayes and Tennant (1986) found juvenile frogs to be active diurnally and nocturnally, whereas adult frogs were largely nocturnal. Feeding activity likely occurs along the shoreline and on the surface of the water (Hayes and Tennant 1986).

CRLF populations persist and flourish where suitable breeding and nonbreeding habitats are interspersed throughout the landscape and are interconnected by unfragmented dispersal habitat. Where this habitat mosaic exists, local extinctions may be counterbalanced by the colonization of new habitat or recolonization of unoccupied areas of suitable habitat (USFWS 2000). Isolated patches far removed from occupied patches eventually go extinct (USFWS 2000). Because of this populations of CA red-legged frogs are most likely to persist where multiple breeding areas are within an assemblage of habitats used for dispersal (USFWS 2000).

Existing surveys and sightings: There are no known occurrences or historical records of this species on the Eldorado National Forest. In the vicinity of the Eldorado National Forest but not on NF lands, adult California red-legged frogs were detected at two locations in the North Fork of Weber Creek during 1996 and 1997. Egg masses and adults have been detected on private land in Spivey Pond on the North Fork of Weber Creek in 1998, 1999, and 2000. These detections are upstream from the previously reported location at Snows Road and within one mile of the forest boundary. In addition, there are eight other locations east of Highway 49 within Placer, El Dorado, and Amador Counties where California red-legged frogs have been historically reported. These locations are: approximately four miles ENE of Foresthill, one half mile NE of Dutch Flat,

South Fork of Weber Creek at Snows Road, Traverse Creek at Traverse Creek Road, one mile SE of Placerville, tributary to the North Fork of the Cosumnes River N of Plymouth, Sutter Creek between Sutter Creek and Volcano, and a pond in the Misery Creek drainage near Pioneer (Jennings and Hayes 1992). The North Fork Weber Creek detection at Spivey Pond is at an elevation of 3,200 feet. All of these historic and current sightings occurred below 3,500 feet in elevation.

During 1997, intensive surveys were conducted on portions of two streams within the Eldorado National Forest, Sopiago and Big Canyon Creeks. A 1997 survey of the South Fork American River for California red-legged and foothill yellow-legged frogs between Alder Creek and approximately 0.5 mile downstream of Riverton resulted in no observed amphibians (Jones and Stokes 1997). Four reaches of three streams were surveyed in 1995, Bear Creek, Rock Creek, and Camp Creek (Fellers and Freel 1996). No CRLF were found in any of these surveys. The streams surveyed in 1995 were considered unlikely habitat for CRLF, primarily due to the lack of slow moving water and shrubby or emergent vegetation required for egg laying and cover for adults (Fellers and Freel 1996). Two streams were surveyed in both 1992 and 1993, Steely Fork of the Cosumnes River and Big Canyon Creek (Martin 1993, Martin, in litt., 1995). Numerous stream surveys in project areas below 5,000 feet elevation have not found any CRLF.

Eldorado National Forest Numerous stream surveys in project areas below 5,000 feet elevation have not found any CRLF (Table 1). The following stream surveys have occurred, some to USFWS CRLF protocol and some not to protocol, as found in the Eldorado NF CRLF database.

Table 1. Stream surveys performed for CRLF in locations below 5000 feet in elevation, year surveyed, and whether the USFWS CRLF protocol was used.

Stream	Year	Survey to Protocol?
Sopiago Creek	1997 1997	Yes No
Big Canyon Creek	1997 1992	Yes No
Steely Fork Cosumnes River	1992, 1993, 1998	No
Bear Creek	1995	No
Rock Creek	1995	No
Camp Creek	1995	No
South Fork American River	1997	Yes
Traverse Creek	1991 and 1995	No
North Fork Weber Creek	1997	Yes
Rock Canyon Creek	1991	No
Snow Canyon Creek	1992 and 1993	No
South Fork Long Canyon Creek	1999 and 2000	No
South Fork Silver Creek	1999	No
West Panther Creek	2000	No

References

Fellers, G.M. and K. Freel. 1996. 1995 Aquatic amphibian surveys: Eldorado National Forest. Final report submitted to Eldorado National Forest, Placerville, CA. 8pp.

Hayes, M.P. and M.R. Jennings. 1988. Habitat correlates of distribution ofthe California red-legged frog (Rana aurora draytonii) and the foothill yellow-legged (Rana boylii): Implications for management. Pages 144-158 In: R. Sarzo, K.E. Severson, and D.R. Patton (technical coordinators). Proceedings of the Symposium on the Management of Amphibians, Reptiles, and Small Mammals in North America. U.S.D.A. Forest Service General Technical Report RM-166.

Hayes, M.P. and M.M. Miyamoto. 1984. Biochemical, behavioral, and body size differences between Rana aurora aurora and R. a. draytonii. Copeia 1984(4): 1018-1022.

Hayes, M.P. and M.R. Tennant. 1986. Diet and feeding behavior of the California red-legged frog, Rana aurora draytonii (Ranidae). The Southwestern Naturalist 30(4): 601-605.

Jennings, M.R. and M.P. Hayes. 1992. Copy of locality records from the data base of Mark. R. Jennings and Marc P. Hayes for use in support of the petition to list Rana aurora draytonii under the Endangered Species Act. 30pp.

Jennings, M.R. and M.P. Hayes. 1994. Amphibian and reptile species of special concern in California. Report prepared for the California Department of Fish and Game, Inland Fisheries Division, Rancho Cordova, CA. 255pp.

Jennings, M.R., M.P. Hayes, and D.C. Holland. 1992. A petition to the U.S. Fish and Wildlife Service to place the California red-legged frog (Rana aurora draytonii) and the western pond turtle (Clemmys marmorata) on the list of endangered and threatened wildlife and plants. 21pp.

Jones and Stokes Associates. 1997. California red-legged frog surveys results for PG&E at the Riverton Water Supply System Project area. Prepared for Pacific Gas and Electric Company by Jones and Stokes Associates, Inc., 2600 V Street, Suite 100, Sacramento, CA.

Martin, D.L. 1993. Sierra Nevada anuran survey: An investigation of amphibian population abundance in the National Forests of the Sierra Nevada of California: Summer 1992 survey. Canorus Ltd., Sacramento, CA.

Rathbun, G.B., M.R. Jennings, T.G. Murphy, and N.R. Siepel. 1993. Status and ecology of sensitive aquatic vertebrates in lower San Simeon and Pico Creeks, San Luis Obispo County, California. U.S. Fish and Wildlife Service, National Ecology Research Center, San Simeon, CA. Prepared for the California Department of Parks and Recreation. 103pp.

Storer, T.I. 1925. A synopsis of the amphibia of California. University of California Publications in Zoology 27:1-342.

USFWS. 1996a. Endangered and threatened wildlife and plants; Determination of threatened status for the California red-legged frog. Federal Register 61(101):25813-25833.

USFWS. 1996b. Interim guidelines for determining protective measures for timber harvest plans to avoid take of the California red-legged frog. Enclosure in letter to Richard Wilson,

California Department of Forestry and Fire Protection, Sacramento, CA. November 27, 1996.

USFWS. 1997. Interim guidance on site assessment and field surveys for California red-legged frogs. USDI Fish and Wildlife Service, Sacramento, CA.

USFWS. 2000. Draft recovery plan for the California red-legged frog (*Rana aurora daytonii).* USDI Fish and Wildlife Service, Portland, OR. January.

USFWS. 2001. Federal register part III: 50 CFR part 17 - Endangered and threatened wildlife and plants; final determination of critical habitat for the California red-legged frog (Rana aurora draytonii); proposed rule. March 13.

Wright, A.H. and A.A. Wright. 1949. Handbook of frogs and toads of the United States and Canada. Comstock Publishing Company, Inc., Ithaca, NY. xii + 640pp.

In litterae:

Fellers, G.M. 1997. Copy of field data sheet for site T-100, surveyed by A. Howard and M. Siemens, Biological Resources Division, USGS, Point Reyes National Seashore, Point Reyes, CA.

Jennings, M.R. 1996. Copy of facsimile to Kelly Geer, U.S. Fish and Wildlife Service, regarding draft proposed definition for California red-legged frog habitat. August 6, 1996. 2pp.

Martin, D.L. 1995. Copies of field data sheets collected during summer 1995 surveys on the Eldorado National Forest.

Valley Elderberry Longhorn Beetle *updated May 2000*

Habitat for the Valley Elderberry Longhorn Beetle is found primarily in moist valley oak woodlands along the margins of rivers and streams in the lower Sacramento River and upper San Joaquin Valley. They may occur as high as 3000 feet in elevation from Redding south to Bakersfield, and from east to west across the valley. Streamside woodlands have been largely developed or converted to agricultural uses, eliminating most of the elderberry necessary for the beetles' survival. Threats to this species include urban development, insecticides, herbicides and fluctuations in stream water levels (Steinhart 1990).

Reproduction of the valley elderberry longhorn beetle is initiated in the spring, when adults feed on elderberry shrubs (*Sambucus* spp.) occurring in riparian areas. Steinhart (1990) described basic development as follows: After hatching, larvae tunnel into the soft core of elderberry stems and excavate passages in the wood as they feed. Larvae may remain in this stage for as long as two years before they emerge into the light of day as adults.

Critical habitat has been designated, but none occurs on National Forest System lands. There have been no detections of Valley elderberry longhorn beetles from the Eldorado National Forest; the closest detection is from along the American River west of the Forest boundary (Pan-Pacific Entomologist, 2000).

Literature Cited

Jones & Stokes Associates, Inc. 1987. Survey of habitat and populations of the Valley elderberry longhorn beetle along the Sacramento River. Final report prepared for U. S. Department of Interior, Fish and Wildlife Service, Region 1. Sacramento, California.

Pan-Pacific Entomologist, Scientific Note. 2000. Vol 76(1): 74-76.

Steinhart, P. 1990. California's Wild Heritage: Threatened and Endangered Animals in the Golden State. Calif. Dept. of Fish and Game. 108 pp.

American Peregrine Falcon *updated May 2000*

The American peregrine falcon was listed as a federally endangered species from 1970 through 1999. The final rule to de-list the Peregrine falcon was published in the Federal Register on August 25, 1999. Following de-listing the species is placed on the Region 5 Forester's Sensitive Species List (USDA Forest Service 1999). The species' status as "Sensitive" in Region 5 will be re-evaluated at the end of the five-year monitoring period that is identified in the U.S. Fish and Wildlife Service's Final Rule for de-listing the species, as published in the Federal Register; or if there is a change in the species' status under the ESA during this period (for example, if the FWS initiated re-listing due to information gathered from monitoring).

Peregrine falcons will contine to be protected under the Migratory Bird Treaty Act of 1918. Measures currently being taken to minimize disturbance at nesting sites should be maintained in future management for this species. The FWS is currently preparing a de-listing monitoring plan.

While listed under the ESA, no critical habitat was identified for this species. Historically, it was found throughout the Sierra Nevada where suitable habitat occurred. The Eldorado LRMP directs the Forest to introduce one nesting pair into suitable nesting habitat identified during the 1982 peregrine habitat surveys.

Habitat mapping and surveys were conducted in 1982, which focused on mapping and evaluating potential cliff nesting locations. Sixty-nine potential cliff nesting sites were mapped and evaluated; 47 of these sites were rated as having high or moderate potential. In 1993 seven of these sites were surveyed with no detections. The closest eyrie known to have been active within the past ten years is at Salt Springs Reservoir, on the Stanislaus National Forest, imediately adjacent to the Eldorado National Forest boundary. Successful nesting occurred in 1993 and 1994 but the site has not been active since.

Peregrines have relatively strict nesting requirements: Vertical cliff habitat with large potholes or ledges that are inaccessible to land predators and are preferentially located near habitat that has a high avian prey population (such as coastal areas or wetlands with large breeding populations of birds) (Monk and Walton 1988).

Peregrines are known to forage near and occasionally within forested habitat types. However, it is not considered an essential habitat type for any stage of their life history. Breeding activity begins as early as February with pair bonding and territory reestablishment. Young fledge in June and July but remain in the territory until late August.

Literature Cited

Boyce, D.A., and C.M. White. 1980. Peregrine falcon nesting habitat survey on U.S. Forest Service lands along the west slope of the Sierra Nevada Mountains. Submitted to the U.S. Forest Service, Eldorado National Forest, by the Wilderness Research Institute. Sebastopol, CA.

Monk, J., B.J. Walton, R. Olendorff and D. Carrier. 1988. California peregrine falcon implementation plan. Santa Cruz Predatory Bird Research Group. 44 pp.

USDI Fish and Wildlife Service. 1982. Pacific coast American peregrine falcon recovery plan. 87pp.

USDI Fish and Wildlife Service. 1999. Endangered and Threatened Wildlife and Plants; final rule to remove the American peregrine falcon from the federal list of endangered and threatened wildlife, and to remove the similarity of appearance provision for free-flying peregrines in the conterminous United States; final rule. August 25. Federal Register 64 (164): 46542-46558.

