Biological Evaluation for Wildlife Sensitive Species

Hazard Tree Slash Clean-up Project

HUME LAKE RANGER DISTRICT
SEQUOIA NATIONAL FOREST and GIANT SEQUOIA NATIONAL MONUMENT

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SUMMARY

This Biological Evaluation analyzes the potential effects of the Hazard Tree Slash Clean-up Project on Forest Service Region 5 sensitive animal species. It is prepared in compliance with the requirements of the FSM 2672.4 and 36 CFR 219.19. The purpose of the project is the removal of accumulated slash in specific campgrounds, organizational camps, and fuelbreaks.

Region 5 Forest Service sensitive species with documented or potential occurrence (based on habitat) near the project area include: Northern goshawks (*Accipiter gentilis*), great gray owls (*Strix nebulosa*), California spotted owls (*Strix occidentalis occidentalis*), Sierra martens (*Martes caurina sierrae)* and fishers (*Pekania pennanti*). For these sensitive species the determination of "**May affect individuals, but not likely to lead to loss of viability or a trend leading to Federal listing**" was made based on the effects analysis of the proposed project activities. That determination was based, in part, on mitigations including limited operating periods designed to prevent disturbance during critical denning/nesting seasons.

I. INTRODUCTION

The purpose of this Biological Evaluation (BE) is to review the potential impacts associated with the Hazard Tree Slash Clean-up Project (Slash Clean-up Project) to determine its effect on Forest Service sensitive species. The BE will determine whether the proposed action would contribute to a trend toward any Forest Service sensitive animal species becoming federally listed. This BE was prepared in accordance with the standards established under Forest Service Manual direction (FSM 2672.42).

Hume Lake Ranger District wildlife records, NRIS Wildlife records, the Sequoia National Forest Reptile and Amphibian Data Base, the California Natural Diversity Data Base, species habitat requirements, and species range information from the California Wildlife Habitat Relationships database were used to develop the list of species likely to be found in or near the project area.

Species considered in depth are listed in Table 1. Appendix A contains a detailed listing of other sensitive species that have the potential to occur within Sequoia National Forest but were eliminated from the need for detailed analysis under this document based on various criteria related to habitat requirements, geographic range or potential effects.

Table 1. Species considered in detail for the Slash Clean-up Project.

Common Name	Scientific Name	Status
Northern Goshawk	*Accipiter gentilis*	FS
Great Gray Owl	*Strix nebulosa*	FS
California Spotted Owl	*Strix occidentalis occidentalis*	FS
Sierra Marten	*Martes caurina sierrae*	FS
Fisher	*Pekania pennanti*	FS

FS = Forest Service Sensitive Species in Region 5

II. CURRENT MANAGEMENT DIRECTION

Direction for sensitive species management is provided in the Forest Service Manual (FSM 2672.1), and the Sequoia Forest Land and Resource Management Plan (LRMP) (USDA 1988) as amended by the 2012 Giant Sequoia National Monument Management Plan (USDA 2012). Forest Service manual direction ensures through the Biological Evaluation (BE) process that all sensitive species receive full consideration in relation to proposed activities.

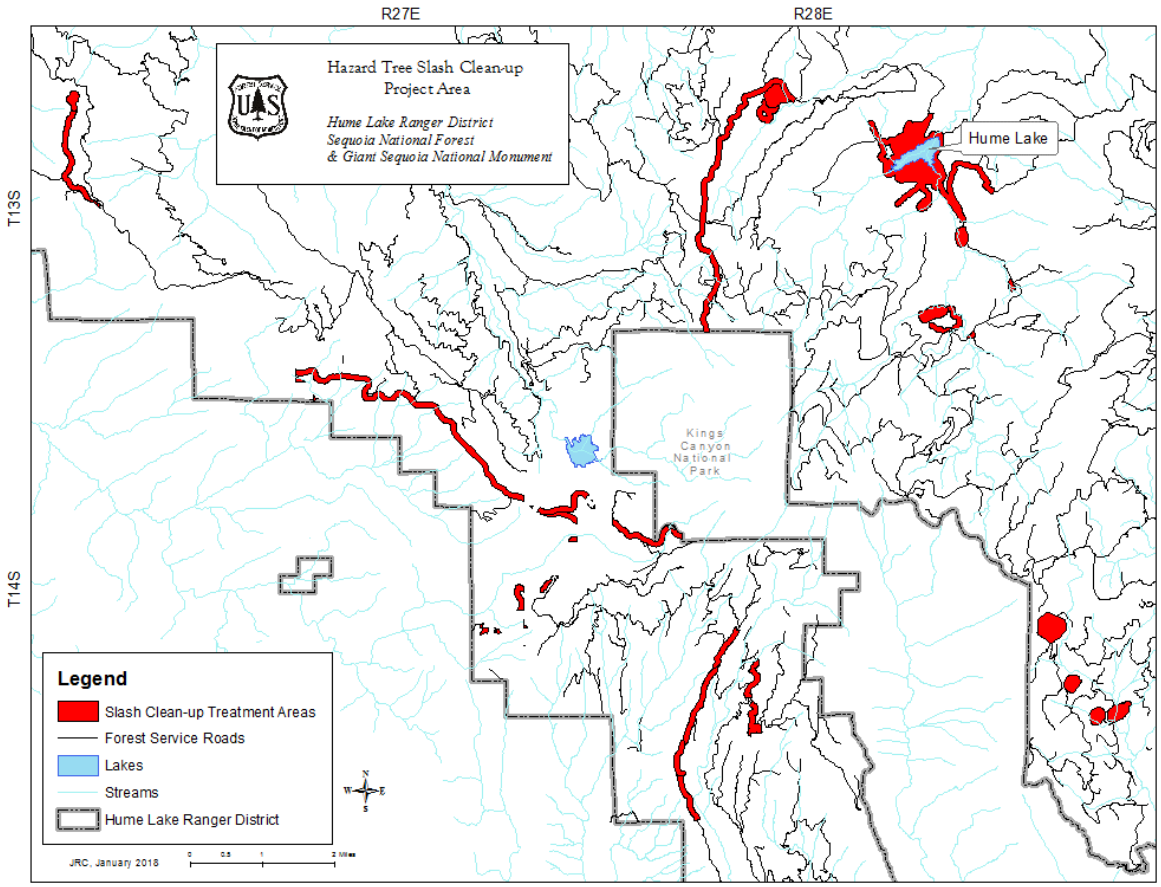
Direction to maintain the viability of Region 5 sensitive species is provided by the National Forest Management Act, the Code of Federal Regulations (CFR 219.19), the Forest Service Manual (FSM 2672), and the Sequoia LRMP as amended by the 2012 Giant Sequoia National Monument Management Plan. The LRMP provides general direction to utilize administrative measures to protect and improve the status of sensitive wildlife species.

The project area is also within Giant Sequoia National Monument and subject to standards and guidelines from the 2012 Giant Sequoia National Monument Management Plan (Monument Plan). Most of the project area is within identified Wildland Urban Interface (WUI) defense or threat zones. The entire project area is within the Southern Sierra Fisher Conservation Area which has specific direction to manage to support fisher habitat requirements.

III. DESCRIPTION OF THE PROPOSED PROJECT

The Slash Clean-up Project is located on the Hume Lake Ranger District of Sequoia National Forest and Giant Sequoia National Monument, at scattered sites within Townships 13-14 South, and Ranges 26-29, East (Map 1).

Map 1. Project Area



PROJECT DESCRIPTION

Purpose and Need: Slash clean up and tree removal was not included in the contracts awarded in 2016 for the felling of hazard trees. The accumulated material in the vicinity of several recreation sites and along two portions of fuel breaks has resulted in a large fuel build up that would make protection of the facilities, or use of the fuel breaks not feasible.

The fuels created by the felled material, including the large down woody debris needs to be reduced to 10 tons per acre within the area approximately 200 feet from Princess Campground and Indian Basin Trail, the Hume Lake Recreation Area, Logger Flat, Landslide, and Tenmile Campgrounds, Bearskin Diabetic Youth Camp, Far Horizons, Pythian, Camp San Joaquin,

Montecito Lake Resort, Eshom Fuelbreak and the portion of Worden Fuelbreak from Eshom Campground south to the intersection with Forest Road No. 15S02 and the private property. In addition, along state highways 180 and 245, Caltrans has requested the ability to completely remove a portion of the trees from the Monument through a contract with the Forest Service because treating and leaving all the material on site is cost prohibitive.

Proposed Action: The proposed action is to reduce fuel in and around the recreation sites and fuel breaks listed above by removing the majority of the felled material by piling and burning, as biomass, or as wood products. The total project area is approximately 1,789 acres.

Where no initial treatment was allowed under the contracts awarded in 2016, and where additional trees have died and are posing a falling hazard, the tops and limbs will be piled and chipped or burned. The large down material, some of which has been piled in log decks, would be removed as biomass, wood products, or burned at high heat to ensure complete combustion such as in an air curtain burner.