California Spotted Owl *(updated May 2001)*

POPULATION STATUS

Context of the Eldorado National Forest in Relation to the Species Range. The Eldorado National Forest occurs in the central portion of the species range and represents about 16 percent of the known population in the Sierra Nevada. There is a relatively uniform distribution of owl sites across the forest and adjoining the Tahoe National Forest to the north and the Stanislaus NF to the south. The elevational range of owl sites on the forest extends from about 3,000 feet to above 8,000 feet, with most owl activity centers occurring below 6,000 feet in elevation.

The range of the California spotted owl extends from the southern Cascades south of the Pit River in Shasta County in the north, to the southern end of the Sierra Nevada mountain range in the south. It includes all mountainous regions of the Southern California Province, and the central coast Ranges at least as far north as Monterey County. Populations are continuous throughout the Sierra Nevada range, permitting dispersal among subpopulations and allowing the species to interact as a metapopulation across the Sierra Nevada. The Sierran population is disjunct from coastal and southern California populations.

Management Status. The California spotted owl (CASPO) is a Forest Service designated sensitive species and a management indicator species on all Sierra Province National Forests in the Pacific Southwest Region. On October 12, 2000, the U.S. Fish and Wildlife Service (FWS) announced its finding that a status review is warranted to determine whether or not the species should be listed as threatened or endangered.

Current Environmental and Population Condition in the Sierra Nevada. The EIS for the Sierra Nevada Forest Plan Amendment (USDA Forest Service 2001) provided a coarse evaluation of current environmental condition for the California spotted owl. The status was ranked as one of five possible conditions ranging from outcome A, where suitable environments are broadly

distributed and at high abundance, to outcome E where suitable environments are highly isolated and exist at very low abundance. The current environmental condition for the California spotted owl was judged in this assessment to be outcome B. Outcome B is described as one where suitable environments are primarily broadly distributed across the range of the species; where temporary gaps occur and suitable environments are absent or only present in low abundance, disjunct areas of suitable environments are typically large enough and close enough to permit dispersal and interaction among subpopulations across the species range. This situation allows operation of metapopulation processes, but there was judged to be some likelihood that existing conditions would result in permanent isolation of some portion of the population (Outcome C).

The current population status for the California spotted owl was also ranked, factoring in the availability of both federal and non-federal habitat and other influences on the spotted owl popoulation. Population status was ranked as outcome B, where "the combination of environmental and population conditions provides the opportunity for the species to be broadly distributed and/or of high abundance across its historical range, but there are gaps where populations are potentially absent or only present in low density as a result of environmental or population conditions. However, the disjunct areas of higher potential population density are typically large enough and close enough to other subpopulations to permit dispersal among subpopulations and potentially to allow the species to interact as a metapopulation across its historical range."

Estimated Population Size and Trend in the Sierra Nevada. Approximately 1,300 California spotted owl territories are known to occur on National Forest lands in the Sierra Nevada.(USDA Forest Service, January 2001). California spotted owls are currently distributed relatively continuously and uniformly throughout their range, although concern exists for fragmentation effects at finer scales, particularly within the geographic areas of concern identified in Verner et al. 1992. Four demographic studies in the Sierra Nevada have reported statistically significant declining population trends over study periods ranging from 8 to 12 years. Although uncertainty exists as to the magnitude of the declines (due to certain assumptions that must be made in the modeling) modeled declines are of sufficient magnitude to warrant concern (USDA Forest Service, January 2001). Apparent declines in censused territorial owls have been noted on at least two of the study areas.

Existing Surveys and Sightings on the Eldorado National Forest. One of the four long-term demographic studies of the California spotted owl population in the Sierra Nevada occurs on the ENF. Demographic parameters have been measured within this study area since 1986. Significant declines in this population over the study period have been detected each year since 1998 (Gutiérrez et al. 2000).

Surveys conducted on the Eldorado National Forest since 1987 have covered an estimated 80 to 90 percent of the suitable spotted owl habitat on the forest, resulting in a current estimate of 207 spotted owl territories on the forest. Survey detections since 1987 are recorded in a forestwide GIS coverage which is updated at the end of each field survey season. Best provessional judgement is used to designate groups of detections thought to represent an individual owl territory, and to designate the activity center associated with the territory. Systematic and comprehensive surveys have been conducted only within the portion of the forest from the Rubicon drainage north to the Middle Fork of the American River (within the demographic study). Elsewhere on the forest the majority of surveys occurred between 1989 and 1992, in response to extensive timber salvage harvest projects. Known owl sites appear to be fairly evenly distributed across the Forest although estimates of crude density (number of owls/total acreage of the study area) within the demographic study area are lower than the mean crude

densities reported from other study areas: 0.259 owls per square mile on the ENF demographic study area versus a mean of 0.495 from three other study areas (Verner et al. 1992: 178). Lower densities are likely the result of large amounts of intermixed private land within the study area.

Verner et al. 1992, identified several geographic areas of concern for the California spotted owl, where future problems might be greatest if the owl's population status were to deteriorate. One such area, identified as area #4, was the large area of intermixed private land and checkerboard ownership within the boundaries of the Eldorado NF, primarily on the Georgetown and Pacific Ranger Districts. This was identified as an area of concern because of habitat fragmentation that decreases the density of owl pairs, makes successful dispersal more difficult, and reduces the likelihood of quick replacement of owls in vacated habitat (Verner et al. 1992: 45). In addition, the 1992 Cleveland Wildfire burned 22,500 acres (about 10,000 acres on National Forest land) within and adjacent to this area of concern, resulting in a temporary gap in owl distribution. Changes in habitat condition in this area of concern, should, therefore, be closely evaluated.

DESCRIPTION OF SUITABLE AND PREFERRED HABITAT

Habitat preferences at the stand scale: California spotted owls utilize mixed conifer, ponderosa pine, red fir and montane hardwood vegetation types on the ENF. The vast majority of owl sites on the Forest occur within the mixed conifer vegetation type. Studies on habitat use by the California spotted owl indicate that it is a habitat specialist which selects for stand characteristics associated with mature forests (Verner et al. 1992).

The EIS for the Sierra Nevada Framework Project (USDA Forest Service, January 2001) provides the following information about California spotted owl habitat preferences based upon information contained in Verner et al. 1992; North et al., in press; Laymon, 1988, Call 1990, Bias and Gutiérrez, 1992, Moen and Gutiérrez, 1997).

Stands preferred by owls for nesting and roosting are characterized by:

- two or more canopy layers
- dominant and codominant trees in the canopy averaging at least 24 inches in dbh
- at least 70 percent total canopy cover (including hardwood component)
- higher than average numbers of very large, old, trees with high crown volume
- higher than average levels of snags and downed woody material

Stands preferred by owls for foraging have:

- at least two canopy layers
- dominant and codominant trees in the canopy averaging at least eleven inches in dbh
- at least 50 percent canopy cover
- higher than average levels of snags and downed woody material

Although spotted owls will forage in stands with 40 percent canopy cover (and possibly as low as 30 percent canopy cover in the red fir type), they appear to be only marginally suitable for foraging (Verner pers. comm. 1999). Recent analysis by Hunsaker et al. (in press) indicated that the threshold between canopy cover values that contribute to or detract from occurrence and productivity is a value near 50 percent (USDA Forest Service, January 2001). Research on the northern spotted owl (North et al. 1999) found snag volume, foliage volume, and canopy layering to be stand attributes significantly associated with owl foraging intensity. Vegetation treatments, such as timber harvest and fuels reduction, that alter these habitat attributes may influence habitat

quality for the California spotted owl.

Habitat preferences based upon CWHR habitat classifications. Approximately 84% of 292 California spotted owl nest vegetation plots were classified as CWHR classes 6, 5D, 5M, 4D, and 4M (USDA Forest Service, January 2001). These CWHR types are also rated as providing high and moderate suitability foraging habitat for California spotted owls based on the expert opinion habitat relationship models contained in the CWHR database. Timber strata 4G (similar to CWHR classes 5D and 6) have been documented as being preferentially selected by owls for nesting and foraging (Verner et al. 1992) and the majority of spotted owl nest sites have been documented to occur in CWHR classes 6, 5D, and 5M. It would be expected, therefore, that CWHR classes 6, 5D, and 5M would have the highest probability of providing stand structures assocated with preferred nesting, roosting, and foraging (USDA Forest Service, January 2001).

Habitat requirements at the landscape scale: The average breeding season home range size of spotted owl pairs on the Eldorado National Forest, using minimum convex polygon, was about 4,700 acres (Laymon, 1988). Bingham and Noon (1998) found the overused portion of the home range to be about 20 percent (or about 1,000 acres), typically in closest proximity to the nest or primary roost stand.

Studies consistently suggest that some basic amount of suitable habitat is necessary to ensure that a pair of owls can successfully raise a sufficient number of offspring to repace themselves (thus providing for a stable population). Bart (1995) found this amount to be in the range of 30 to 50 percent of an owl home range in a study conducted on the northern spotted owl in the Pacific northwest. Recently completed analysis in the Sierra National Forest demographic study area concluded that canopy cover composition within owl home ranges is significantly correlated with owl occurrence and productivity (Hunsaker et al. in press). Productivity was positively correlated with the proportion of the analysis area having greater than 50% canopy-cover and negatively correlated with the proportion having less than 50% canopy cover. The median value for the portion of a 1,062 acre circular analysis area (surrounding an owl nest location) with greater than 50% canopy cover, was 60 percent.

Information on the desired configuration or patchiness of habitat within a spotted owl's home range is lacking for the California spotted owl. Demographic studies on the northern spotted owl in the Klamath Province have found that birds with access to larger blocks of suitable habitat had slightly lower mortality rates, but those with home ranges that were more patchy had slightly higher fecundity (number of young produced per breeding female). A landscape pattern with some fine-scale fragmentation of old forest (small patches of other habitats with convoluted edges) dispersed within and around a main patch of old forest appeared to provide the optimum balance in promoting both high fecundity and high survival (Franklin et al. 2000).

Diet. Spotted owls occurring above about 4,000 feet in elevation in the Sierra Nevada prey mainly on flying squirrels, while those occurring in the lower mixed conifer and ponderosa pine belt below this elevation rely heavily upon woodrats (Verner et al. 1992). On the Eldorado, greater numbers of spotted owl sites occur in habitat types where flying squirrels dominate, but a substantial number of sites do occur in lower elevation forests. Important ecological linkages for spotted owl prey species include the presence of large, old trees, large snags, denser multi-layered forest canopy, and large decaying logs on the forest floor (Verner et al. 1992).

Habitat Status Across the Sierra Nevada. Forest ecologists estimate that old forest conditions have declined from 50 to 90 percent compared to the range of historical conditions. The habitat change of greatest concern in the Sierra Nevada has been the rapid disappearance of the large, old

and generally decadent trees that are the focus of nesting by spotted owls. Seven additional factors of concern about owl habitat, having resulted from a combination of logging and fire suppression since the turn of the century, were described in Verner et al. 1992: the long recovery period for spotted owl habitat after logging, the ingrowth of shade-tolerant tree species creating unnaturally dense stands with ground-to-crown fuel ladders, excessive build-up of surface fuels, loss of large-diameter logs, disturbance and/or removal of duff and topsoil layers, and change in the composition of tree species (fewer pines and black oaks and more firs and incense cedar).

Habitat Status on the Eldorado NF. Habitat remains broadly distributed on the Eldorado National Forest, however a temporary habitat gap exists in the area burned by the Cleveland wildfire. The geographic area of concern, mapped as the large area of intermixed and checkerboard land ownership on the Georgetown and Pacific Ranger Districts, is an area where suitable habitat appears to be fragmented and in low abundance as the result of past and ongoing timber harvest. Within this area, the lower density of spotted owl pairs increases the uncertainty of successful mate finding and replacement of vacated territories.

BREEDING CYCLE

The spotted owl breeding cycle extends from about early March to mid- to late September on the Eldorado National Forest. Egg laying through incubation, when female spotted owl must remain at the nest, extends from early April through mid-to late May. Young owls typically fledge from the nest in mid-to late June and remain near the nest in the weeks following fledging. Adults continue to bring food to the fledglings until mid-to late September. Wasser et al. (1997) measured significantly higher levels of stress hormones in male northern spotted owls whose home range centers were within 0.41 km (0.25 mi.) of major logging roads or recent (10 years to present) timber activity. Forest Service recommendations for reducing direct effects to spotted owls have generally included minimizing disturbances within 0.25 miles of known roosts or nests during the breeding season (March 1 through August 31). Requirements for Limited Operating Periods are described in the Record of Decision for the Sierra Nevada Forest Plan Amendment.

RISK FACTORS

Timber Harvest and Vegetation Management: Much of the current concern regarding California spotted owl poplation trends is focused on the effects of vegetation management on the distribution, abundance and quality of habitat. Logging since the turn of the century has resulted in a reduction in the amount and distribution of mature and older forests and specific habitat elements succh as lare trees, snags, and downed logs, used for nesting and foraging by California spotted owls (Verner et al. 1992, Laudenslayer 1990, McKelvey and Johnston 1992, Franklin and Fites-Kaufmann 1996, Beardsley et al. 1999, Bouldin 1999). The conservation stategy provided in the Sierra Nevada Forest Plan Amendment addresses these concerns through a strategy that provides for: (1) retention of at least 50% canopy cover when mechanical vegetation treatments occur, (2) management for old forest conditions over large areas (old forest emphasis areas) and within the heavily used portion of each spotted owl's home range outside the urban intermix zone, (3) retention of multi-layered stand conditions and vertical stand diversity by limiting the maximum tree size removed to 12 inches dbh surrounding spotted owl PACs and to 20 inches dbh in the urban intermix zone and general forest.

Climate: Weather (in particular the effects of heavy late spring precipitation on reproductive output) has been identified as one probable cause of declining California spotted owl populations by several researchers. Widespread reproductive failure has been documented in years with late spring storms (Steger et al. 1999, Gutierrez et al. 1999, North et al., 1999, Franklin et al. in press). North et al. (1999) found a correlation between nest sites with higher productivity and high amounts of canopy volume over the nest (associated with very large, old trees). This indicates the importance of maintaining large old trees and high canopy volume at nest sites in order to buffer against the effects of weather on reproduction.

Wildfire: The ingrowth of shade-tolerant species and the excessive buildup of surface fuels are conditions that have resulted from past forest management and fire suppression, and which increase the risk of high-severity fire. Approximately 39 percent of the known owl sites on national forest lands occur in areas designated as "high fire hazard risk"(USDA Forest Service 2001).

CONSERVATION STRATEGY

Conservation Strategy in the Sierra Nevada Forest Plan Amendment. The Sierra Nevada Forest Plan Amendment (2001), provides a conservation strategy for the California spotted owl. The CASPO conservation strategy does not identify a target number and distribution of spotted owl sites at the Forest, Sierra Nevada, or rangewide scales. Rather, the stategy establishes a set of guidelines for vegetation management projects that are expected to "maintain habitat capable of supporting existing owl populations, stabilize current population declines, and provide increases in owl habitat over time. The strategy is based on providing and improving fundamental components of spotted owl habitat such as: high foliage volume and complex vegetation structure at nest sites; a high percentage of home ranges in forests with moderate to high cover that are concentrated near nest sites; and habitat for primary prey species, especially the northern flying squirrel." The strategy is expected to improve the environmental outcome for the California spotted owl over 50 years to one where, "Suitable environments are broadly distributed and of high abundance across the historical range of the species across NFS lands. The combination of distribution and abundance of environmental conditions provides opportunity for continuous or nearly continuous intraspeific interactions for the species." (USDA Forest Service, January 2001).

The primary project design elements of the Conservation Strategy can be summarized as follows:
Vegetation Management:

1. Stand altering activities are limited to reduction of surface and ladder fuels through prescribed fire treatments and hand treatments within 300-acre Protected Activity Centers surrounding known or suspected spotted owl nest sites.
2. Vegetation treatments are limited to the use of presecribed fire or the removal of material less than 12 inches in dbh in all vegetation patches larger than one acre in size that are classified as CWHR types 6, 5D or 5M.
3. Prescribed fire is used as the first priority to achieve fuels treatment outcomes within 1,000-acre home range core areas surrounding each spotted owl activity center and within Old Forest Emphasis Areas. Where mechanical treatments are necessary, fuels objectives should be met through mechanical thinning of trees less than 12 inches in dbh, except within the the urban intermix.

4. In the urban intermix and in the general forest outside of spotted owl home range core areas, vegetation treatments are limited to the removal of material less than 20 inches as needed to meet described fuels management objectives.
5. In the urban intermix, if 1,000 acres of suitable spotted owl habitat is unavailable within a mile and a half radius of a spotted owl activity center, treatments within CWHR 4M and 4D habitat within a home range core area are limited to those described in item 3.
6. Vegetation treatments maintain a minimum of 50 percent canopy cover and do not reduce existing canopy cover where it is between 40 and 50 percent. Mechanical treatments may reduce canopy cover by no more than 10 percent within old forest emphasis areas and home core areas, and by no more than 20 percent within the urban intermix and general forest.
7. A minimum of the 4 largest snags per acre are retained in mixed conifer forest; a minimum of the 6 largest snags per acre are retained in red fir forest.
8. 10 to 15 tons per acre of down wood is retained in the largest pieces available.
9. Surveys are conducted in suitable habitat with unknown occupancy, prior to undertaking vegetation treatments.
10. Limited operating periods are applied within a quarter mile of spotted owl activity centers if activites may disturb nesting spotted owls (deviation from LOPs may occur for a small number of prescribed burning projects).

Project Design Recommendations for the Eldorado National Forest. The Conservation Strategy provided by the Sierra Nevada Forest Plan Amendment addresses important risk factors for the California spotted owl, both rangewide and on the Eldorado National Forest. Additional standard project design features have not been identified for California spotted owls on the Eldorado National Forest; such recommendations would be based on project-specific conditions and analyses. Changes to habitat quality and abundance within geographic area of concern # 4, occurring on the Georgetown and Pacific Ranger Districts, should receive careful analysis at the project level.

LITERATURE CITED

Bart, J. 1995. Amount of suitable habitat and viability of northern spotted owls. Conservation Biology 9:943-946.

Beardsley, D., C. Bolsinger, and R. Warbington. 1999. Old-growth forests in the Sierra Nevada: by type in 1945 and 1933 and ownership in 1993. Gen. Tech. Rep. PNW-GTR-516. USDA Forest Service, Pacific Northwest Research Station. Portland, OR.

Bingham, B.B. and B.R. Noon. 1997. Mitigation of habitat 'take': application to habitat conservation planning. *Conservation Biology* 11:127-139.

Franklin, A.B., D.R. Anderson, R.J. Gutierrez, and K.B. Burnham. 2000. Climate, habitat quality, and fitness in northern spotted owl populations in northwestern California. *Ecological Monographs* 70:539-590.

Franklin, J.F. and J.A. Fites-Kaufmann. 1996. Assessment of late-successional forests of the Sierra Nevada. Pages 627-669 In: Sierra Nevada Ecosystem Project, Final Report to Congress, Vol. II, Assessments and Scientific Basis for Management Options. Univ. Calif., Davis, Centers for Water and Wildland Resources.

Gutiérrez, R.J., Seamans, M. E., Bond, M. Population ecology of the California spotted owl in the central Sierra Nevada: Annual Results 1999. Annual Progress Report to Region 5, USDA Forest Service. March 2000.

Hunsaker, C. T., B. B. Boroski, G.N. Steger, and J. Verner. In press. Relations between occurrence and productivity of Califfornia spotted owls and canopy cover.

Laudenslayer, W.F. and H.H. Darr. 1990. Historical effects of logging on the forests of the Cascade and Sierra Nevada ranges of California. *Transactions of the Western Section of the Wildlife Society* 26:12-23.

Laymon, Steven A., 1988. Ecology of the spotted owl in the central Sierra Nevada. Unpublished Dissertation, University of California, Berkely.

McKelvey, K.S. and J.D. Johnston. 1992. Historical perspectives on forests of the Sierra Nevada and the Transverse Ranges of southern California: forests at the turn of the century. In: *The California spotted owl: a technical assessment of its current status* coordinated by J. Verner, K.S. McKelvey, B.R. Noon, R.J. Gutierrez, G.I. Gould Jr., and T.W. Beck. Gen. Tech. Rep. PSW-GTR-133. USDA Forest Service, Pacific Southwest Research Station, Albany, CA.

Moen, C.A. and R. J. Gutiérrez. 1997. California spotted owl habitat selection in the central Sierra Nevada. *Journal of Wildlife Management*, 61(4): 1281-1287.

Noon, Barry R., Blakesley Jennifer A. Demographic parameters of the California Spotted Owl on the Lassen National Forest; preliminary results (1990-1998). Summary Report submitted to Region 5, USDA Forest Service. February 1999.

North, M., G. Steger, R. Denton, G. Eberlein, T. Munton, and K. Johnson. 2000. Association of weather and nest-site structure with reproductive success in California spotted owls. *J Wildlife Management* 64:797-807.

Steger, George N., Munton, T.E. , Eberlain, G.P., Johnson, K.D. A study of spotted owl demographics in the sierra National Forest and Sequoia and Kings anyon National Parks. Annual Progress Report submitted to R5, USDA Forest Service. December 1999.

USDA Forest Service. 2001. Sierra Nevada Forest Plan Amendment. Final Environmental Impact Statement. Pacific Southwest Region, USDA Forest Service.

Verner, Jared, McKelvey, Kevin S., Noon, Barry R., Gutiérrez, R.J., Gould, Gordon I. Jr., Beck, Thomas W., Technical Coordinators, 1992. The California spotted owl: a technical assessment of its current status. General Technical Report PSW-GTR-133 Albany CA: Pacific Southwest Research Station, Forest Service, US Department of Agriculture; 285 p.

Verner, Jared. Review of "A Preliminary Report on the Status of the California Spotted Owl in the Sierra Nevada." USDA Forest Service, Pacific southwest Research Station, Forestry Sciences Laboratory, Fresno, California. July 7, 1999.

Wasser, S.K., K. Bevis, G. King and E. Hanson. 1997. Noninvasive physiological measures of disturbance in the northern spotted owl. *Conservation Biology* 4:1019-1022.

Northern Goshawk *(updated May 2001)*

POPULATION STATUS AND CONTEXT FOR PROJECT LEVEL ANALYSES

Context of the Eldorado National Forest in Relation to the Species Range. Northern goshawks are distributed throughout forest and woodlands of the Holarctic, extending across the boreal forests of North America, south through the western mountains to Mexico, and in the east, south through the hardwood forest to approximately New York/New Jersey (in USDA Forest Service, 2001). The Sierra Nevada, and Eldorado National Forest, therefore, represent a very small portion of this species range. Approximately 588 northern goshawk sites are known to occur within the Sierra Nevada, with about 12 percent of those sites (69) found on the Eldorado National Forest (USDA Forest Service, 2001).

Management Status. The northern goshawk is a Forest Service designated sensitive species and a management indicator species on all Sierra Province National Forests in the Pacific Southwest Region. There is concern that northern goshawk populations and reproduction may be declining in North America and California due to changes in the amount and distribution of habitat or reductions in habitat quality (in USDA Forest Service, 2001). In 1998 the U.S. Fish and Wildlife Service (FWS) completed a status review for the northern goshawk and announced its finding that there is no evidence that the goshawk population is declining in the western United States, that habitat is limiting the overall population, that there are any significant areas of extirpation, or that a significant curtailment of the species' habitat or range is occurring" (Federal Register 1998). Further litigation is pending.

Ranking of the Species' Environmental Condition and Population Condidtion in the Sierra Nevada. The EIS for the Sierra Nevada Forest Plan Amendment (USDA Forest Service 2001) evaluated the current environmental condition for the northern goshawk on national forest land throughout the Sierra Nevada. The species status was ranked as one of five possible conditions ranging from outcome A, where suitable environments are broadly distributed and at high abundance, to outcome E where suitable environments are highly isolated and exist at very low abundance. The current environmental condition for the northern goshawk was estimated to be one where suitable environments are primarily well distributed but with temporary gaps; suitable environments are large enough to allow operation of metapopulation proceses (outcome B).

Considering the availability of both federal and non-federal habitat and other influences on the northern goshawk popoulation, the EIS for the Sierra Nevada Forest Plan Amemendment evalutated the current population status for the northern goshawk as outcome B. This is described as a condition where, "the combination of environmental and population conditions provides the opportunity for the species to be broadly distributed and/or of high abundance across its historical range, but there are gaps where populations are potentially absent or only present in low density as a result of environmental or population conditions. However, the disjunct areas of higher potential population density are typically large enough and close enough to other subpopulations to permit dispersal among subpopulations and potentially to allow the species to interact as a metapopulation across its historical range."

Estimated Population Size and Trend in the Sierra Nevada. Approximately 577 northern goshawk territories are known to occur on National Forest lands in the Sierra Nevada (USDA Forest Service 2001). There does not appear to have been a change in the geographic distribution

of northern goshawks in the Sierra Nevada relative to the range reported by Grinnel and Miller (1944). Population trends of northern goshawks in the Sierra Nevada are unknown, although numbers are suspected to be declining due to habitat reductions and loss of territories to timber harvest (Bloom et al. 1986). There are currently no rigorous research or monitoring efforts being conducted to assess population trends, demographic rates, or effects of habitat manipulations.