The following design features would be required during implementation:

- There are known invasive plant species in the vicinity of the project area, so heavy equipment would be washed prior to entry onto National Forest System lands to prevent spread of noxious invasive plants.
- To meet the minimum of 10 tons per acre of large down woody debris, the 3 to 5 largest trees (large end diameter of 30+ inches) will be left on site and where it does not conflict with operability of the site for recreation or fuel management (i.e. designated fuel break).
- Applicable Best Management Practices would be adhered to for protection of water and soil quality.

Mitigations

The following mitigation is required to reduce the threat of disturbance to wildlife during implementation of this project:

- Maintain a limited operating period (LOP), prohibiting activities from **March 1 through June 30**. This LOP is intended primarily to protect fisher during the denning season, but would protect other wildlife species from disturbance during their denning/nesting season as well.

IV. EXISTING ENVIRONMENT

The project area is defined as the maximum area from which slash may be treated or removed and is based on a 200 ft. buffer of the roads and/or recreation sites in need of hazardous fuels reduction. The project area boundary is therefore larger than the actual acres from which slash treatment activities will occur. The project area encompasses approximately 1,789 acres. Elevations in the project area range from approximately 4,500 to 7,000 feet. Habitat in the project area is comprised primarily of mixed conifer, chaparral and oak woodland. Conifer species include white fir, sugar pine, ponderosa pine, Jeffrey pine and incense cedar.

Species and Habitat Accounts:

A detailed life history account for most species is provided in the Sierra Nevada Forest Plan Amendment FEIS and ROD (USDA 2001), hereby incorporated by Reference. Much of this information is summarized in the section below, but also incorporates localized data on habitat condition, habitat use and surveys completed.

Habitat acres for each species within the project area were calculated by using existing geographic information system (GIS) vegetation data (EVEG based on data collected in July 2016). All acres are approximate.

Northern Goshawk *(Accipiter gentilis)*

Habitat Preferences and Biology

Preferred habitat for goshawks consists of older-age coniferous, mixed, and deciduous forest habitat. The habitat includes large trees for nesting, a closed canopy for protection and thermal cover, and open spaces allowing maneuverability below the canopy (Hargis et al. 1994; Squires and Kennedy 2006). Snags, downed logs, and high canopy cover appear to be preferred habitat features although many east side Sierran territories are relatively open and have fewer snags. Snags and down logs are an important component used by numerous prey species. In addition, many of the species that provide the prey base for northern goshawks are associated with open stands of trees or natural openings containing an understory of native shrubs and grass (Fowler 1988). Northern goshawk demography is strongly influenced by prey availability (Squires and Kennedy 2006).

Northern goshawk nesting habitat is characterized by dense canopy closure (50 to 90 percent) in mature forest with open flight paths under the canopy (McGrath et al. 2003). Nest trees for this species are commonly located on benches or basins surrounded by much steeper slopes (Hargis et al. 1994). Mature trees serve as nest and perch sites, while plucking posts are frequently located in denser portions of the secondary canopy. The same nest may be used for several seasons, but alternate nests are common within a single territory. The chronology of nesting activity varies annually and by elevation. In general, nesting activities are initiated in February with nest construction, egg laying, and incubation occurring through May and June (Dewey et al. 2003). Young birds hatch and begin fledging in late June and early July and are independent by mid-September.

Habitat models based on best professional opinion contained in the California Wildlife Habitat Relationships (CWHR) database rate the following vegetation types and strata as providing high nesting and feeding habitat capability for northern goshawks: structure classes 4M, 4D, 5M, 5D and 6 in Sierran mixed conifer, white fir, ponderosa pine, montane hardwood-conifer, montane riparian, red fir, Jeffrey pine, lodgepole pine, subalpine conifer, and montane hardwood (California Department of Fish and Game 2005). CWHR assigns habitat values according to expert panel ratings. Using the CWHR model, there are over 200,000 acres of moderate and high suitability nesting and foraging habitat for northern goshawks in Giant Sequoia National Monument. There are 1,061 acres of moderate and high suitability goshawk habitat in the Slash Clean-up project area.

Distribution

While northern goshawks are year-round residents in many higher elevation areas of California, population trends for this species in the state are poorly known (Keane 2008). Surveys for nesting northern goshawks have occurred intermittently in relation to projects or based on reported sightings in portions of Sequoia National Forest. Eight territories have been identified on the Hume Lake Ranger District based on nest location or location of an adult and juvenile.

Historically, nesting sites were found near Indian Basin, which which is adjacent to the project area. However, surveys of this area in 2008 and 2011 failed to detect goshawks. More recently, nesting was documented near Eshom Campground, which is near the project area.

Risk Factors

Habitat loss and degradation are the primary known threats to northern Goshawks (Squires and Kennedy 2006). Collection, habitat fragmentation, disturbance at a specific site, and edge effects were described by Gaines et al. (2003) as factors that potentially affect northern goshawks. Human disturbance has the potential to cause northern goshawks to abandon nest sites during the nesting (Boal and Mannan 1994) and post fledging period (February 15 through September 15).

Management and Status

Management direction in the 2012 Monument Plan for northern goshawks includes delineating a 200-acre protected activity center (PAC) around the most recent nest site and alternate nest sites containing the best available suitable forested habitat in the largest contiguous patch as possible (USDA 2012). There are no goshawks PACs within the Slash Clean-up project area. The California Department of Fish and Game has designated northern goshawks as a California species of special concern.

Great Gray Owl (*Strix nebulosa)*

Habitat Preferences and Biology

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. Great gray owls have nested on artificial platforms. The breeding density of this bird seems limited by both prey and nest site availability.

Timing of breeding activities varies along both a north-south gradient and an elevation gradient in California. Egg laying in California begins in late March or early April at low elevation sites, and can be as much as a month later at high elevation sites. Courtship activities occur a month prior to egg laying. Snow conditions on the breeding grounds appear to control the onset of nesting, and it is possible that late spring rains cause nest abandonment.

The diet of great gray owls may vary locally but consists primarily of small mammals, predominantly rodents. All available literature indicates that great gray owls in the western United States overwhelmingly select only two prey taxa: voles (*Microtus spp.*) and pocket

gophers (*Thomomys spp.*). Voles prefer meadows with dense herbaceous vegetative cover (Zeiner et al 1990). A four-inch stubble height at the end of the growing season is thought to provide suitable cover for voles (Beck 1985) although other studies suggest herbaceous heights of 12" are preferred (Greene 1995). Gophers are predominantly subterranean but they also appear to have herbaceous cover preferences (Greene 1995). Compaction of meadow soils may reduce the suitability of areas for gophers. Great gray owls catch these mammals by breaking through their tunnels. During the winter, great gray owls have been observed plunging through the snow to capture prey.

Foraging habitat in the Sierra Nevada is generally open meadows and grasslands in forested areas, and trees along the forest edge are used for hunting perches. Openings caused by fires or timber harvest serve as foraging habitat when the vegetation is in early successional stages (Hayward 1994, Greene 1995). Greene (1995) found that sites occupied by great gray owls had greater plant cover, vegetation height, and soil moisture than sites not occupied by owls. Canopy closure was the only variable of three variables measured (canopy closure, number of snags greater than 24" dbh, and number of snags less than 24" dbh) that was significantly larger in occupied sites than in unoccupied sites.

Some great gray owls in the Sierras utilize lower elevation sites for nesting, often in areas away from meadows and coniferous forest. Wu et al. (2015) found that 21% of the nest sites they visited were below elevations of 3,000 feet and over 0.4 mile from the nearest meadow. Almost one third of the nests were in oaks, rather than the typical broken-top fir snag.

Historic and Current Distribution

Great gray owls are a holarctic species. They remain evenly distributed across their range but have variability in local distribution. In the U.S. the range includes Alaska, Washington, northern Idaho, and western Montana south through the Cascade and Sierra Nevada ranges to east-central California, west-central Nevada, and northwest Wyoming. The southern populations in the western U.S. are considered relatively stable, breeding every year and remaining in the same general area throughout the year, although, as previously stated, breeding in Yosemite National Park is somewhat sporadic (Winter 1999). The northern populations and those at the southern edge of the range in eastern Canada are considered less stable. The Sierra Nevada populations are the most southerly populations of this species in the world.

In a genetic study, Hull et al. (2010) found that the Sierra Nevada population of great gray owls has been isolated throughout the Holocene to the present. They consider the Sierra Nevada population a distinct lineage and recommended it be designated as the subspecies *Strix nebulosa yosemitensis.* They believe that subspecies status is also justified by life history differences between great gray owls in the Sierra Nevada and the larger species range.