Existing Surveys and Sightings on the Eldorado National Forest. Goshawk sightings recorded on the Eldorado National Forest have been largely opportunistic; surveys have been limited to specific project areas (documented in Ranger District project files) and have not covered a large proportion of the northern goshawk habitat on the forest. Survey detections have been recorded in a forestwide GIS coverage which is updated at the end of each field survey season. Best provessional judgement is used to designate groups of detections thought to represent an individual goshawk territory, and to designate the activity center associated with the territory. Approximately 69 goshawk sites have been located, primarily over the past 10 years, although the current occupancy status remains unknown for some of these sites. The known goshawk sites appear to be fairly well distributed across the Forest, between 4,000 and 7,000 feet in elevation.

DESCRIPTION OF SUITABLE AND PREFERRED HABITAT

Habitat preferences at the stand scale: Northern goshawks utilize mixed conifer, ponderosa pine, red fir, subalpine conifer, lodgepole pine, montane riparian and montane hardwood vegetation types on the ENF. Nest site habitat characteristics are the best-known aspect of northern goshawk habitat use patterns. Very little information exists regarding foragin habitat use patterns, particularly during winter. No information is available that addresses habitat quality (as measured by survival and fecundity) at any spatial scale (USDA Forest Service, January 2001).

The EIS for the Sierra Nevada Framework Project (USDA Forest Service, January 2001) provides the following information about northern goshawk habitat preferences based upon three studies in the Sierra Nevada (Hargis et al. 1994, Keane 1999 and Maurer 2000) and a number of additional studies from other parts of the western United States.

When compared to random plots, stands preferred by northern goshawks for nesting and roosting (in westside vegetation types), are characterized by:

- Greater basal area
- Greater numbers of large live trees (trees > 24" dbh)
- Greater canopy cover (mean of 65% and 70% in two studies)
- Higher than average numbers of very large, old, trees (mean of 16 and 17 trees/ac > 40" dbh)
- Significantly lower numbers of trees less than 12" in dbh

Foraging habitat preferences of northern goshawks are poorly understood, although limited information from studies in conifer forests indicate northern goshawks prefer to forage in mature forests (summarized in Squires and Reynollds 1997) with greater canopy closure and greater density of large (>40"dbh) trees relative to random plots (Bright-Smith and Mannan, 1994, Beirer and Drennan, 1997, Hargis 1994, Austin, 1993).

Habitat preferences based upon CWHR habitat classifications. Classification of nest plot data from 35 nest sites form the Lake Tahoe Region (Keane 1999) ressulted in 71 percent of the

nest vegetation plots being classified as CWHR classes 6, 5D, or 5M and the remaining 14% being classified as 4D, 4M, or 4P (USDA Forest Service, January 2001). These CWHR types (with the exception of 4P) are also rated as providing high suitability nesting habitat for northern goshawks based on the expert opinion habitat relationship models contained in the CWHR database. High feeding habitat capability is found in these same types and within 5P and 5S stands.

Habitat requirements at the landscape scale: The mean breeding season home range size of northern goshawks in the Lake Tahoe region was found to be about 6,700 acres for males and about 5,000 acres for females (Keane, 1999). Mean non-breeding period home ranges exceed 10,000 acres. Conservation strategies proposed for the northern goshawk typically recognize three spatial scales for managing northern goshawk home ranges (Reynolds et al. 1992). The first scale addresses the amount and spatial distribution of nesting habitat, the second addresses the post-fledging area, and the third addresses thre foraging areas within the remainder of the home range. Limited information is available on habitat patterns at larger and multiple scales and how these patterns affect habitat quality for northern goshawks.

Nest Stands: Forest stands containing nests are often small (25 to 250 acres) and territories may contain one to five alternate nest stands (Woodbridge and Detrich 1994). Woodbridge and Detrich (1994) reported that near 100% territory occupancy rates were observed in territories with nest stand clusters totaling 150 to 200 acres of nesting habitat; occupancy rates declined as the size of the nest stand declined below 150 acres.

Post Fledging Areas: Post-fledging areas (PFA) surround the nest area and are used by both adults and the young as they learn to hunt from the time of fledging through dispersal (Reynolds et al. 1992). PFAs average about 420 acres (Kennedy et al. 1994). Reynolds et al. proposed guidelines regarding the desired amounts of different forest structural classes within PFAs to provide for protective cover and a diversity of prey species. These guidelines call for 60 percent of the PFA to be in mid-aged and mature forest stages with canopy covers ranging from greater than 50% to greater than 70% depending upon forest type. The remainder of the PFA is managed to provide young forest and grass-forb stages. No data exists to evaluate these guidelines relative to Sierra Nevada Forests.

Foraging Areas: Understanding how prey availability for northern goshawks varies with stand structure and landscape habitat patterns is essential for understanding how to manage northern goshawk populations by providing suitable habitat for prey. Reynolds et al. (1992) has made recommendations that are applied to national forests in the southwest. These recommendations call for a variety of age classes and canopy cover ranging from greater tha 40% to greater than 60% depending on forest vegetation type.

Diet: Prey availability is a primary limiting factor for raptor populations. Northern goshawks prey on a wide variety of species. Primary prey in the Lake Tahoe region were douglas squirrels, golden-mantled and Belding's ground squirrels, chipmunks, Steller's jay, flicker, and robin. Species that are active year-round, such as Douglas squirrels may be more important prey species during winter (Keane 1999).

Habitat Status Across the Sierra Nevada. Forest ecologists estimate that old forest conditions have declined from 50 to 90 percent compared to the range of historical conditions. The habitat change of greatest concern in the Sierra Nevada has been the rapid disappearance of the large, old and generally decadent trees and increases in the numbers of smaller diameter trees and density of forest understories as a result of fire suppression. These trends suggest there has been a reduction

in the amount and distribution of the mature and older forests with large trees and open understories used for nesting by northern goshawks. Greater uncertainty exists regarding changes in foraging habitat although limited knowledge suggests these changes would also have led to a decline in the quanity and quality of foragin habitat.

Habitat Status on the Eldorado NF. Suitable nesting and foraging habitat occurs in patches of varying size and abundance across most of the Eldorado National Forest. Lack of information on the amounts and spatial distribution of vegetation classes associated with high quality territories, limits a meaningful assessment of habitat status on the forest.

BREEDING CYCLE

The northern goshawk breeding cycle extends from mid- February through mid- September on the Eldorado National Forest. Egg laying through incubation, when female spotted owl must remain at the nest, occurs from mid-April up to mid-June. Young goshawks typically fledge from the nest in early June to mid- July and remain near the nest for a period of 4 to 8 weeks following fledging. Not all pairs of northern goshawks reprduce each year. The proportion of territories with active nests has been documented to range from 14 to 100 percent among years in the Sierra Nevada (Keane 1999). Forest Service recommendations for reducing direct effects to northern goshawks have generally included minimizing disturbances within 0.25 miles of known roosts or nests during the breeding season (March 1 through September 15). Requirements for Limited Operating Periods are included in the Record of Decision for the Sierra Nevada Forest Plan Amendment (January 2001)

RISK FACTORS

The major threat to northern goshawks at the present time concerns the effects of vegetation management (timber harvest, fuels treatments, etc) and wildfire on the amount and distribution and quality of habitat (Bloom et al. 1986, Keane and Morrison 1994, Kennedy 1997, Squires and Reynolds 1997, Smallwood 1998, DeStefano 1998). Breeding site disturbance from vegetation treatments, human recreation, and falconry harvest is an additional risk factor. Currently legal harvest of northern goshawks is low and does not impact the Sierra Nevada population but the impact of legal and illegal harvest together has the potential to negatively impact individual territories and potentially local populations. This is not known to be a problem on the Eldorado National Forest, however, and is a greater concern on the east side of the Sierra Nevada. Weather patterns, in conjunction with prey dynamics, appear to be a primary factor affecting northern goshawk reproduction and potentially survival (Keane 1999). The effects of climate and chemical pollutants are two potential risk factors that require further investigation (USDA Forest Service, January 2001).

CONSERVATION STRATEGY

Conservation Strategy in the Sierra Nevada Forest Plan Amendment. The Sierra Nevada Forest Plan Amendment (January 2001), provides a conservation strategy for the northern goshawk that builds upon the conservation strategy developed for the California spotted owl. The strategy provides specific guidelines for managing goshawk nest stands; foraging habitat needs are expected to be met through the conservation strategy developed for the California spotted owl. The broad distribution and large home range size of the California spotted owl results in a strategy that is likely to provide well-distributed habitat for the northern-goshawk and other old forest-associated species. The northern goshawk conservation strategy does not identify a target number and distribution of goshawk sites at the Forest or Sierra Nevada scales. Rather, the stategy establishes a set of guidelines that are expected to "provide the environmental conditions necessary to establissh a high likelihood of maintaining viable populations off the northern goshawk well distributed across the Sierra Nevada planning area." The strategy is based on providing and improving fundamental components of old forest habitat such as: high foliage volume and complex vegetation structure, particularly at nest sites. Until The strategy is expected to result in a slight improvement in the environmental outcome for the northern goshawk over 50 years.

The primary project design elements of the Conservation Strategy can be summarized as follows:

1. Stand altering activities are limited to reduction of surface and ladder fuels through prescribed fire treatments and hand treatments within 200-acre Protected Activity Centers surrounding known or suspected spotted goshawk nest sites.
2. Vegetation treatments are limited to the use of presecribed fire or the removal of material less than 12 inches in dbh in all vegetation patches larger than one acre in size that are classified as CWHR types 6, 5D or 5M (stands with ave. tree dbh greater than 24" and greater than 60% canopy cover).
3. Prescribed fire is used as the first priority to achieve fuels treatment outcomes within Old Forest Emphasis Areas and 1,000 acre areas surrounding spotted owl activity centers. Where mechanical treatments are necessary, fuels objectives should be met through mechanical thinning of trees less than 12 inches in dbh, except within the the urban intermix.
4. In the urban intermix and in the general forest vegetation treatments are limited to the removal of material less than 20 inches as needed to meet described fuels management objectives.
5. Mechanical vegetation treatments maintain a minimum of 50 percent canopy cover and do not reduce existing canopy cover where it is between 40 and 50 percent. Mechanical treatments may reduce canopy cover by no more than 10 percent within old forest emphasis areas and spotted owl home core areas, and by no more than 20 percent within the urban intermix and general forest.
6. A minimum of the 4 largest snags per acre are retained in mixed conifer forest; a minimum of the 6 largest snags per acre are retained in red fir forest.
7. 10 to 15 tons per acre of down wood is retained in the largest pieces available.
8. Surveys are conducted in suitable habitat with unknown occupancy, prior to undertaking vegetation treatments.
9. Limited operating periods are applied within a quarter mile of goshawk nest stands if activites may disturb nesting goshawks (deviation from LOPs may occur for a small number of prescribed burning projects).

Project Design Recommendations for the Eldorado National Forest. The Conservation Strategy provided by the Sierra Nevada Forest Plan Amendment addresses important risk factors for the northern goshawk, both rangewide and on the Eldorado National Forest. Additional

standard project design recommendations have not been identified for the Eldorado National Forest. Pending further information, the Sierra Nevada-wide strategy relies upon the conservation strategy developed for the California spotted owl to provide foraging habitat for northern goshawks. Site-specific consideration of habitat distribution may need to occur therefore, in areas where owl and goshawk occurrances do not overlap. In such areas, evaluation of post-fledging and/or foraging habitat needs may lead to additional site specific recommendations. As further information becomes available on how prey availability for northern goshawks varies with stand structure and landscape habitat patterns, project design recommendations can be refined.

LITERATURE CITED

Austin, K.K. 1993. Habitat use and home range size of breeding northern goshawks in the southern Cascades. MSc. Thesis. Oregon State Univ. Corvallis, OR.

Bloom, P.H., G.R. Stewart, and B.J. Walton. 1986. The status of the northern goshawk in California, 1981-1983. Calif. Dept. Fish and Game, Wildlife Management Branch, Administrative Report 85-1.

Beier, P. and J.E. Drennan. 1997. Forest structure and prey abundance in foraging areas of northern goshawks. *Ecological Applications* 7:564-571.

Bright-Smith, D.J. and R.W. Mannan. 1994. Habitat use by breeding male northern goshawks in northern Arizona. *Studies in Avian Biology* 16:58-65.

DeStefano, S.B. 1998. Determining the status of northern goshawks in the West: is our conceptual model correct. *J. Raptor Research* 32:342-348.

Hargis, C.D., C. McCarthy, and R.D. Perloff. 1994. Home ranges and habitats of northern goshawks in eastern California. *Studies in Avian Biology* 16:66-74.

Keane, J.J. 1999. Ecology of the northern goshawk in the Sierra Nevada, California. PhD Dissertation. Univ. of Calif., Davis.