There have been a number of historic detections of great gray owls on the Hume Lake Ranger District, including in the Stony Creek area in 1992. More recent surveys in 2007 and 2012 have failed to detect great gray owls in that area. There are a number of meadows within or adjacent to the project area with potential great gray owl habitat, including: Bearskin Meadow, Beartrap Meadow, and Indian Basin Meadow. However, no great gray owls have been detected at these locations. Currently, the only known nesting site on the Hume Lake Ranger District is west of McKenzie Ridge and well outside the project area.

Risk factors

Collision with motor vehicles is a source of mortality in some areas, including one case documented in the Monument near Stony Creek. Shooting still occurs in many areas (Nero and Copeland 1981). However, these types of mortality have not been identified as a significant threat to this species in the Sierra Nevada (Beck and Winter 2000). Predation of eggs and young by other raptor species, especially great horned owls, may be common. Impalement on barbed wire and electrocution on transmission lines have also been reported. West Nile virus infection is also a potential threat, particularly given the small population size in the Sierra Nevada (Hull et al. 2012).

Management and Status

Great gray owls were classified as an endangered species by the State of California in October 1980. The 2012 Monument Plan stipulates that Protected Activity Centers (PACs) of at least 50 acres of the highest quality nesting habitat be established around all known great gray owl nest stands. One great gray owl PAC has been designated on the Hume Lake Ranger District, but is not near the Slash Clean-up project area.

California Spotted Owl *(Strix occidentalis occidentalis)*

Habitat Preferences and Biology

California spotted owls are one of three recognized subspecies of spotted owls, including the northern spotted owl, (*Strix occidentalis caurina*) and the Mexican spotted owl (*Strix occidentalis lucida*) (American Ornithologists' Union 1957). California spotted owls are considered prey specialists (Verner et al. 1992) because they select a few key species among the variety of taxa on which they prey, which includes mammals, birds, and insects (Barrows 1980, Hedlund 1996, Smith et al. 1999, Thrailkill and Bias 1989). In the upper elevations of the Sierra Nevada, the primary prey is the northern flying squirrel (*Glaucomys sabrinus*) (Verner et al. 1992). In lower elevations of the Sierra Nevada and in Southern California, the primary prey is the dusky-footed woodrat (*Neotoma fuscipes*) (Thrailkill and Bias 1989). Both flying squirrels and woodrats occur in the diets of owls in the central Sierra Nevada (Verner et al. 1992).

Spotted owls are primarily territorial; however non-territorial owls ("floaters") may also exist in populations and occupy territories after they are vacated (Gutiérrez 1994, LaHaye et al. 1994). Estimates of California spotted owl home range size are extremely variable. Based on an analysis of data from telemetry studies of California spotted owls, mean breeding season, pair home range sizes have been estimated (using 100 percent minimum convex polygon method): 9,000 acres on the Lassen National Forest, true fir type; 4,700 acres on the Tahoe and El Dorado National Forests, mixed conifer type; and 2,500 acres on the Sierra National Forest, mixed conifer type. All available data indicate that home ranges are smallest in habitats at relatively low elevations that are dominated by hardwoods, intermediate in size in conifer forests in the central Sierra Nevada, and largest in the true fir forests in the northern Sierra Nevada (Verner et al. 1992). Home ranges of owls in areas where the primary prey is northern flying squirrels are consistently larger than those where the primary prey is dusky-footed woodrats presumably because woodrats occur in greater densities and weigh more than flying squirrels (Zabel et al. 1992). As of 1992,

approximately 25 percent of known owl sites were found where woodrats are the primary prey species and 75 percent of sites were found where flying squirrels are the primary prey species (Verner et al. 1992).

The spotted owl breeding cycle extends from about mid-February to mid- to late September. Egg laying through incubation, when the female spotted owl must remain at the nest, extends from early April through mid to late May. California spotted owls nest in a variety of tree/snag species in pre-existing structures such as cavities, broken top trees, and platforms such as mistletoe brooms, debris platforms and old raptor or squirrel nests (Gutiérrez et al. 1992, 1995). Young owls typically fledge from the nest in mid to late June. In the weeks after fledging, the young are very weak fliers and remain near the nest tree. Adults continue to bring food to the fledglings until mid to late September when the young disperse. Information on the dispersal abilities of California spotted owls is scant. Verner et al. (1992) indicates that two-thirds of the juveniles would be expected to disperse at least eight miles.

Not all pairs of California spotted owls nest every year. In fact, over a ten year period of demographic studies in the Sierra Nevada, 1992 was the only year when nearly all study owls nested. It is not unusual for owls in an established activity center to skip several years between one nesting and the next. Sites may be vacant for several consecutive years when the population is in decline, but then be reoccupied to support breeding pairs during a population upswing. Spotted owls as a species have apparently evolved high adult survival rates associated with irregular and unpredictable reproduction (Noon and Biles 1990) their long life span allows eventual recruitment of offspring even if recruitment does not occur each year (Franklin et al. 2000).

Spotted owls are long-lived (owls in the wild have been known to be 17 years old) and adult survival rates in the Sierra Nevada are relatively high (greater than 0.80; Noon et al. 1992, Blakesley and Noon 1999, Steger et al. 1999), indicating the species may be able to persist over the short-term even with extensive reduction in the amount of its suitable habitat (Noon et al. 1992).

In the Sierra Nevada, 80 percent of spotted owl sites have been found in mixed conifer forests (sugar and ponderosa pine, white fir, Douglas-fir, giant sequoia, incense-cedar, black oak, and red fir), 10 percent in red fir forests (red and white fir, lodgepole pine, and quaking aspen) seven percent in ponderosa pine/hardwood forests (ponderosa pine, interior and canyon live oak, black oak, incense-cedar, white fir, tanoak, and Pacific madrone), and three percent in other forest types such as east-side pine, and foothill riparian/hardwood (cottonwood, California sycamore, interior live oak, Oregon ash, and California buckeye) (Verner et al. 1992).

Six major studies (Gutiérrez et al. 1992) described habitat relations of the owl in four general areas spanning the length of the Sierra Nevada. These studies examined spotted owl habitat use at three scales: landscape; home range; and nest, roost, or foraging stand. By comparing the amount of time owls spend in various habitat types to amount of habitat available, researchers determined that owls preferentially used areas with at least 70 percent canopy cover, used habitats with 40 to 69 percent canopy cover in proportion to its availability, and spent less time in areas with less than 40 percent canopy cover than might be expected.

In studies referenced by Gutiérrez et al. (1992), spotted owls preferred stands with significantly greater canopy cover, total live tree basal area, basal area of hardwoods and conifers, and snag basal area for nesting and roosting. In general, stands suitable for nesting and roosting have (1) two or more canopy layers, (2) dominant and codominant trees in the canopy averaging at least 24 inches in dbh, (3) at least 70 percent total canopy cover (including the hardwood component), (4) higher than average levels of very large, old trees, and (5) higher than average levels of snags and downed woody material.

Habitat models based on best professional opinion contained in the California Wildlife Habitat Relationships (CWHR) database rate the following types as providing high capability nesting and feeding habitat for spotted owls: structure classes 4M, 4D, 5M, 5D and 6. Using the CWHR model there are 1,061 acres of moderate and high suitability habitat in the project area.

Distribution

California spotted owl populations have two major geographic groups, one inhabiting the Sierra Nevada Province and the other in the Southern California Province, with Tehachapi Pass as the dividing line between the two populations. These regions are distinct geographically. In the Sierra Nevada, California spotted owls are mostly continuously and uniformly distributed, with several breaks in distribution where habitat appears limited due to natural or human caused factors (Beck and Gould 1992).

Sequoia National Forest has conducted surveys for spotted owls across the forest since the early 1980's. Based on those survey results, there area an estimated 120+ spotted owl territories on the Forest. Twenty of these territories are located on the Hume Lake Ranger District in a variety of locations and habitat types. There have been a number of historic spotted owl detections in the project area and many more in the vicinity. However, there are no known nest stands within the project boundary.

Population Trends

Four demographic studies of California spotted owls have been ongoing for a number of years within the Sierra Nevada: (1) Eldorado National Forest (since 1986); (2) Lassen National Forest (since 1990); (3) Sierra National Forest (since 1990); and (4) Sequoia-Kings Canyon National Park (since 1990). In 2007, the Sierra Nevada Adaptive Management Project (SNAMP) initiated an additional California spotted owl study on the Tahoe National Forest. The initial study area for this SNAMP study had so few California spotted owls that it was expanded to incorporate the long-term Eldorado National Forest demographic study area.

One of the primary objectives of demographic studies is to monitor rate of change (lambda (λ)) in owl populations (i.e., the number of owls present in a given year divided by the number of owls present the year before). For these demographic models, a lambda of 1 indicates a stable population; less than one indicates the population is decreasing and greater than 1 indicates an increasing population. Lambda is estimated from models and is typically presented as an estimate of the rate of population change, along with a standard error (SE) or a 95% confidence interval (CI). The 95% confidence interval represents the reliability of the estimate of lambda.

Managers typically view a population as stable if the 95% confidence interval overlaps a lambda of 1.

For the California spotted owl demographic studies, lambda is estimated individually for each study area at five-year intervals (Franklin et al. 2004, Blakesley et al. 2010). The most recent analysis, using data collected between 1990 and 2005, provided estimates of lambda for all four Sierra Nevada demography study areas (Blakesley et al. 2010):

Lassen: mean estimated lambda is 0.973, with a 95% CI ranging from 0.946 to 1.001

Eldorado: mean estimated lambda is 1.007, with a 95% CI ranging from 0.952 to 1.066

Sierra: mean estimated lambda is 0.992, with a 95% CI ranging from 0.966 to 1.018

Sequoia-Kings Canyon: mean estimated lambda is 1.006, with a 95% confidence interval ranging from 0.947 to 1.068

Blakesley et al. (2010) conducted a "meta-analysis" of the data from all four sites, but did not report a mean estimated lambda for the collective data. Researchers update these estimates annually in unpublished reports, but the greater sample sizes of the multi-year analyses result in more significant and meaningful estimates.

The 2010 meta-analysis concluded that, with the exception of the Lassen study area, owl populations were stable, with adult survival rate highest at the Sequoia-Kings Canyon study site. The 95% confidence limit for lambda in the Lassen study area ranged from 0.946 to 1.001 (estimated value 0.973), which barely includes 1, and the analysis estimated a steady annual decline of 2 – 3% in the Lassen study population between 1990 and 2005.

There has been no recent population monitoring within the Hume Lake Ranger District. The Sequoia-Kings Canyon study site is less than five miles from the project area and may best represent the population trend of spotted owls in this location.

Risk Factors

General threats to spotted owls include: the range expansion of barred owls, catastrophic large wildfires, disease (West Nile Virus and parasites), insect and pathogen issues (loss of trees), and loss of habitat (urbanization, industrial timber harvest).

Management and Status

The USFWS has conducted several significant status reviews of the California spotted owl in response to listing petitions (published 12 month findings: USFWS 2003, USFWS 2006). In their review, dated May 15, 2006, the USFWS found that the listing of the California spotted owl was not warranted. They concluded that "impacts from fires, fuels treatments, timber harvest, and other activities are not at a scale, magnitude, or intensity that warrants listing, and that the overall magnitude of threats to the California spotted owl does not rise to the level that requires the protections of the Act" at this time.

The USFWS received another petition for listing in 2015, which is currently under review (Federal Register, Vol. 80, No. 181). The California spotted owl is listed as a species of special concern by the California Department of Fish and Game.

Management direction from the 2012 Monument Plan includes delineation of 300 acre protected activity centers (PACs) with associated 300 acre Home Range Core Areas (HRCAs) that have specific restrictions on activity. There are currently 20 spotted owl PACs located on the Hume Lake Ranger District. No spotted owl PACs overlap with the project area.

Sierra Marten (*Martes caurina sierrae*) * previously identified as American Marten (*Martes americana*). Classified as a separate species by Dawson and Cook (2012).

Habitat Preferences and Biology

Marten habitat includes mature mesic conifer forests interspersed with meadows, providing abundant small mammal prey, features for resting and denning, and sufficient canopy coverage for protection from avian predators (Buskirk and Ruggiero 1994). Conifer forest types important to marten within the Sierra Nevada include red fir, lodgepole pine, subalpine conifer, mixed conifer-fir, Jeffrey pine, and eastside pine (Simon 1980, Spencer 1981, Spencer et al. 1983, Zeiner et al. 1990, Cablk and Spaulding 2002). In their study on the Tahoe National Forest (Sagehen Creek), Spencer et al. (1983) found martens select riparian lodgepole pine stands at elevations below 6,726 feet and old-growth red fir stands above 6,726 feet. Martens were apparently using the lodgepole stands to hunt for Douglas squirrels.

Mature coniferous forests provide large-diameter trees and snags, large downed logs, and moderate to high canopy closure, and interspersed riparian areas and meadows, important attributes for prime marten resting, denning, and foraging habitat. Kirk and Zielinski (2009) concluded that high-elevation, late seral forests appear important for marten population persistence. Marten within the northern Sierra Nevada select stands with 40 to 60 percent canopy closure for both resting and foraging and avoid stands with less than 30 percent canopy closure (Spencer et al. 1983). Koehler et al. (1975) also stated that marten avoid stands of less than 30 percent canopy closure, while Bull et al. (2005) found marten within northeast Oregon avoid stands with less than 50 percent canopy closure. Marten generally avoid habitats that lack overhead cover, presumably because these areas do not provide protection from avian predators (Allen 1982, Bissonette et al. 1988, Buskirk and Powell 1994, Spencer et al. 1983). In Yosemite National Park, martens avoid areas lacking overhead cover and prefer areas with 100 percent overhead cover, especially when resting (Hargis and McCullough 1984).

At the landscape scale, patches of preferred habitat and the distribution of open areas with respect to these patches may be critical to the distribution and abundance of martens (Buskirk and Powell 1994). Small open areas, especially meadows, and regenerating stands (or plantations) are used by marten as foraging habitat, but these openings are of optimum value when they occupy a small percent of the landscape and occur adjacent to mature forest stands meeting requirements for denning or resting habitat. In general, marten appear to avoid landscapes with greater than 25 to 30 percent of the area in openings, even where suitable habitat connectivity exists (Chapin et al. 1998, Hargis et al. 1999). Poole et al. (2004) found marten

within British Columbia categorically avoid non-forested cover types, but they did extensively use young (<40 years of age) deciduous stands during the summer.

Various studies in the Sierra Nevada indicate that martens have a strong preference for forest-meadow edges, and riparian forests appear to be important foraging habitats for voles (Spencer et al. 1983, Martin 1987). Voles are common in riparian zones and are important year-round prey for martens within the Sierra Nevada (Zielinski et al. 1983, Zielinski 1984, Hargis and McCullough 1984, Martin 1987). Both Simon (1980) and Spencer (1981) found heavy marten use along Sierra Nevada meadow edges. Martens preferred foraging in areas within 197 feet of a meadow, but avoided areas greater than 1,312 feet from a meadow and rarely ventured farther than 33 feet within a meadow (Spencer et al. 1983). Spencer et al. (1983) also found martens prefer areas with an abundance of Douglas squirrel feeding sign.

Dead and down material such as large snags, large downed woody material, and debris piles (especially near the ground) appear to provide protection from predators, prey sources, access to subnivean spaces, and protective thermal microenvironments, especially in the winter (Buskirk and Powell 1994, Spencer et al. 1983, Thompson and Harestad 1994, Bull et al. 2005). Bull et al. (2005) found marten within northeastern Oregon prefer habitats with high volumes of dead and down trees and avoid areas with low densities of dead trees. Sites used for subnivean entry have (1) greater percent cover of coarse woody debris, (2) greater total volume of coarse woody debris, (3) greater numbers of log layers, (4) greater volume of undecayed and moderately decayed logs, (5) less volume of very decayed logs, and (6) fewer small root masses than surrounding forest stands (Corn and Raphael 1992). Hence, large coarse woody debris (snags, downed logs, large branches, and root masses) are an important winter habitat component for both resting/denning and foraging.

Numerous food habits studies have been conducted across the range of martens with approximately half indicating voles (*Microtus* spp. and *Clethrionomys* spp.) are a dominant food item (Martin 1994). *Microtus* also contribute to the diet of martens within the Sierra Nevada (Zielinski et al. 1983, Zielinski 1984, Hargis and McCullough 1984, Martin 1987), but in some areas are apparently not as important as sciurids and deer mice (*Peromyscus* spp.) (Simon 1980, Zielinski and Duncan 2004). Douglas squirrels (*Tamiasciurus douglasii*) in particular may be highly important to martens within California because of both their prevalence in the diet and their relatively high biomass compared to other prey items. However, the occurrence of voles versus tree squirrels in diet studies may also reflect the seasonal timing of the study. Zielinski et al. (1983) suggested that martens within California switched over to Douglas squirrels when winter snows made voles more difficult to capture (and perhaps squirrels more vulnerable). Structural habitat complexity enhanced, rather than diminished, the efficiency of predatory search by martens (Andruskiew et al. 2008).

Parturition occurs between mid-March and late April. The young are reared in dens, and the mother moves the young among dens. The dens are important to recruitment and may represent a special habitat need (Ruggiero et al. 1994). Marten natal dens typically are found in cavities in large trees, snags, stumps, logs, burrows, caves, rocks, or crevices in rocky areas. The dens are lined with vegetation and occur in structurally complex, late successional forests (Buskirk and Ruggiero 1994). Post-natal dens are typically found in cavities, logs, underground, or in slash

piles (Bull and Heater 2000). Canopy cover and the number of large old trees in these patches exceed levels available in the surrounding suitable habitat. The availability of habitat suitable for natal dens may limit reproductive success and population recruitment; this has direct repercussions on future population size (Buskirk and Ruggiero 1994).