Keane, J.J. and M.L. Morrison. 1994. Northern goshawk ecology: effects of scale and levels of organization. *Studies in Avian Biology* 16:3-11.

Kennedy, P.L. 1997. The northern goshawk (*Accipiter gentilis atricapillus*): is there evidence of a population decline? *J. Raptor Research* 31:95-106.

Kennedy, P.L., J.M. Ward, G.A. Rinker, and J.A. Gessaman. 1994. Post-fledging areas in northern goshawk home ranges. *Studies in Avian Biology* 16:75-82.

Maurer, J.R. 2000. Nesting habitat and prey relations of the northern goshawk in Yosemite National Park, California. MSc. Thesis. Univ. of Calif., Davis, CA.

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. Gen. Tech/ Rep/ RM-217. Rocky Mountain Forest and Range Experiment Station, USDA Forest Service, Ft. Collins, CO.

Squires, J.R. and R.T. Reynolds. 1997. Northern Goshawk (*Accipiter gentilis*). In: The Birds of North America, No. 298. A. Poole and F. Gill, eds. The Academy of Natural Sciences, Philadelphia, PA, and The American Ornithologist's Union, Washington, D.C.

Smallwood, K.S. 1998. On the evidence needed for listing the northern goshawks (*Accipiter gentilis*) under the Endangered Species Act: a reply to Kennedy. *J. Raptor Research* 32:323-329.

Woodbridge, B. and P.J. Detrich. 1994. Territory occupancy and habitat patch size of northern goshawks in the southern Cascades of California. *Studies in Avian Biology* 16:83-87.

Great Gray Owl *updated January 2003*

The Sierra Nevada Mountains are the southern range of the great gray owl in the western United States. The Eldorado LRMP, as amended in January 2001, provides direction for protection of 50 acres of forested habitat surrounding known nest sites and for maintenance of at least 12 inches of grass height in adjacent meadows habitats.

Historic sightings are recorded for all counties in the Cascade range in California and the Sierra Nevada as far south as Tulare Co. The present known population is centered in Yosemite National Park. It includes nesting activity on the Stanislaus National Forest at five distinct locations, and several recent sightings on the Sierra National Forest. On the Eldorado National Forest a pair of great gray owls utilized Leoni Meadows early in the breeding season in 2002 but did not remain after mid-June. Coordinated inventories for great gray owls have not been conducted on a large scale. These owls are somewhat secretive and difficult to detect. There is a possibility that they will be found occupying additional locations where there is suitable habitat. The California population was estimated at 60-70 birds in 1984 (Winter 1985). Recent sightings in Yosemite National Park and on adjacent National Forests in the Sierra Nevada indicate the actual population could measure 100-200 birds (Tom Beck, pers. comm. 1992).

In the Sierra Nevada, great gray owls are found in mixed coniferous forest from 2,400 to 9,000 feet elevation where such forests occur in combination with meadows or other vegetated openings. Nesting usually occurs within 600 feet of the forest edge and adjacent open foraging habitat. Most nests are made in broken top snags (generally firs), but platforms such as old hawk nests, mistletoe infected limbs, etc. are also used. Nest trees or snags are generally greater than 21 inches dbh and 20 feet tall. Nest trees on the Stanislaus National Forest averaged 32 inches dbh and 32 feet tall, while those in Yosemite National Park averaged 44 inches dbh and 45 feet tall (Greene 1995).

In the Yosemite area, males begin establishing nesting territories in March to early April (Beck 1985). After 30 to 36 days of incubation, eggs hatch from mid May to mid June. Young begin to fledge in early June to early July, but will remain around the nest through August. However,

great gray owls will breed earlier at higher elevations (approximately 2 weeks earlier for every 1000 foot increase in elevation).

In the Sierra Nevada, pocket gophers and voles appear to be important prey species (Winter 1982, Reid 1989). Meadows appear to be the most important hunting habitat for great gray owls, where approximately 93% of their prey are taken (Winter 1981). Great gray owls have been documented also using open forest, clearcuts, and burned areas, but these habitats appear to provide suboptimal foraging habitat (Greene 1995).

Great gray owls hunt by perching 2 to 20 feet high (Winter 1981) at the edges of meadows or grasslands and listening for prey in grass runways or underground burrows, then flying low over the ground and dropping on the prey (Brunton 1971, Nero 1969, Winter 1981). Winter (1982) observed that owls at Ackerson Meadow in the Stanislaus NF used a mean perch height of 10.8 feet in trees with an average dbh of 13 inches and that they preferred trees with a dbh larger than 9 inches. Larger trees possibly have more open limb development, allowing stooping and less view obstruction. Winter (1982) also observed owls using fence posts as hunting perches. Stoop distances observed in Yosemite National Park ranged from 0.98 feet to 213 feet, with a mean of 77.57 feet (Reid 1989). On the Stanislaus NF, the longest stoop distance observed was 200 feet and the average was 29.8 feet (Winter 1982). The lack of perches at the edges and/or within meadows may render a meadow unsuitable for great gray owls.

Literature Cited

Beck, T.W. 1985. Interim direction for management of great gray owl. USDA Forest Service, Stanislaus National Forest. Sonora, CA. 24pp.

Brunton, D.F. 1971. Observations of the great gray owl on winter range. Can. Field Nat. 86: 315-322.

Bull, E.L. and M.G. Henjum. 1990. Ecology of the great gray owl. General Technical Report PNW-GTR 265. Pacific Northwest Research Station, USDA Forest Service, Portland OR. 39pp.

Greene, C. 1995. Habitat requirements of great gray owls in the central Sierra Nevada. M.S. Thesis. University of Michigan. 94pp.

Reid, M.E. 1989. The predator-prey relationships of the great gray owl in Yosemite National Park. Cooperative National Park Research Studies Unit Technical Report No. 35. 86pp.

Wilson, J. 1981. Some aspects of the ecology of the great gray owl in the Central Sierra Nevada. USDA Forest Service. 30pp.

Wilson, J. 1985. Great gray owl survey, 1984. California Department of Fish and Game. Project W-65-r-2. Progress Report.

Winter, J. 1981. Some aspects of the ecology of the great gray owl in the Central Sierra Nevada. USDA, Forest Service. Stanislaus National Forest Contract # 43-2276. Final report. Sonora, CA. 30pp.

Winter, J. 1982. Further investigations on the ecology of the great gray owl in the central Sierra Nevada. Final Report to the Forest Service under contract #43-2348. Stanislaus National Forest, Sonora CA. 35pp.

Winter, J. 1986. Status, distribution and ecology of the great gray owl (*Strix nebulosa*) in California. San Francisco, CA: San Francisco State University. 121pp. M.S. thesis.

Willow Flycatcher

The Eldorado LRMP, as amended in January 2001, provides direction intended to protect all known occupied willow flycatcher habitat from the effects of livestock grazing. Surveys of meadows greater than 15 acres in size, that occur within 5 miles of occupied habitat, will occur between 2001 and 2004. There are historic occupied sites documented within the boundary of the Eldorado National Forest, one near Packsaddle Pass and the other from Forni Meadow. Both detections were from the 1980s.

The willow flycatcher is a small passerine neotropical migrant bird that breeds in riparian deciduous shrub habitat in the United States and Canada, primarily in willows. Wet meadows appear to be the most common habitat, but riparian deciduous shrubs along streams are also used. The willow flycatcher was once a common summer resident throughout California. However, observed declines in breeding populations have been a growing concern for over four decades and it is now limited to scattered meadows of the Sierra Nevada and along the Kern, Santa Margarita, and San Luis Rey Rivers; the statewide population is estimated at about 145 territorial males (Harris et al. 1988).

Most of the remaining breeding populations of willow flycatchers in the Sierra Nevada occur in isolated mountain meadows (up to 8000 feet elevation) and along the Kern River in Kern County (around 2600 feet elevation) (Harris et al. 1988). Small populations have also been detected on the Modoc National Forest and National Wildlife Refuge (Wilson pers. comm 1994), Mammoth Lake, Lee Vining Creek and Bridgeport Valley (Gaines 1977), and Lundy Canyon (Gaines 1988). The two largest known populations are the Kern River population and the population in the Perazzo Meadows area of the Tahoe National Forest.

Habitat typically includes moist meadows with perennial streams and smaller spring fed or boggy areas with willow (*Salix* spp.) or alders (*Alnus* spp.). The presence of water during the breeding season appears to be an important habitat component (Fowler et al. 1991). The minimum size meadow useable for willow flycatchers is assumed to be 0.62 acres (Fowler et al. 1991). Willow flycatchers have also been found in riparian habitats of various types and sizes ranging from small lakes or ponds surrounded by willows with a fringe of meadow or grassland, to willow lined streams, grasslands, or boggy areas.

Willow flycatchers are territorial during the breeding season. Studies on the TNF have found that territory sizes average 0.84 acre (Sanders and Flett 1989). Females may forage outside or at the fringe of the territories defended by males. In addition, after the young fledge the family groups use areas outside of the territories for feeding and cover (M. Flett, pers. comm.). The breeding season begins in late May to early June (Garratt and Dunn 1981) with adults and fledglings generally staying in the breeding areas through August.

Nests are open cupped, usually 3.7 to 8.3 feet above the ground and mostly near the edge of deciduous, riparian shrub clumps (Sanders and Flett 1989, Valentine et al. 1988, Harris 1991).

Willow flycatchers forage by either aerially gleaning insects from trees, shrubs, and herbaceous vegetation, or they hawk larger insects by waiting on exposed forage perches and capturing them in flight (Ettinger and King 1980, Sanders and Flett 1989). In the Perazzo Meadow, willow flycatchers usually flew less than 3.3 feet from a perch when hawking insects, but occasionally flew as far as 33 feet (Sanders and Flett 1989). The selection of nest sites near water appears to be related to increased densities of aerial insects.

Literature Cited

Fowler, C., B. Valentine, S. Sanders and M. Stafford. 1991. Habitat Suitability Index Model: willow flycatcher (*Empidonax traillii*). Unpublished document, USDA Forest Service, Tahoe National Forest. 15 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 1986 Survey. California Department of Fish and Game. Wildlife Management Division Administrative Report. 88-1. 32 pp.

Sanders, S.D., and M.A. Flett. 1989. Ecology of a Sierra Nevada population of willow flycatchers (*Empidonax traillii*), 1986-1987. Wildlife Management Division Administrative Report 88-3. 34pp.

Serena, M. 1982. The status and distribution of the willow flycatcher (*Empidonax traillii*) in selected portions of the Sierra Nevada, 1982. Calif. Dept. of Fish and Game, Wildlife Management Division Administrative Report No. 82-5. 28 pp.

Pacific Fisher *(updated June 2001)*

Context of the Eldorado National Forest in Relation to the Species Range. In western North America, fishers once ranged from northern British Columbia into central California in the Pacific Coastal Mountains, and south into Idaho, Montana, and probably Wyoming in the Rocky mountains. Their present range is reduced, encompassing disjunct pieces of the former range.

Management Status. The Pacific fisher is a Forest Service regionally designated sensitive species. The US Fish and Wildlife Service was petitioned to list the Pacific fisher under the Endangered Species Act in 1990 and 1994. In both cases the FWS determined there was insufficient information to warrant a status review. A third petition was submitted to the FWS on November 27, 2000; a 90-day finding has yet to be issued on the merits of this latest petition.

General Environmental and Population Conditions in the Sierra Nevada. The EIS for the Sierra Nevada Forest Plan Amendment (USDA Forest Service 2001) evaluated the current environmental condition for the Pacific fisher in relation to five possible conditions ranging from outcome A, where suitable environments are broadly distributed and at high abundance, to outcome E where suitable environments are highly isolated and exist at very low abundance. The current environmental conditions for the Pacific fisher were estimated to be patchy with some disjunct areas of suitable habitat that are effectively isolated (Outcome C-).

The current population condition, factoring in the availability of both federal and non-federal habitat and other influences on the Pacific fisher popoulation was evaluated in the EIS for the Sierra Nevada Forest Plan Amemendment. The population condition was estimated to be somewhat more disjunct with little chance of interaction across gaps in the species distribution (Outcome D).

Estimated Population Size and Trend in the Sierra Nevada. Fisher populations are presently at low numbers or absent throughout most of their historic range in Montana, Idaho, Washington, Oregon, and California (Heinemeyer and Jones 1994). In recent decades, a scarcity of sightings in Wasshington, Oregon, and the northern Sierra Nevada may indicate fisher extirpation from much of this area (Zielinski et al. 1996, Aubrey and Raley 1999). The southern Sierra Nevada and northwestern California populations may be the only naturally-occurring, known breeding populations of fishers in the Pacific region from southern British Columbia to California (Powell and Zielinski 1994, Zielinski et al. 1997). Moreover, mortality rates of adult fishers in the southern sierra population appear to be high (Truex et al 1998).

Existing Surveys and Sightings on the Eldorado National Forest. Several project area surveys have occurred on the Eldorado Nationa Forest in compliance with 1992/1993 Regional survey protocols. All surveys have had negative results. In addition, PSW research station completed surveyed sample points over a 10 km grid spacing aligned with National Forest Inventory vegetation sampling points across the forest (Zielinski et al. May, 1997). The sampling design for this survey effort was designed to provide information about regional distribution and was not intended to meet the sampling design requirements for project-based surveys. Negative results of this survey, nonetheless, provide ffurther indication that fisher, if they occur on the Eldorado National Forest, likely occur at very low densities. Over the past ten years, a number of incidental fisher detections have been reported on the ENF; the following detections have been reported by highly reliable sources (fisher researchers or professional wildlife biologists).

1988 Rubicon River drainage T12N, R13E, Sec. 33
1994 Vicinity of Wrights Lake campground
1995 Vicinity of Stumpy Meadows Reservoir, T12N, R13E, NE1/4, NE1/4, Sec. 9

DESCRIPTION OF SUITABLE AND PREFERRED HABITAT

In California, pacific fisher most often occur at elevations between 2000-5000 feet in the North Coast region and 4000-8000 feet in the southern Sierra Nevada (Freel 1991). In general, Pacific fishers use forest or woodland landscape mosaics that include conifer-dominated stands, and avoid entering open areas that have no overstory or shrub cover. They select forests that have multi-storied, dense (60-100%) canopy cover. Late-successional coniferous or mixed forests provide the most suitable fisher habitat because they provide abundant potential den sites and preferred prey species. Abundant snags and downed logs appear important for their prey species (Buck et al. 1983, Rugierro et al. 1994, Freel 1991). The presence of large conifers and hardwoods is a highly signficant predictor of Pacific fisher occurance in the southern Sierra Nevada.

Patches of preferred habitat and the location of open areas with respect to these patches may be critical to the distribution of fishers in an area. Habitat patches that are interconnected by other forest types will probably receive use whereas habitat patches separated by large open areas are less likely to be used. Riparian corridors and forested saddles between major drainages may provide important dispersal habitat or landscape linkages for the species. Abundant evidence

exists for selective movement patterns along drainages (Rugierro et al. 1994, Buck et al. 1983, Freel 1991).

Fisher apparently use greater percentages of middle to early seral stage habitats for foraging in summer months, although they still appear to need and utilize adjacent mature, old forest stands for denning, especially in areas with high snowfall. Freel (1991)corresponds suitable habitat with the following timber strata size and density classes: 3, 4, and 5, N and G. Habitat with less than 30 percent canopy cover is considered unsuitable (Freel 1991).

Numerous and heavily travelled roads are not desirable in order to avoid habitat disruption and/or animal mortality. Roads may decrease prey and food availability for fisher (Allen 1987) due to decreases in prey populations resulting from road kills and/or behavioral barriers to movement.

Diet.
Microtine rodents are important prey species for both fisher and marten in many areas of North America. The abundance of a favored prey species, the southern red-backed vole (*Clethrionomys gapperi*) has been positively correlated with abundance of woody debris on the forest floor (Allen 1987). Maser et al. (1978) attributed the elimination of red-backed voles from clearcuts to xerification (drying out) of the habitat, loss of downed woody material and elimination of the vole's primary food, which is mycorrhizal fungi. Elimination of woody debris and loss of understory vegetation can decrease populations of small prey species of mammals in forested habitats and, therefore, similarly affect populations fisher.

RISK FACTORS

Trapping, with logging, has had a major impact on fisher populations (Ruggiero et al. 1994). In addition, the fisher typically avoid humans; thus, increased road access and human activity within fisher habitat may have affected fisher populations. Ruggiero et al. (1994) cite even-aged timber management practices as one of the likely reasons that fisher populations have not recovered in the Pacific Northwest. The assessment found insufficient information to determine the impact of uneven-aged timber management practices (such as those currently in use on Sierra Nevada National Forests) upon Pacific fisher.
Lamberson et al. (2000) describe a number factors that currently put the Sierra Nevada fisher population at risk of extinction:

1. **population size.** Although no population size estimates have been published, the population is likely to be no less than 100 and probably no more than 500 individuals.
2. **population isolation.** Fishers in the southern Sierra Nevada appear to be isolated from those in northern California by >350 linear km (Zielinski et al. 1995 and W.J. Zielinski, unpublished data). This distance exceeds the maximum observed dispersal distance for fishers, ~100 km (Arthur *et al.* 1993, York 1996).
3. **habitat / landscape specificity.** Recent surveys have detected fishers from Yosemite National Park south through the Greenhorn Mountains in a variety of habitats ranging from low elevation mixed chaparral habitats on the fringe of the forest matrix into red fir forests. However, most detections have occurred in mid-elevation habitats including montane hardwood, montane hardwood-conifer, mixed conifer and ponderosa pine forests. Radio-telemetry research conducted on Sequoia National Forest has suggested these mid-elevation forests have large trees and logs needed for denning and resting

(Zielinski et al., in prep) as well as a diverse prey base (Zielinski *et al.* 1998). The combination of timber harvest and fire suppression during the 20th century has resulted in a greater prevalence of small diameter trees throughout the Sierra Nevada (McKelvey and Johnston 1992).

Although higher elevation habitats (i.e., red fir forests) may provide ample structures for denning and resting, deep snow during the winter months likely impedes fisher mobility (Krohn *et al.* 1995); as a result, these forests are of less value to fisher than mid-elevation habitats where snow cover is sporadic and rarely deep for extended periods. Lower elevation habitats in the southern Sierra Nevada (chaparral and woodlands) lack resting and denning structures, and may not provide thermal regulation during hot summer months.

4. **physiological limitations.** The fisher has a relatively low annual reproductive capacity. Fishers are capable of reproducing annually beginning at 2 years old, producing 1-4 young per year ($\bar{x} = 2.5$, Heinemeyer and Jones 1994).
5. **risk of habitat loss / alteration due to fire and land management.** In the southern Sierra Nevada habitat loss due to catastrophic fire is of concern. Fire suppression policies have apparently altered the disturbance regime from one of frequent, low intensity fires of small areal extent to rare, high intensity fires of potentially large extent. While the former played a crucial role in maintaining a landscape where forests with large trees and heterogeneous canopies were more common, the latter can result in large-scale crown fires that result in habitat of little or no value to fishers.
6. **stochastic phenomena.** As with any small, isolated population, risks of extinction are enhanced by stochastic factors. Demographic stochasticity, the chance events associated with annual survival and reproduction, and environmental stochasticity, temporal fluctuations in environmental conditions, tend to reduce population persistence (Shaffer 1981, see Boyce 1992 and Beissinger and Westphal 1998 for reviews).
7. **the interaction of these factors**. The interaction of these factors may move the population from a relatively stable, though numerically small condition, into an irreversible extinction vortex. For example, if demographic stochasticity results in lower than average recruitment of female kits into the population in 3 consecutive years, and this is followed by 2 heavy-snow winters and one large fire, the population may quickly become in jeopardy of local extinction.
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CONSERVATION STRATEGY

Conservation Strategy in the Sierra Nevada Forest Plan Amendment.

The network of old Forest emphasis areas and guidelines associated with those areas, the Southern Fisher Conservation Area, as well as the umbrella provided by guidelines associated with maintaining California spotted owl habitat, are all expected to maintain mangement options for the fisher while a comprehensive conservation strategy (scheduled for completion by 2003) is being prepared.

Project Design Recommendations for the Eldorado National Forest.

The Sierra Nevada Forest Plan Amendment (2001) includes guidelines that should largely address project design recommendations for fisher on the Eldorado National Forest. In 1994, a habitat network was mapped on the Eldorado NF by identifying areas on the Forest that come closest to providing the amounts of mature forest habitat needed within potential fisher home range areas of 6,000 to 11,300 acres in size. This resulted in a total of 11 areas being mapped as potential "fisher use areas" (FUAs). Movement corridors providing connectivity between FUAs were then mapped using orthophotography. Movement corridors typically followed drainages and saddles. The width of the corridors were 600 to 1200 feet based on information in Freel (1991). This

assessment may provide useful information for project planning and for design of habitat connectivity during watershed and landscape analysis.

LITERATURE CITED

Aubry, K. and C. Raley. 1999. Ecological characteristics of fishers in southwestern Oregon. USFS Pacific Northwest Research Station. Olympia, WA. 7 pages.

Buck, S., C. Mullis and A. Mossman. 1983. Final report: Coral Bottom - Hayfork Bally fisher study. USDA Forest Service. Unpublished report. 133 pp.

Freel, M. 1991. A literature review for management of fisher and marten in California. Unpubl. Document, USDA Forest Service, Pacific Southwest Region.

Heinemeyer, K.S., and J.L. Jones. 1994. Fisher biology and management: a literature review and adaptive management strategy. Missoula, MT: USDA Forest Service Northern Region. 108 pages.

Kucera, T.E. and W.J. Zielinski. 1995. The Case of Forest Carnivores: Small Packages, Big Worries. Endangered Species Update, University of Michigan.

Lamberson, R.H., W.J. Zielinski, and D. MacFarlane. 2000. Preliminary analysis of fisher population viability in the southern Sierra Nevada. Unpublished report. February 2000.

Powell, R.A. and W.J. Zielinski. 1994. The fisher. Pages 38-73. In:L.F. Ruggiero et al., tech. eds. The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the Western United States. Gen. Tech. Rep. RM-254. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. Ft. Collins, CO. 184 pages.

Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, L.J. Lyon and W.J. Zielinski, tech. eds. 1994. The Scientific Basis for Conserving Forest Carnivores: American Marten, Fisher, Lynx, and Wolverine in the United States. Gen. Tech. Rep. RM-254. Ft. Collins, CO: U. S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 184 pp.

Truex, R.L., W.J.Zielinski, R.T. Golightly, R.H. Barrett, and S.M. Wisely. 1998. A meta-analysis of regional variation in fisher morphology, demography, and habitat ecology in California. Draft report submitted to: Calif. Dept. Fish and Game, Wildlife Management Division, Nongame Bird and Mammal Section. Sacramento, CA. 118 pages.

Zielinski, W.J. and R.H. Barrett. 1997. Southern Sierra Nevada fisher and marten sgudy: Progress Report IV. 15 May 1994- 2 October 1996. Unpublished report.

Zielinski, W.J., T.E. Kucera, and R.H. Barrett. 1996. Current distribution of the Fisher, *Martes pennanti*, in California. *Calif. Fish and Game* 81(3):104-112.

Zielinski, W.J., T.E. Kucera, and R. H. Barrett. 1995. Current distribution of the fisher, Martes pennanti, in California. Calif. Fish and Game 81(3): 104-112.

Zielinski, W.J., C.R. Carroll, and L. Campbell. Using Survey Data to Monitor Population Status and Develop Habitat Models for Fishers and other Mesocarnivores. Progress Report I. USDA Forest Service, Pacific Southwest Research Station, Redwood Sciences Laboratory, 28 May, 1997.

Marten *(Updated May 2000)*

In California, marten occur in the northern Sierra Nevada at elevations of 3,400 feet to 10,400 feet, averaging 6,600 feet. In the southern Sierra Nevada, the elevational range is 4,000 to 13,100 feet, averaging 8,300 feet (Freel 1991). On the Eldorado National Forest, marten have not been detected below 5,000 feet in elevation and predominantly occur above 6,000 feet in elevation.

Preferred habitat is characterized by dense (60 to 100% canopy), multi storied, multi species late seral coniferous forests with a high number of large (> 24 inch dbh) snags and downed logs (Freel 1991). These areas are often in close proximity to both dense riparian corridors (used as travelways), and include an interspersion of small (<1 acre) openings with good ground cover (used for foraging). Forest stands dominated by Jeffrey pine did not appear to support marten on the Tahoe National Forest (Martin 1987).

Preferred forest types include mature mesic forests of red fir, red fir/white fir mix, lodgepole pine, and Sierran mixed conifer, which correspond to timber seral stages and densities of 3, 4, and 5, G and N (Freel 1991).

Seral Stage	height	dbh	Timber Class	% Crown Closure
3	20-50ft	6-24in		
4 large tree	>50	>24	N	40-69
5 multi-story	>50	>24	G	>69

Marten are known to exist in suitable habitat on all the National Forests in the Sierra Nevada Province. They most often occur at somewhat higher elevations than fisher (Freel 1991).

Numerous and heavily travelled roads are not desirable in order to avoid habitat disruption and/or animal mortality. Roads may decrease prey and food availability for marten as well as fisher (Allen 1987) due to prey population decreases resulting from road kills and/or behavioral barriers to movement. Occasional one and two lane forest roads with moderate levels of traffic should not limit marten movements.