In a study within Giant Sequoia National Monument, Zielinski et al. (1997) found 36 percent of the rest sites used by martens were in trees. Martens rested in conifers more often than hardwoods and tended to reuse rest sites with a frequency of 25.5 percent.

Habitat relationships for this species are defined by the California Wildlife Habitat Relationships (CWHR) models, which model habitat suitability for California's terrestrial vertebrates (California Department of Fish and Game 2005). The CWHR habitat stages that are moderately to highly important for martens are: 4M, 4D, 5M, 5D, and 6, particularly within red fir, lodgepole pine, subalpine conifer, mixed conifer-fir, Jeffrey pine, and eastside pine (California Department of Fish and Game 2005). Using the CWHR model, there are 1,061 acres of habitat suitable for martens in the project area. However, none of these acres are in the vegetation types listed above that are considered "particularly important" to martens.

Historic and Current Distribution

In California, American martens were distributed throughout the Sierra Nevada and Cascades, while the Humboldt marten (*M. a. Humboldtensis)* occurred in the Coast ranges. In a genetic study, Slauson et. al (2008) found American marten within the Sierra Nevada differed substantially from coastal populations of martens, suggesting American marten populations were not a historically genetically homogeneous population and divergence may have occurred in separate glacial refugia.

Martens are currently distributed throughout the Sierra Nevada and Cascades (Buskirk and Zielinski 1997) between elevations of 5,500 to 10,000 feet, but most often found in the Sierra Nevada above 7,200 feet (Cablk and Spaulding 2002). For example, 81 percent of the 31 martens detected over an eight-year study on the Stanislaus National Forest were recorded at elevations above 6,562 feet. This distribution coincides with snowfall levels of greater than 9.1 inches per winter month (Krohn et al. 1997). Extensive marten surveys have been conducted across Sequoia National Forest, with numerous detections, including within the project area.

Risk factors

Martens are among the most habitat-specific mammals in North America (Buskirk and Powell 1994), and changes in the quality, quantity, and distribution of available habitat could affect their distributional range. Risks to marten habitat include activities that remove overhead cover, large-diameter trees, or coarse woody debris and activities that convert mesic to xeric sites with associated changes in prey communities (Campbell 1979). Although overhead cover is regenerated via plant successional processes, loss of coarse woody debris can only be ameliorated by artificial additions to the system or by the growth and decadence of new large-diameter trees (Buskirk and Ruggiero 1994).

In northern Utah, martens responded negatively to low levels of habitat fragmentation when the average distance between openings was less than 95 m (317 feet; Hargis et al. 1999). Andren

(1994) suggested that as landscapes become fragmented there is a negatively synergistic combination of increasing isolation and decreasing patch size of suitable habitat that compounds the results of simple habitat loss. For some species, this may result in a decrease of greater magnitude than can be explained solely by the loss of suitable habitat. Martens may be a species that demonstrates this pattern of exponential population declines at relatively low levels of fragmentation (Bissonette et al. 1997).

Roads can result in the direct and indirect mortality of individual martens, as well as the degradation of habitat. Roads can fragment habitat and affect the ability of the animals to use otherwise suitable habitat on either side of the road, and the associated presence of vehicles and humans, can cause animals to avoid otherwise suitable habitats near roads. For example, Robitaille and Aubry (2000) found American martens to concentrate their activity away (greater than 300 m) from roads (although use near roads was not precluded). Vehicular collisions resulting in marten mortality have been known to occur on the Hume Lake Ranger District. Most were associated with long paved stretches of road, like General's Highway, where vehicles tended to maintain higher speeds.

Habitat quality for this species would likely be affected by climate change. A vulnerability assessment by Hauptfeld and Kershner (2014) ranked overall vulnerability of the marten as moderate/high, due to its moderate/high sensitivity to climate and non-climate stressors, moderate adaptive capacity, and moderate/high exposure. Pacific martens are also listed as "Climate Vulnerable" in the 2015 California State Wildlife Action Plan (CDFW 2015).

Management and Status

The 2012 Monument Plan requires the establishment of den site buffers that consist of 100 acres of the highest quality habitat in a compact arrangement surrounding known marten dens. No den site buffers have been established in the project area. Pacific martens are Species of Conservation Concern in California and were designated a "Species of Greatest Conservation Need" in the 2015 California State Wildlife Action Plan (CDFW 2015).

Fisher *(Pekania pennanti)*

A complete discussion of fisher biology and status is available in "Southern Sierra Nevada Fisher Conservation Assessment" (Spencer, et al. 2015). Below is a summary with information specific to the analysis area.

Habitat Preferences and Biology

In the Sierra Nevada, fisher habitat occurs in mid-elevation forests (Grinnell et al. 1937). In the southern Sierra Nevada, fishers occur sympatrically with martens (*Martes americana*) at elevations of 5,000 to 8,500 feet in mixed conifer forests (Zielinski et al. 1995). The Sierra Nevada status and trend monitoring project (USDA 2006) has detected fishers as low as 3,110 feet and as high as 9,000 feet in the southern Sierra Nevada, which are considered to be extremes of the elevation range.

In the southern Sierra Nevada, the preferred habitats include mixed conifer, ponderosa pine and montane hardwoods. Oaks, particularly black oak (*Quercus kelloggii*) appear to be a key component of the habitat (Carroll et al. 1999, Zielinski et al. 2004a). Forest structural characteristics within fisher home ranges are strongly skewed toward mid- to late-seral stands with high canopy cover; large, cavity-forming trees are required for resting and denning habitat (Seglund 1995, Zielinski et al. 2004b, Yaeger 2005). Geographic conditions correlated with core fisher habitat in California include complex topography, steep slopes, and proximity to water (particularly in the southern Sierra Nevada) (Zielinski et al. 2004b, Carroll 2005).

Purcell, et al. (2009), studied resting structures used by fishers on an area of Sierra National Forest. They determined that canopy cover was the most important variable distinguishing areas used as rest sites by fishers. Large live trees and large snags made up the majority of the rest structures. Trees used as resting sites were often the largest available in the area. Resting sites were on steeper slopes, closer to streams and with smaller and more variable trees than random sites. Habitat suitable for resting and denning sites is thought to be most limiting to the population; therefore, these habitats should be given more weight than foraging habitats when planning or assessing habitat management (Powell and Zielinski 1994, Zielinski et al. 2004a).

The Southern Sierra Fisher Conservation Strategy (Spencer et al. 2016) identifies high value fisher reproductive habitat as vegetation types: Douglas Fir, Eastside Pine, Jeffrey Pine, Lodgepole Pine, Montane Hardwood-Conifer, Montane Hardwood, Montane Riparian, Ponderosa Pine, Red Fir, Subalpine Conifer, Sierran Mixed Conifer, or White Fir in CWHR size and density classes: 4D, 5M, 5D, and 6. Using this model and current vegetation information, there are 654 acres of high value fisher reproductive habitat in the project area.

Population Genetics

Several studies have revealed low genetic diversity in the southern Sierra Nevada fisher population (Drew et al. 2003, Wisely et al. 2004, Tucker et al. 2012, 2014). The southern Sierra population became isolated from other populations thousands of years ago. Genetics also indicate that the southern Sierra Nevada (including what is now Sequoia National Forest) may have provided a refuge for fisher during the era of European settlement.

Three genetic subpopulations in the southern Sierras have been identified, separated at the Kings River and Tule River watersheds, in or near the Mountain Home Demonstration State Forest (Tucker et al. 2012, 2014). The subpopulation in the Hume Lake Ranger District and Sequoia National Park is labeled Core Area 3 by the Southern Sierra Fisher Conservation Strategy (Spencer et al. 2016). None of the linkage areas identified in Spencer et al. (2016) would be affected by this project.

Historic and Current Distribution

Grinnell et al. (1937) described the distribution of fishers in California as a continuous arc from the northern Coast Range eastward to the southern Cascades, and then south through the western slope of the Sierra Nevada. As of 1995, Zielinski et al. determined that fishers remain extant in just two areas comprising less than half of the historic distribution: northwestern California and the southern Sierra Nevada from Yosemite National Park southward, separated by a distance of approximately 250 miles.

Trends

Status and trend monitoring for fishers in the Sierra Nevada was initiated in 2002; the monitoring objective was to be able to detect a 20 percent decline in population abundance and habitat (USDA 2006). This monitoring includes intensive sampling to detect population trends on the Sierra and Sequoia national forests, where fishers currently are found, and was supplemented by less intensive sampling in suitable habitat in the central and northern Sierra Nevada specifically designed to detect population expansion.