Bennett and Samson (1984) identified three major causes for concern regarding the distribution and abundance of marten in the Rocky Mountains. These causes are generally applicable throughout the range of marten in North America. First, the current distribution of marten is a small portion of their historic range. Secondly, extensive habitat destruction and fragmentation along with trapping and fire are major factors contributing to this contraction of historic range. Finally, large home range sizes combined with low reproductive potential and an affinity for habitats that have decreased dramatically over time result in limited ability for populations to recover from natural or human caused disturbances.

In Utah Hargis and Bissonette (1995) found that marten captures declined as openings in the landscape increased. They also noted declines in marten captures as edge increased and where open areas were more closely spaced. In that study, no captures occurred where openings occupied greater than 35% of the landscape or where the average distance between openings was less than 100 meters. They recommend that land managers identify forested areas approximately 2-3 square miles in size that contain structural attributes associated with optimum marten habitat (large diameter conifers, canopy cover > 30%, and abundant large diameter logs), and to maintain the landscape so that the percentage of non-forested acreage does not exceed 20% of the total (including clearcuts, meadows, and natural openings). They further state that the forested areas need not be closed to timber harvests, but selective cutting methods should be considered over clearcutting when possible. Where clearcutting is used, cut blocks should be separated by forested buffers greater than 650 feet wide.

In Maine, Chapin et al. (1997) indicate that marten may neither prefer nor require conifer-dominated forests or forests with a closed overstory canopy throughout all of their geographic range. In their study, marten selected stands with an abundance of snags, high volume of fallen dead trees and root mounds, and regenerating understory of deciduous and coniferous vegetation, despite canopy closures of mature trees less than 50%, and typically less than 30%. Rather, vertical and horizontal structure may be more important habitat attributes than age or species composition of the forest overstory (Buskirk and Ruggiero 1994). Chapin et al. (1997) recommend that conservation practices focus on structural attributes that functionally influence the quality of forested habitats for marten, rather than merely age, species composition, and canopy closure of overstory trees, and that these structural requirements could be maintained in a variety of managed and unmanaged stands.

Prey species abundance is a critical component of the habitat and there is some dietary overlap with the Pacific fisher. Both species prey heavily upon squirrels. Marten prey items may vary seasonally however. Simon (1980) found insects dominating the diet in summer and fall, while Douglas squirrels (*Tamiasciurus douglasii*) provided the bulk of winter and spring nourishment. At Sagehen Creek, CA, on the Tahoe National Forest, Zielinski (1983) found microtine rodents the most frequent year-round prey. Chickaree, snowshoe hare, northern flying squirrel, and deer mouse were taken almost exclusively during the winter; and squirrels and chipmunks formed the largest component of the diet from late spring through fall.

Coarse woody debris is an important component of marten habitat, especially in winter, by providing structure that intercepts snowfall and creates subnivean tunnels, interstitial spaces, and access holes. Zielinski et al. (1983) suggested that marten activity varied to allow them to take advantage of subnivean dens utilized by their prey. Sherburne and Bissonette (1994) found marten more likely to utilize subnivean access points that contained more abundant prey. They also found that when coarse woody debris covered a greater percent of the ground, marten use also increased. They state that only older growth forests with accumulated coarse woody debris provide the forest floor structure necessary to enable marten to forage effectively during the winter.

Literature Cited

Bateman, M.C. 1986. Winter habitat use, food habits and home range size of the marten, *Martes americana*, in western Newfoundland. Canadian Field Naturalist 100: 58-62.

Bennett, L.A. and F.B. Samson. 1984. Marten ecology and habitat management in the central Rocky Mountains: problem analysis. USDA Forest Service and Colorado Cooperative Wildlife Research Unit, Colorado State University. Fort Collins, CO. 60 pp.

Buskirk, S.W. and L.F. Ruggiero. 1994. American marten. Pages 7-37 *in* L.F. Ruggiero, K.B. Aubry, S.W. Buskirk, L.J. Lyon, and W.J. Zielinski, eds. The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the western United States. U. S. Forest Service Gen. Tech. Rep. RM-254.

Chapin, T.G., D.J. Harrison, D.M. Phillips. 1997. Seasonal habitat selection by marten in an untrapped forest preserve. J. Wildl. Manage. 61:707-717.

Davis: University of California, Centers for Water and Wildland Resources. 1996. Sierra Nevada Ecosystem Project, Final Report to Congress.

de Vos, A. 1951. Recent findings in fisher and marten ecology and management. Transactions North American Wildl. Conf. 16:498-505.

Freel, M. 1991. A literature review for management of fisher and marten in California. Unpubl. Document, USDA Forest Service, Pacific Southwest Region.

Hargis, C.D. and J.A. Bissonette. 1995. The effect of forest fragmentation on American marten populations and prey availability. Final report for the utah Division of Wildlife Resources, Wasatch-Cache National Forest, Ashley National Forest, Utah Wilderness Association (Contract No. 91-9166). December 31, 1995. 96pp.

Hargis, C.D. and D.R. McCullough. 1984. Winter diet and habitat selection of marten in Yosemite National Park. J. Wildlife Management 48:140-146.

Koehler, G.M., W.R. Moore and A.R. Taylor. 1975. Preserving the pine marten: management guidelines for western forests. Western Wildlands 2:31-36.

Martin, S.K. 1987. The ecology of the pine marten (*Martes americana*) at Sagehen Creek, California. PhD Thesis. University of California, Berkeley. 223 pp.

Powell, R.A. 1979. Mustelid spacing patterns:variations on a theme by Mustela Zhurnal Tierpsychologie. 50:153-165.

Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, L.J. Lyon and W.J. Zielinski, tech. eds. 1994. The Scientific Basis for Conserving Forest Carnivores: American Marten, Fisher, Lynx, and Wolverine in the United States. Gen. Tech. Rep. RM-254. Ft. Collins, CO: U. S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 184 pp.

Schempf, P.F. and M. White. 1977. Status of six furbearer populations in the mountains of northern California. USDA Forest Service. 51 pp.

Sherburne, S.S. and J.A. Bissonette. 1994. Marten subnivean access point use: response to subnivean prey levels. J. Wildl. manage. 58:400-405.

Simon, T.L. 1980. An ecological study of the marten in the Tahoe National Forest, California. M.S. Thesis. California State University, Sacramento. 140 pp.

Spencer, W.D. and W. J. Zielinski. 1983. Predatory behavior of pine martens. Journal of Mammalogy 64:715-717.

Zeiner, D.C., W.F. Laudenslayer, Jr., K.E. Mayer and M. White. 1990. California Wildlife: Volume III: Mammals. California Dept. of Fish and Game, Sacramento CA. 407 pp.

Zielinski, W.J., W.D. Spencer and R.H. Barrett. 1983. Relationship between food habits and activity patterns of pine martens. J. Mammalogy 64:387-396.

Sierra Nevada Red Fox *(Updated May 2000)*

Sierra Nevada red fox inhabit forested areas interspersed with riparian and meadow habitat, and brush fields. Preferred forest types include red fir, lodgepole pine and sub alpine fir in the higher elevations of the Sierra Nevada (Schempf and White 1977). In the northern Sierra Nevada, most records occur in fir and mixed conifer types, with a large number of sightings also in pine and lodgepole. In the southern Sierra, most sightings were in mixed conifer forests, although lodgepole pine and fir were also important (Schempf and White 1977).

As of 1977, Sierra Nevada red fox populations were thought to be maintaining themselves at a low level or perhaps declining (Schempf and White 1977). There is little information presently available to either justify or counter that assumption.

Sierra Nevada red fox occur mainly at elevations greater than 7,000 feet, and seldom below 5,000 feet, inhabiting the Hudsonian and Canadian life zones (Schempf and White 1977). They move seasonally from the higher elevations in the winter to mid elevation forests during the summer. Red fox may be more tolerant of openings than either marten or fisher, as they will hunt in open areas. Predator avoidance in the open may not be a problem for this native fox (Duncan Furbearer Interagency Working Group 1989). Opportunistic hunters, their diet is omnivorous over most of the year, but meat is the most prevalent food in winter (Schempf and White 1977).

Although no specific criteria for analyzing red fox habitat has been developed and little is known about this species, it is assumed that red fox may be more adaptable than other furbearers. Further, it is assumed that if the more restrictive habitat requirements of fisher, marten, willow flycatcher, and California spotted owls are provided, the habitat requirements will be met for red fox (Freel 1991).

Literature Cited

Freel, M. 1991. A literature review for management of fisher and marten in California. Unpubl. Document, USDA Forest Service, Pacific Southwest Region.

Schempf, P.F. and M. White. 1977. Status of six furbearer populations in the mountains of northern California. USDA Forest Service. 51 pp.

California Wolverine *(Updated May 2000)*

The wolverine is a California State Threatened species. The Eldorado LRMP does not provide specific guidelines for this species. However, general guidelines provide for the management of old forest habitat and wilderness guideliness provide for the retention of remote, undisturbed landscapes.

Wolverines are generally considered a solitary species, with adults apparently associating only during the breeding season (Butts 1992). Home ranges of opposite sexes overlap (Powell 1979). However, partial overlap of home ranges of some wolverines of the same sex is common (Ruggiero et al. 1994). Studies indicate that home ranges in North America may vary from less than 38.6 square miles to over 347.5 square miles. Males have larger territories than females. Individuals may move great distances on a daily basis; 15 to 30 miles a day is common for males, and some individuals have moved 60 to 70 miles in a single day. Except for females providing for offspring, or males seeking mates, movement is generally motivated by food (Ruggiero et al. 1994). Although wolverine are primarily nocturnal, diurnal movement is often recorded. During summer, long distance movements appear to be restricted to night when temperatures are cooler (Hornocker and Hash 1976).

Considered a scarce resident in California, the known habitat distribution occurs from Del Norte and Trinity counties east through Siskiyou and Shasta Counties, and south through the Sierra Nevada to Tulare County (Zeiner et al. 1990). Most sightings in the North Coast mountains fall within the 1600 to 4800 ft. elevational range. In the northern Sierra Nevada, most sightings fall between 4300 to 7300 ft., and in the southern Sierra Nevada, between 6400 to 10,800 ft. (Zeiner et al. 1990).

In the North Coast region, wolverine have been observed in Douglas-fir and mixed conifer habitats, and probably also use red fir, lodgepole, wet meadow, and montane riparian habitats (Schempf and White 1977, Zeiner et al. 1990). Habitats used in the northern Sierra Nevada include mixed conifer, red fir, and lodgepole pine. The species probably also uses subalpine conifer, alpine dwarf-shrub, wet meadows, and montane riparian (White and Barrett 1979, Zeiner et al. 1990). In the southern Sierra Nevada, habitat preference includes lodgepole pine, red fir, mixed conifer, subalpine conifer, alpine dwarf-shrub, barren, and probably wet meadows, montane chaparral, and Jeffrey pine (Zeiner et al. 1990).

White and Barrett (1979) state that wolverines are highly dependent upon mature conifer forests for survival in winter, and generally move downslope in winter into heavier timber where food is available.

Wolverines are generally described as opportunistic omnivores in summer and primarily scavengers in winter (Ruggiero et al. 1994). In winter, most large prey is carrion, but large snowbound prey such as deer, elk, and moose, may also be killed. Wolverines cache food, and may be able to locate and retrieve prey under deep snow. During the summer, marmots, ground squirrels, gophers, mice, berries, insects, and even porcupines may be taken while foraging in open to sparse tree habitats on the ground, in trees, burrows, among rocks, and sometimes in shallow water (Zeiner et al. 1990, Ruggiero et al. 1994).

At the landscape level, the wolverines large home ranges need to be considered in forest management planning (Banci 1994). However, what is understood about home range size and

use is biased to remote, undeveloped northern habitats (Canada), and generally is not known for the Sierra Nevada.

Little is known regarding wolverine use in forested habitats. Wolverines have a close association with large ungulate mammals, such as deer. However, habitats managed for deer may not necessarily provide for the wolverine's other life needs. The low availability of natal dens may limit reproduction in some areas, and physical structure such as coarse woody debris may be important. According to Banci (1994), management prescriptions that successfully provide for the life needs of species such as the American marten, fisher, lynx and their prey will also provide for the needs of wolverine at the stand level. It is not known whether this will provide for wolverine habitat needs at the landscape or larger scales.

During the winter of 1991/1992, the California Dept. of Fish and Game, University of California Berkeley, and five National Forests conducted a cooperative wolverine study using baited infra-red camera systems at 57 camera stations. Forests involved were the Inyo, Lake Tahoe Basin Management Unit, Shasta-Trinity, Stanislaus, and the Tahoe. No wolverines were detected.

Several incidental sightings of wolverines have been reported on the Eldorado National Forest since 1980, mostly from within the Desolation Wilderness. Sighting confirmed through track or photo identification have not been made, however.