Results indicate that fishers are well-distributed in portions of the Sequoia and Sierra National Forests; but occupancy rates are consistently higher on the Sequoia than the Sierra (USDA 2005). Carnivore surveys on the Hume Lake Ranger District have resulted in numerous detections of fishers near the project area.

A recent analysis of the SNFPA Long Term Monitoring data was completed which analyzed a core of 243 sample units from 2002 through 2009 (Zielinski et. al 2013). Findings suggest that over the 8-year period, there was no trend or statistically significant variations in fisher occupancy rates in the southern Sierra populations. The small population of fishers in the southern Sierra does not appear to be decreasing.

Threats to Fishers in the Southern Sierra Nevada Population

The Southern Sierra Nevada Fisher Conservation Assessment (Spencer et al. 2015) identified the primary threats to this fisher population as: habitat loss and fragmentation; rodenticides and other poisons; predation; disease and infections; roads and other human structures; and climate change.

Habitat connectivity is a key to maintaining fisher within a landscape. Activities that result in habitat fragmentation or population isolation pose a risk to the persistence of fishers. Timber harvest, fuels reduction treatments, road presence and construction, and recreational activities may result in the loss of habitat connectivity resulting in a negative impact on fisher distribution and abundance.

The level of road and trail density and associated noise disturbance may influence how fishers utilize available habitat. Dark (1997) for example studied fishers in a well-roaded study area (i.e. areas without roads did not exist) on the Shasta-Trinity National Forest. The results suggested that fishers were detected more frequently at sites where roads were closed by the use of gates or otherwise designed to discourage vehicular traffic. Fishers used habitats with a greater density of low-use roads, and favored landscapes with more contiguous, unfrequented forests and less human activity. Campbell (2004, In USFWS 2004) noted that sample units examined within the central and southern Sierra Nevada region occupied by fishers were negatively associated with road density.

Vehicular collisions resulting in fisher mortality have been reported in a number of studies. Heinemeyer (1993), for example, noted vehicular collision as a source of fisher mortality. Along a portion of Highway 41 in Sierra National Forest and Yosemite National Park, nine road-killed fishers were found from 2008-2012 (O'Brien et al. 2013). Instances of fisher mortality on the Hume Lake Ranger District have also occurred. Most were associated with long paved stretches of road where vehicles tended to maintain higher speeds (e.g. Highway 180).

In addition to the risk of vehicular collisions, forest roads may increase predation on fishers by mountain lions, bobcats, and coyotes using these routes as travel and hunting corridors (Naney et al. 2012). Predation sites tend to be closer to roads, on average, and bobcat and fisher interactions are more likely to occur near roads and other open areas (Wengert 2013).

Management and Status

The Forest Service has considered fishers to be a Sensitive Species in the Pacific Southwest Region since 1984. In 2004, the U. S. Fish and Wildlife Service determined that the West Coast population of fisher was warranted for listing under the Endangered Species Act, but precluded due to heavy agency workloads (69 FR 18770), and included it on the list of "Candidate" species. In March 2013, the USFWS opened an information gathering period regarding the status of the fisher throughout the range of its West Coast distinct population segment (DPS).

The fisher of the Pacific states, or the West Coast DPS, was proposed for listing on December 23, 2014 as a threatened species under the federal Endangered Species Act (79 FR 76950). The West Coast Fisher DPS includes all potential fisher habitat in Washington, Oregon and California from the east side of the Cascade Mountains and Sierra Nevada to the Pacific coast. That proposal was withdrawn in April 2016 (81 FR 22710).

In March 2009, the California Fish and Game Commission recommended that the fisher be assessed for listing as threatened or endangered under the California State Endangered Species Act. This recommendation initiated a 12-month status review by the California Department of Fish and Game (CDFG) culminating in a determination by the Commission on June 23, 2010, that the listing was not warranted. A status review was reinitiated in March 2013, making fishers a candidate species under the California Endangered Species Act. The status review found the Southern Sierra Nevada fisher population to be warranted for listing as threatened (CDFW 2015). The California Fish and Game Commission Notice of Findings stated that the Pacific fisher southern Sierra ESU (defined as California south of the Merced River) is determined to be listed as threatened. The final date of legislation is pending.

The 2012 Monument Plan and 2004 SNFPA require the establishment of fisher den site buffers that consist of 700 acres of the highest quality habitat in a compact arrangement surrounding verified birthing and kit rearing dens. Fisher den site buffers have a limited operating period of March 1-June 30 for all new projects. No den site buffers have been established in or near the project area. The entire project area is within the Southern Sierra Fisher Conservation Area, which requires the retention of habitat structures important to fishers, including canopy cover and large trees (Monument Plan, p. 87, S&G #1).

V. EFFECTS ANALYSIS

Northern Goshawks, Great Gray Owls, California Spotted Owls, Sierra Martens and Fishers

Determining Direct and Indirect Effects

The direct and indirect effects of the alternatives in the Slash Clean-up Project on these species were evaluated using two primary metrics:

1. **Loss of Important Habitat Elements (down woody debris)**. Down woody debris provides cover and habitat for important prey species. A reduction in the amount of large down woody material would therefore reduce habitat quality for each of these species.

2. **Disturbance.** Noise and other human activity from chipping and piling and burning may cause disturbance to wildlife in the project area.

3. **Fisher Specific Metrics.** The *Southern Sierra Fisher Conservation Strategy* (Version 1.0, February 2016) amended by *Changed Circumstances and Implementation of the Southern Sierra Nevada Fisher Conservation Strategy, Note from the Authors* (2017) contain a number of recommendations for vegetation management in fisher habitat, including:

Within suitable habitat (which the conservation strategy puts in hexagons based on the average size of the home range of female fishers in other areas):

- **Goal 3.** Restore and maintain high quality and resilient fisher habitat conditions.
  Objective 3.1. Improve fisher habitat resiliency and restore fire as a key ecological process.
  Conservation measures. Reduce hazardous fuel conditions and increase habitat heterogeneity patterns that reflect how topography, soil, and other factors affect vegetation characteristics and fire behavior; implement ecological restoration concepts described in GTR 220/237 to promote conditions that allow fire to serve its natural ecological role in maintaining resilient and heterogeneous forest conditions; maximize use of prescribed fire or wildfire managed for resource benefits at large scales and under conditions that promote resiliency and fisher habitat values.
  Objective 3.2. Maintain or increase important fisher habitat elements.
  Conservation measures. Retain and promote recruitment of large trees, coarse woody debris (large snags and logs), trees with cavities and other defects, large black oaks, dense tree clusters and gaps at fine (<0.5 ac) resolution, and clumps of multi-storied tree canopies.

The following should be considered where mechanical treatments are planned in and around remaining high value reproductive habitat (CWHR 4D, 5M, 5D, and 6):

- Design treatments to limit disturbance from mechanical treatments to <13% of each affected cell within a 5-year period (Zielinski et al. 2013b), providing resilience goals for remaining high value reproductive habitat are achievable. Where remaining high value reproductive habitat is at significant risk of loss or isolation due to lack of resilience, design treatments to limit disturbance from mechanical treatments to <30% of each affected cell within a 5-year period (Zielinski et al. 2013b, Spencer et al. 2015). Where remaining high value reproductive habitat is at significant risk, and resiliency goals cannot be met while limiting treatment disturbance to these rates, conduct a cost-benefit assessment to determine if benefits to fisher habitat conservation in the long-term are likely to outweigh short-term costs.

Fishers also select or require specific habitat stand structural conditions, including dense, multi-storied canopies for resting and denning habitats, abundant dead-wood structures, and ground-level hiding and escape cover. The following guidelines should apply to the design of vegetation treatments to retain and promote suitable habitat structural conditions:

- Retain on average 3-5 tons of large (>20-in diameter) logs per acre. Log density should vary across the landscape, with some patches of high abundance (5 tons/ac) and others with lower densities (<1 tons/ac). If large trees or snags must be felled, leave 3-5 tons per acre on the ground in the largest size classes where they do not pose a significant fuel or safety risk.
- Pile brush and retain some slash piles for fisher escape cover and prey habitat.

Proposed Action

Slash produced by felling hazard trees within the 1,789 acre project area would be treated by piling and burning, chipping or removed as biomass/wood products. Some of the large down material, which has been piled in log decks, would be removed as biomass, wood products or burned at high heat to ensure complete combustion such as in an air curtain burner.

To meet the minimum of 10 tons per acre of large down woody debris, the 3 to 5 largest trees (large end diameter of 30+ inches) will be left on site and where it does not conflict with operability of the site for recreation or fuel management (i.e. designated fuel break).

1. **Loss of Important Habitat Elements (down woody debris)**. *Slash from felled hazard trees would be removed wherever necessary within the 1,789 acre project area (along roads and at recreation sites). This down woody material would be lost as cover and habitat for prey species.*

Removal of felled trees would reduce the amount of down woody debris available to wildlife in some areas. Felled trees would be retained where needed to meet the required minimum of 10 to 20 tons per acre of logs greater than 12 inches in diameter (GSNM Management Plan, p.87).

Habitat quality for Northern goshawks, great gray owls, California spotted owls, Sierra martens and fishers may be reduced, depending on the number, location and specific characteristics of the material removed. Given the large home range sizes for these species, the loss of down woody material in a small portion of that home range is unlikely to threaten their survival.

Habitat near developed campgrounds, organizational camps, and roads is already of lower quality for Northern goshawks, spotted owls, Sierra martens and fishers because of disturbance, habitat fragmentation, edge effects and collisions (Gaines et al. 2003). Nest and roost sites are less likely to be near roads because of disturbance. For example, Phillips et al. (2010) found that California spotted owls nested away from edge habitats. So the removal of down woody material would occur in areas of less valuable habitat than if this were to occur in the middle of a forested stand.

2. **Disturbance.** Noise and other human activity from piling, chipping and burning may cause short-term disturbances to wildlife in the project area. However, the activities would only occur outside the breeding season in most cases because of the required limited operating period (see project mitigations).

3. **Fisher Specific Metrics.**

We evaluated the consistency of the Hazard Tree Clean-up Project with the goals, objectives and recommendations in the Southern Sierra Nevada Fisher Conservation Strategy (Spencer et al. 2016, 2017). The project area is within what the strategy labels as Fisher Core Area 3, which includes the area from south of the Kings River to near Mountain Home State Forest. There are no "linkage areas" near the project area. The Hazard Tree Slash Clean-up Project is in alignment with the Southern Sierra Fisher Conservation Strategy goal to "restore and maintain… resilient fisher habitat conditions." Vegetation management where critical habitat elements for fishers are maintained can both preserve existing habitat and increase the resiliency of the habitat to future losses from tree mortality and wildfires. The project reduces the risk of stand replacing fire while maintaining large trees, oaks, and canopy cover on the landscape.

Hexagonal grid cells about the size of an average female breeding home range or territory (10 km^2, ~4 mi^2) were overlaid on the project analysis area. The Hazard Tree Slash Clean-up project area overlaps 18 individual hexagons within Core Area 3. An analysis of cumulative effects for these 18 hexagons was conducted using the Sierra Nevada Fisher Conservation Strategy guidelines shown above.

The five-year window from 2018-2022 was used to assess the percentage of each hexagon treated. Implementation of the Hazard Tree Slash Clean-up Project is expected in 2018. This five-year window accounts for any mechanical vegetation treatment activities expected to occur within each hexagon (both this project and the proposed Eshom Area Fuel Break Project). Results are shown in Table 2.

One of the hexagons exceeds the 13 percent treated Conservation Strategy guideline limit (16%). This hexagon includes the Hume Lake area, including private property that is the site of the Hume Lake Christian Camp. In that specific area, the safety of the community outweighs the need to optimize fisher habitat in the short-term. The remaining 11 hexagons are all under 13 percent treated mechanical during that time period (Range of less than 1% to 11%) meeting the Sierra Nevada Fisher Conservation Strategy guideline for limiting disturbance to fishers.

The project requires retention of the three to five largest down trees (large end diameter of 30+ inches) per acre treated. This is expected to meet the Sierra Nevada Fisher Conservation Strategy recommendation of 3-5 tons of large (>20-in diameter) logs per acre.

Table 2: The maximum acreage of possible mechanical treatments and the total percentage potentially treated within the eighteen hexagons affected by the Hazard Tree Slash Clean-up Project, shown in three five-year window beginning with project implementation.

	2018-2022	
Hexagon	Total Treated Acres	% of Hexagon Treated
5067	131	**5%**
5068	12	**<1%**
5142	130	**5%**
5143	399	**16%**
5144	102	**4%**
5216	55	**2%**
5218	39	**2%**
5219	9	**<1%**
5220	106	**4%**
5292	125	**5%**
5293	90	**4%**
5369	46	**2%**
5370	159	**6%**
5373	65	**3%**
5446	266	**11%**
5448	51	**2%**
5449	56	**2%**
5522	36	**1%**

*mechanical treatments will not occur on all these acres, **only** in areas with slash created by hazard tree felling.

The 2016 Southern Sierra Nevada Fisher Conservation Strategy also contains management recommendations. Those "Conservation Measures" applicable to the activities proposed in this project include:

- A limited operating period of **March 1 to June 30** for tree-cutting activities within natural stands with CWHR diameter class 12 in or greater or mastication within stands typed as Sierran mixed conifer (SMC), conifer-hardwood (MHC), and ponderosa pine (PPN) CWHR 4D, 5M, 5D, or 6.
- A limited operating period of **March 15 to May 1** for burning large slash or woody debris piles (>0.1 ac), piles adjacent to possible den structures, or in situations where simultaneous lighting would create intense smoke.

Cumulative Effects

The cumulative effects sections of this document places the alternatives in context with past, present, and reasonably foreseeable actions which, when considered collectively, may affect wildlife habitat. Since the project area is dispersed across multiple watersheds, the spatial scale for cumulative effects analysis is the entire Hume Lake Ranger District. This is an appropriate scale for determining cumulative effects since it includes all suitable habitat potentially affected by implementation of the project.

The temporal scale for the analysis is five years into the future, the time frame that future actions can reasonably be predicted. The cumulative effects of past management activities are incorporated within the existing condition. Past vegetation-changing actions or events (for example, fuels treatments and wildland fires) have already been captured by the Forest's GIS vegetation layer (EVEG).

For assessment of future projects, the Forest completes a quarterly "Schedule of Proposed Actions" (SOPA) which tracks proposals that are ongoing or have sufficient detail to insure they are reasonably foreseeable. The total list of actions presented on the SOPA is not included here. Some projects have been cancelled or are undergoing revision, with others not included because they have limited scope and intensity and present no appreciative impact on available habitat.

Climate changes will likely cause changes in the distribution of species in the analysis area. Modeling efforts have projected that forest types and other vegetation dominated by woody plants in California would migrate to higher elevations as warmer temperatures make those areas suitable for colonization and survival. For example, with higher temperatures and a longer growing season, the area occupied by subalpine and alpine vegetation was predicted to decrease as evergreen conifer forests and shrublands migrate to higher altitudes. The precise effects of climate change on individual species are difficult to predict and will not be addressed in detail in the effects analysis.

Rodenticides

Anticoagulant rodenticides and other toxicants used at illegal marijuana grow sites may threaten fisher and "pose equally grave risks" to American marten, California spotted owls, and great gray owls (Gabriel et al. 2012). No specific information is available regarding the illegal use of toxicants in the analysis area but it is reasonable to assume they are present and a threat to many wildlife species. However, we currently lack the information to quantify the threat for this analysis.

Current Activities

Grazing: The analysis area contains multiple grazing allotments. Because grazing is a past, ongoing, and foreseeable future action and because use levels and associated impacts from this activity are not expected to change as a result of implementation of any of the alternatives, cattle grazing activity is not expected to contribute measurable impacts to habitat quality. Grazing permits for these allotments include specific measures designed to protect key habitat elements.

Recreation and Roads: The analysis area is used regularly by campers, hunters and OHV users. There are hundreds of miles of Forest Service roads in the analysis area. These are past,

ongoing, and foreseeable future action but use levels and associated impacts from this activity are not expected to change as a result of implementation of the proposed action, recreation is not expected to contribute additional measurable impacts to habitat quality.

Future Activities The SOPA accessed on 2/1/2018 had the following relevant management activities proposed within the cumulative effects analysis area:

Big Stump-Redwood Mtn. Fuels Restoration Project: Proposal to reduce fuels buildup in a portion of Big Stump Giant Sequoia Grove through prescribed burning to protect nearby facilities and begin reintroducing fire into the grove.

Eshom Area Fuelbreak Maintenance: Proposal to maintain up to 769 acres on six existing fuelbreaks in the Eshom portion of the district. Proposed treatments are hand and machine felling hazard trees and piling the material. Piles would be burned.

Stony Creek Lodge Expansion Project: Expand lodging facilities to 45 rooms at the Stony Creek Lodge, on Generals Highway.

Additional Foreseeable Future Activities (not listed in the SOPA)

Tower/Park Ridge Prescribed Burns: Prescribed fire project in cooperation with Kings Canyon National Park. Less than 75 acres within the analysis area would be potentially impacted.

Eshom Ecological Restoration Project: Potential forest health/fuels reduction project in the area south of Eshom Campground and adjacent to Hartland. A proposed action has not been developed enough for a quantitative analysis in this document.

Cumulative Effects

1. **Loss of Important Habitat Elements (down woody debris)**.