Literature Cited

Banci, V. 1994. Wolverine. Pages 99-127. In: L.F. Ruggiero, et al., tech. eds. The scientific basis for conserving forest carnivores: American marten, fisher, lynx, and wolverine in the Western United States. Gen. Tech. Rep. RM-254. USDA Forest Service, Rocky Mountain Forest and Range Experiment Station. Ft. Collins, CO. 184 pages.

Butts, T.W. 1992. Wolverine (*Gulo gulo*) biology and management: A literature review and annotated bibliography. Unpublished paper for the U.S. Forest Service. Northern Region.

Hornocker, M.G. and H.S. Hash. 1981. Ecology of the wolverine in northwestern Montana. Can. J. Zool. 59:1286-1301.

Powell, R.A. 1979. Mustelid spacing patterns:variations on a theme by Mustela Zhurnal Tierpsychologie. 50:153-165.

Ruggiero, L.F., K.B. Aubry, S.W. Buskirk, L.J. Lyon and W.J. Zielinski, tech. eds. 1994. The Scientific Basis for Conserving Forest Carnivores: American Marten, Fisher, Lynx, and Wolverine in the United States. Gen. Tech. Rep. RM-254. Ft. Collins, CO: U. S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 184 pp.

White, M. and R.H. Barrett. 1979. A review of the wolverine in California with recommendations for management. Unpublished paper. Prepared for the USDA Forest Service, Region 5. By the Dept. of Forestry and Resource Mangement. College of Natural Resources. University of Calif. Berkley. 71 pp.

Zeiner, D.C., W.F. Laudenslayer, Jr., K.E. Mayer and M. White. 1990. California Wildlife: Volume III: Mammals. California Dept. of Fish and Game, Sacramento CA. 407 pp.

Pallid Bat *Updated May 2000*

The pallid bat is a California Species of Special Concern. The Eldorado LRMP does not provide specific management direction for this species. However, general guidelines direct the forest to improve habitat capability for hardwood associated species.

Throughout California the pallid bat is usually found in low to middle elevation habitats below 6000 ft. (Philpott 1997), however, the species has been found up to 10,000 ft. in the Sierra Nevada (Sherwin pers. comm. 1998). Populations have declined in California within desert areas, in areas of urban expansion, and where oak woodlands have been lost (Brown 1996).

A variety of habitats are used, including grasslands, shrublands, woodlands, and coniferous forests (Philpott 1997). Pallid bats are most common in open, dry habitats that contain rocky areas for roosting. They are a yearlong resident in most of their range and hibernate in winter near their summer roost (Zeiner et al.1990). Occasional forays may be made in winter for food and water (Philpott 1997).

Day roosts may vary but are commonly found in rock crevises, tree hollows, mines, caves and a variety of human-made structures. Tree roosting has been documented in large conifer snags, inside basal hollows of redwoods and giant sequoias, and bole cavities in oaks (pers. comm. Sherwin 1998). Cavities in broken branches of black oak are very important, and there is a strong association with black oak for roosting (pers. comm. Pierson 1996). Roosting sites are usually selected near the entrance to the roost in twilight rather than total darkness. The site must protect bats from high temperatures, as this species is intolerant of roosts in excess of 104 degrees Fahrenheit. Pallid bats are also very sensitive to roost site disturbance (Zeiner et al. 1990, Philpott 1997).

Night roosts are usually more open sites and may include open buildings, porches, mines, caves, and under bridges (Philpott 1997, pers. comm. Sherwin 1998, Pierson 1996).

Pallid bats are a gregarious species, often roosting in colonies of 20 to several hundered individuals. Pregnant females gather in summer maternity colonies of up to several hundred females, but generally fewer than 100 (Brown 1996). Parturition occurs between May and July. Young are weaned in mid to late August with maternity bands disbanding between August and October (Pers. comm. Sherwin 1998).

The pallid bat is very maneuverable on the ground and commonly feeds on large ground-dwelling arthropods. Common prey are Jerusalem crickets, longhorn beetles, and scorpions, buth they will also forage at low heights of 0.5 to 2.5 meters above the ground on large moths and grasshoppers (Zeiner et al. 1990, Philpott 1997).

Literature Cited

Barbour, R.W. and W.H. Davis. 1969. Bats of America. University Press of Kentucky. 283 pp.

Bolster, B.C. 1998. Calif. Dept. of Fish and Game, Presentation to the Western Bat Working Group Workshop. Feb. 9-13, 1998. Reno, Nevada.

Brown, P. 1996. Presentation at the Natural History and Management of Bats in Calfornia and Nevada Conference. The Wildlife Society Western Section, Nov. 13-15, 1996. Sacramento, CA.

Kunz, T.H. and R.A. Martin. 1990. *Plecotus townsendii*. Mammalian Species. The American Society of Mammalogists. No. 175:1-6.

Philpott, W. 1997. Summaries of the life histories of California bat species. USDA Forest Service, Sierra National Forest, Pineridge Ranger Station. 30pp. Unpublished Document.

Pierson, Elizabeth. 1996. Pierson and Rainey Consultants, Berkeley CA. Presentation at the North California Mine Assessment for Bats Seminar. Shasta College, Redding CA. June 4-6, 1996.

Pierson, E.D. 1996. Presentation to The Western Section of the Wildlife Society, Natural History and Management of Bats in California and Nevada Workshop. Nov. 13-15. Sacramento, CA.

Pierson, E.D., W.E. Rainey and D.M. Koontz. 1991. Experimental mitigation for Townsend's big-eared bat at the McLaughlin Mine in California. From Proceedings V: Issues and technology in the management of impacted wildlife, April 8-10, 1991. Snowmass, Co., Thorne Ecological Institute, Boulder, CO.

Sherwin, R. 1998. Presentation to the Western Bat Working Group Workshop.February 9-13. Reno, Nev., Pers. Comm.

Szewczak, Joseph 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.

Tatum L. 1998. Wildlife Biologist. USFS, Mendocino National Forest, Supervisor's Office.

Zeiner, D.C., W.F. Laudenslayer, Jr., K.E. Mayer and M. White. 1990. California's wildlife: Volume III: Mammals. Calif. Dept. of Fish and Game, Sacramento, CA. 407 pp.

Townsend's Big-eared Bat *Updated May 2000*

Manaagement Status and Direction. The Townsend's big-eared bat is a FWS Species of Concern and a California Species of Special Concern. The Eldorado LRMP does not provide specific management guidelines for this species. However, general management guidelines address hardwood, riparian, and meadow habitats.

Life History and Habitat Requirements. 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 south and southeastern United States (Sherwin 1998).

In California, the species is typically found in low desert to mid-elevation montane habitats, although sightings have been reported up to 10,800 feet (Philpott 1997, Sherwin 1998). Habitat associations include desert, native prairies, coniferous forests, mid-elevation mixed conifer, mixed hardwood-conifer forests, riparian communities, active agricultural areas and coastal habitat types (Kunz and Martin 1982, Brown 1996, Sherwin 1998). The Mother Lode within

the Sierra Nevada foothills has been known historically as the "heart of concentrations" (Pierson 1996). Distribution of this species is strongly correlated with the availability of caves and cave-like roosting habitat (Sherwin 1998). Populations have incurred serious declines over the past 40 years in parts of California (Brown 1996).

Townsend's are a year-round California resident. Individuals are very loyal to their natal sites and usually do not move more than 10 kilometers from a roost site (Pierson et al. 1991, Pierson 1996). They roost within caves, abandoned mines, and buildings. Buildings must offer cave-like spaces in order to be suitable. This species is highly sensitive to roost disturbance (Brown 1996). Night roosts may occur in more open settings, including under bridges (Philpott 1997).

Historically, maternal colonies may have contained several hundred individuals. However, maternal colonies at the present usually contain from 35 to 150 individuals (Brown 1996). Maternal colonies select warm parts of the structure, and usually roost in the that zone (Kunz and Martin 1982). These colonies form between March and June (may vary by local climate conditions), with a single pup born between May and July (Sherwin 1998). Pups are fully weaned by six weeks (Kunz and Martin 1982). Females usually remain alert and active in maternity roosts. Clusters of females hang on open surfaces, making them readily detectable.

Males remain solitary during the summer. Winter hibernating colonies are composed of mixed-sexed groups and may range from a single individual to several hundred animals (Sherwin 1998). This bat hibernates throughout its range in caves and mines where temperatures are 55 degees Fahrenheit or less, but generally above freezing. Roost sites are usually in the cooler air near the cave or mine entrance (Barbour and Davis 1969, Kunz and Marten 1982). Individuals may move during winter in response to temperature change (Barbour and Davis 1969).

Foraging usually begins well after dark (Kunz and Marten 1982). Foraging associations include edge habitats along streams and areas adjacent to and within a variety of wooded habitats (Sherwin 1998). In California, the species is shown to forage preferentially in association with native vegetation (Brown 1996). Flight is slow and maneuverable, with the species capable of hovering (Zeiner et al. 1990) and gleaning insects off foliage (Brown 1996). The Townsend's bat is a moth specialist, with over 90% of its diet composed of lepidopterans (Sherwin 1998).

Identification and protection of significant roost sites is still needed in most areas, and significant populations need to be monitored over time (Sherwin 1998).

Literature Cited

Barbour, R.W. and W.H. Davis. 1969. Bats of America. University Press of Kentucky. 283 pp.

Brown, P. 1996. Presentation at the Natural History and Management of Bats in Calfornia and Nevada Conference. The Wildlife Society Western Section, Nov. 13-15, 1996. Sacramento, CA.

Kunz, T.H. and R.A. Martin. 1990. *Plecotus townsendii*. Mammalian Species. The American Society of Mammalogists. No. 175:1-6.

Philpott, W. 1997. Summaries of the life histories of California bat species. USDA Forest Service, Sierra National Forest, Pineridge Ranger Station. 30pp. Unpublished Document.

Sherwin, R. 1998. Presentation to the Western Bat Working Group Workshop.February 9-13. Reno, Nev., Pers. Comm.

Szewczak, Joseph 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.

Zeiner, D.C., W.F. Laudenslayer, Jr., K.E. Mayer and M. White. 1990. California's wildlife: Volume III: Mammals. Calif. Dept. of Fish and Game, Sacramento, CA. 407 pp.

Western Red Bat *Updated May 2000*

The western red bat is a California Species of Special Concern. The Eldorado LRMP does not provide specific management guidelines for this species. However, general guidelines address management of riparian and oak woodland habitats.

The western red bat occurs throughout California in elevations up to 3000 feet and excluding desert habitat. Populations are scattered and considered rare throughout the state (Philpott 1997). The species is found primarily in riparian and wooded habitats, particularly in willows, cottonwoods, and sycamores (Bolster 1998).

Red bats are highly migratorial between their summer and winter range, although migratory patterns are not well documented, and winter behavior is poorly understood. However, it is known to winter in the San Francisco area and to the south, and has been observed hibernating in leaf litter (Brown 1996). The timing of migration for males and females seems to differ, although groups tend to migrate together (Bolster 1998).

Western red bats are typically solitary. Roosting has been observed in caves, but generally these bats roost singly within tree foliage or shrubs, and often along edge habitat adjacent to streams or open fields. Colonies are not formed. Roost sites are generally hidden from view from all directions except from below. The lack of obstruction from below allows the bat to drop downward for flight. Roost sites usually have dark ground cover to minimize solar reflection, have nearby vegetation to reduce wind and dust, and are generally located on the south or southwest side of a tree (Bolster 1998).

Females give birth to one to five young per year with an average of 2.3. Young are born during June (Brown 1996, Bolster 1998).

Foraging is generally at high altitudes over the tree canopy and begins one to two hours after sunset. Although solitary roosters, red bats forage in close association with one another in summer. Food items consist of a wide variety of flying insects including homopterans, coleopterans, hymenopterans, dipterans, and lepidopterans (Bolster 1998), and are apparently based on size rather than type (Brown 1996).

There are many gaps in the knowledge of this species, and more information is required on roosting requirements, altitudinal distribution, migration patterns, effects of controlled burns, and effects of pesticide use (Bolster 1998).

Literature Cited

Bolster, B.C. 1998. Calif. Dept. of Fish and Game, Presentation to the Western Bat Working Group Workshop. Feb. 9-13, 1998. Reno, Nevada.

Brown, P. 1996. Presentation at the Natural History and Management of Bats in Calfornia and Nevada Conference. The Wildlife Society Western Section, Nov. 13-15, 1996. Sacramento, CA.

Philpott, W. 1997. Summaries of the life histories of California bat species. USDA Forest Service, Sierra National Forest, Pineridge Ranger Station. 30pp. Unpublished Document.

Zeiner, D.C., W.F. Laudenslayer, Jr., K.E. Mayer and M. White. 1990. California's wildlife: Volume III: Mammals. Calif. Dept. of Fish and Game, Sacramento, CA. 407 pp.