In addition to the potential loss of large down woody debris in this project, the projects listed above would also reduce down woody material in the short-term (chipping, masticating or pile burning) or long-term (snag removal). However, all these projects are required to meet the Giant Sequoia Monument Plan retention requirements of 10 to 20 tons per acre of logs greater than 12 inches in diameter (GSNM Management Plan, p.87). The cumulative effects of these management actions would reduce the amount of down woody material on less than 7 percent of the mid and late seral forest habitat (4M, 4D, 5M, and 5D) in the analysis area.

2. **Disturbance.**

Noise and other human activity in these future projects may cause short-term disturbances to wildlife in the local area. However, Limited Operating Periods would be utilized as needed to protect sensitive areas from disturbance during the breeding season.

VI. DETERMINATIONS

REGION 5 FOREST SERVICE SENSITIVE SPECIES

Northern goshawks, Great Gray Owls, California Spotted Owls, Sierra Martens and Fishers:

Proposed Action

It is my determination that the proposed action in the Hazard Tree Slash Clean-up Project **may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability** of *Northern goshawks, great gray owls, California spotted owls, Sierra martens, and fishers*. The removal of down woody material would reduce habitat quality in some areas, although the largest down trees will be retained to insure a minimum of 10 tons/acre of large woody material. The cumulative effects of this project would impact less than seven percent of the existing habitat for these species in the analysis area.

No special management areas (PACs, Den Site Buffers, etc.) would be impacted. Disturbance from project activities may occur, but would be limited to periods outside the important nesting/denning season. The project is also consistent with the goals and recommendations in the Southern Sierra Nevada Fisher Conservation Strategy, including the goal to "restore and maintain…resilient fisher habitat conditions."

Required Mitigations:

- A limited operating period of **March 1-June 30** for all project activities.
- Retain felled trees on the ground where needed to achieve down woody material standards of 10 to 20 tons per acre in logs greater than 12 inches in diameter.

Recommended Mitigation:

- Retain some slash piles to provide cover for wildlife, if they don't create unacceptable fuel loading in the area.

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Appendix A. Forest Service Sensitive Animal Species in Sequoia National Forest (*List **Updated 6/30/2013)***				
Species	**Status**	**Habitat**	**Effects Determination**	**Rationale**
Birds				
Northern goshawk *(Accipiter gentilis)*	FSS, CSSC	Dense mixed conifer forest to open eastside pine	**may affect individuals,** but is not likely to result in a trend toward Federal listing or loss of viability	See analysis and effects determination above.
Western yellow billed cuckoo *(Cocczyus americanus occidentalis)*	FSS, FC, SE	Dense riparian forest. On SQF, only known from Lake Isabella.	No effect	Project area outside known range and lacks suitable habitat.
Little Willow flycatcher *(Empidonax trailii brewsterii*)	FSS, SE	Large meadow complexes with dense willow and standing water, up to 8,000'	No effect	No detections or suitable habitat in or near the project area.
Bald Eagle *(Haliaeetus leucocephalus*)	FSS, SP, SE	Lakes and open water. Nests on large trees.	No effect	Species and habitat not impacted by the proposed action. No potential roost trees near lakes or rivers would be removed.
Great gray owl *(Strix nebulosa)*	FSS, SE	Large meadows & openings 2,500 – 9,000'. Dense forest and large snags for nesting.	**may affect individuals,** but is not likely to result in a trend toward Federal listing or loss of viability	See analysis and effects determination above.
California spotted owl *(Strix occidentalis occidentalis)*	FSS, CSSC	Dense forest (>40% canopy closure), preference for stands with ≥2 layers, but open enough to allow for observation and flying space to attack prey. Substantial amounts of dead woody debris are desirable.	**may affect individuals,** but is not likely to result in a trend toward Federal listing or loss of viability	See analysis and effects determination above.
Mammals				
Pallid bat *(Antrozous pallidus)*	FSS, CSSC	Open habitats, rocky crevices, tree cavities, mines,	No effect	Species and key habitat characteristics not impacted by

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Species	**Status**	**Habitat**	**Effects Determination**	**Rationale**
		caves, or buildings for maternity roosts. Deep crevices are important for day roosts.		the proposed action. No potential roost sites would be affected.
Townsend's big eared bat *(Corynorhinus townsendii townsendii)*	FSS, CSSC	Nocturnal, roosts in caves, uses wide variety of habitats although usually mesic areas for foraging.	No effect	May forage near the project area. Species and key habitat characteristics not impacted by the proposed action. No potential roost sites would be affected.
Fringed myotis *(Myotis thysanodes)*	FSS	Optimal habitats are pinyon-juniper, valley foothill hardwood, and hardwood-conifer habitats, but it is found in a wide variety of habitats. Roosts in caves, mines, buildings, crevices in rocks, and snags.	No effect	Species and key habitat characteristics not impacted by the proposed action. No potential roost sites would be affected.
California wolverine *(Gulo gulo luteus)*	FSS, ST, SP	Remote habitats, sensitive to human presence. 4000' to 13,000' mixed habitats	No effect	No verified detections in the area for 50+ years. Unlikely to be found near project area due to human disturbance.
Sierra marten *(Martes caurina sierrae)*	FSS, CSSC	Dense forest (>30% canopy cover), high number of large snags and down logs, close proximity to dense riparian corridors for movement, and an interspersion of small (<1 acre) openings with good ground cover for foraging. Potential occupied elevation 4,000-13,000 ft.	**may affect individuals,** but is not likely to result in a trend toward Federal listing or loss of viability	See analysis and effects determination above.
Fisher *(Pekania pennanti)*	FSS, SPT	Dense forest (>40% canopy cover). high number of large	**may affect individuals**, but are not likely to	See analysis and effects determination above.

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Species	**Status**	**Habitat**	**Effects Determination**	**Rationale**
		snags and down logs, close proximity to dense riparian corridors for movement, and an interspersion of small (<1 acre) openings with good ground cover for foraging.	contribute to the need for federal listing or result in a loss of viability.	
Amphibians				
Yellow blotched salamander *(Ensatina escholtzii croceator)*	FSS, CSSC	Valley foothill/hardwood habitats and conifer, moist habitats and down logs in tributaries of the lower Kern River.	No effect	Project area is outside of known range for this species.
Relictual slender salamander *(Batrachoceps relictus)*	FSS, CSSC	Down logs and moist areas, generally in mixed conifer zone.	No effect	Project area is outside of known range for this species.
Kern Canyon slender salamander *(Batrachoceps simatus)*	FSS, ST	Down logs and moist areas, below 3,500' Limited to Kern Canyon	No effect	Project area is outside of known range for this species.
Fairview slender salamander *(Batrachoceps bramei)*	FSS, CSSC	Down logs and moist areas, ~7,000-8,000'. Limited to Kern Plateau	No effect	Project area is outside of known range for this species.
Foothill yellow-legged frog *(Rana boylii)*	FSS, CSSC	Low gradient streams and ponds generally below 6,000'	No effect	Historically present in the Hume Lake District but no known extant populations near the project area. No activities would occur in suitable habitat.
Reptiles				
Western (Pacific) pond turtle *(Actinemys marmorata)*	FSS, CSSC	Low gradient ponds and streams with basking sites below 5,000 feet. Can be found up to 1 mile from perennial water.	No effect	Species and habitat not impacted by the proposed action. No activities would occur in riparian areas below 5,000 feet.

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Species	**Status**	**Habitat**	**Effects Determination**	**Rationale**
California legless lizard *(Anniella pulchra)*	FSS, CSSC	Loose, moist soil in chaparral and valley foothill woodland. Generally below 6,000'.	No effect	Project area is outside of known range for this species.
Fish				
Kern brook lamprey *(Lampetra hubbsi)*	FSS, CSSC	Silty backwaters of rivers emerging from the Sierra foothills, including the Kings River. Elevations below 1000'	No effect	Project area is outside the range of this species. Habitat in the Kings River would not be affected.
Hardhead *(Mylopharodon conocephalus)*	FSS, CSSC	Warm water rivers at low elevation	No effect	Project area is outside the range of this species. Habitat in the Kings River would not be affected.
California golden trout *(Oncorhynchus mykiss aguabonita)*	FSS, CSSC	Cold water tributaries of the South Fork of the Kern River above Rockhouse Basin.	No effect	Project area is outside of known range for this species.
Kern River rainbow trout *(Oncorhynchus mykiss gilberti)*	FSS, CSSC	Extant populations in the Kern River above Durrwood Creek, in Rattlesnake and Osa Creeks, and possibly upper Peppermint Creek.	No effect	Project area is outside of known range for this species.
Invertebrates				
Tehachapi fritillary butterfly *(Speyeria egleis tehachapina)*	FSS	Currently limited to the Piute Mountains; utilizes violets as host plants.	No effect	Project area is outside of known range for this species.
Listing Status Key: FC= Federal Candidate	FSS= USFS Sensitive Species CSSC=CA Species of Special Concern		SP= State Fully Protected SE= State Endangered ST = State Threatened	