

**Draft Environmental Impact Statement for  
Proposed Habitat Conservation Plan and Incidental Take Permit**

**Sierra Pacific Industries  
California**



**April 2019**

**U.S. Fish and Wildlife Service  
Pacific Southwest Region  
Sacramento Fish and Wildlife Office  
Sacramento County, California**

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## Cover Sheet

Proposed Action: Sierra Pacific Industries HCP, proposed issuance of an ITP for two covered species for 50 years.

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### Abstract:

*This EIS evaluates the environmental consequences of issuing an incidental take permit for the northern spotted owl and California spotted owl (collectively the "Covered Species") under the federal Endangered Species Act within the state of California where SPI timber management operations occur, pursuant to a proposed Habitat Conservation Plan. In addition to an alternative utilizing the proposed Habitat Conservation Plan, we have evaluated a No Action Alternative and one additional alternative related to the Covered Species. These alternatives would have varying effects to the Covered Species. We analyzed the effects of these three alternatives on biological resources (land use and ownership, vegetation communities, wildlife and fisheries), water resources, air quality and climate change, socioeconomics and environmental justice, and cultural and historic resources.*

## Summary

The United States Fish and Wildlife Service (Service) proposes to issue a 50-year incidental take permit (ITP) to Sierra Pacific Industries (SPI) for two subspecies, the federally-threatened northern spotted owl (NSO-*Strix occidentalis caurina*) and the California spotted owl (CSO-*Strix occidentalis occidentalis*; listing status under review). The Covered Lands include SPI's land holdings in California that reside in the Klamath Mountains, Southern Cascades, and Sierra Nevada ecological subregions. The action is needed in response to an application from SPI for an ITP for the NSO and CSO, as well as to provide long-term comprehensive conservation and protection of the NSO and CSO and their habitats at ecologically appropriate scales on SPI lands in California.

On August 23, 2017, the Service published a Notice of Intent (NOI) in the Federal Register (FR) to solicit feedback from potentially affected federal, state, and local agencies, tribes, and the public in determining the scope of this environmental impact statement (EIS). Public scoping meetings were held on September 13, 2017, in Redding, California, and on September 14, 2017, in Sacramento, California. The news release and NOI were also published on the Service's Sacramento and Yreka Office websites, and an online webinar was held on September 14, 2017. The scoping period closed on September 22, 2017. The scoping meetings provided an opportunity for the attendees to learn about the Proposed Action (i.e., issuance of an ITP) and comment on environmental issues of concern and the alternatives that should be discussed in the EIS. Oral and written comments were accepted by the Service during both the in-person scoping meetings and the webinar. A total of three oral comments and eight written letters were received during the scoping period.

### Purpose and Need for Action

The purpose of our action is to provide long-term comprehensive conservation and protection of the NSO and CSO and their habitats at ecologically appropriate scales on SPI lands in California, which includes addressing the stressor of barred owls (*Strix varia*) on spotted owls. This action is needed in response to an application from SPI for an incidental take permit for the NSO and CSO, covering take which would result from its proposed timber harvest and management activities.

### Proposed Action and Alternatives

- **No Action Alternative:** Under the No Action Alternative, the Service would not issue an ITP. The current management practices are assumed to continue to guide management of SPI Covered Lands. No additional conservation measures, beyond what is required by the California Forest Practice Rules (CFPR) and SPI's other existing land use conservation plans, would be implemented to accomplish habitat conservation plan (HCP) goals. Future Migratory Bird Treaty Act (MBTA) Scientific Collecting Permits for barred owl research would not be issued (i.e., no additional research on barred owls would be conducted).
- **HCP Alternative – Proposed Action:** The action proposed by the Service to meet the purpose and need is to issue a 50-year ITP to SPI pursuant to the provisions of section 10(a)(1)(B) of the Endangered Species Act (ESA), which would authorize the incidental take of the federally-threatened NSO and the currently non-listed CSO resulting from SPI's timber harvest and timber management activities in California.
- **Adaptation of the Northwest Forest Plan and Sierra Nevada Forest Plan Amendment (NWFP/SNFPA) Alternative:** Under this alternative, the federal action would be for the Service to issue an ITP to SPI associated with the development of an HCP for the NSO and CSO under which SPI would manage known and suspected nest stands according to the Northwest Forest Plan (NWFP) within the range of the NSO (United States Department of Agriculture [USDA] and

United States Department of the Interior [USDOI] 1994) and the Sierra Nevada Forest Plan Amendment (SNFPA) within the range of the CSO (USFS 2004a).

Based upon the effects of the alternatives, the responsible official will decide whether to issue an ITP to SPI based on the Service’s ESA and National Environmental Policy Act (NEPA) compliance determinations. A summary of potential effects by alternative is shown in the table below.

**Summary of potential effects by alternative.**

<b>Resource</b>	<b>No Action Alternative</b>	<b>HCP Alternative – Proposed Action</b>	<b>NWFP/SNFPA Alternative</b>
Land Use and Ownership	No effects.	No effects.	No effects.
Vegetation Communities	Effects to vegetation are expected during timber harvest and management activities. Beneficial effects for certain species that thrive in disturbed environments would be expected, while negative effects would be expected for species not adapted to disturbance.	Marginal beneficial effect compared to the No Action Alternative because of the implementation of the conservation measures included in the SPI HCP, such as habitat element retention and Tier 1 NSO AC protections.	No disturbance in no-harvest areas, with no effects to vegetation communities in those areas. Possible marginal beneficial effect compared to the No Action Alternative due to no harvest areas, as well as yet to-be-determined conservation measures. Possible increase in adverse effects in certain areas if harvest increases in the harvestable areas of the Covered Lands, when compared to the No Action Alternative.

Resource	No Action Alternative	HCP Alternative – Proposed Action	NWFP/SNFPA Alternative
Wildlife/Fishery Resources	Wildlife and fishery resources would continue to be affected by timber harvest and management activities, with habitat modification and loss being the primary effect. No barred owl research would occur, with their populations expected to increase throughout the Analysis Area.	Similar effect compared to the No Action Alternative because wildlife and fishery resources would continue to be affected by timber harvest and management activities, though the location and timing of those effects may differ due to implementation of the conservation measures (e.g., establishing protection zones [PZs], habitat element retention). Barred owl research to be conducted throughout the 50-year permit term may result in reduced barred owl populations in the Analysis Area.	Potential adverse effect compared to the No Action Alternative because intense harvest may be concentrated on a smaller amount of the Covered Lands due to the establishment of large habitat reserves. Barred owl research to be conducted throughout the 50-year permit term may result in reduced barred owl populations in the Analysis Area.

Resource	No Action Alternative	HCP Alternative – Proposed Action	NWFP/SNFPA Alternative
Northern Spotted Owl	<p>High canopy cover, large tree habitat would increase at a similar rate to that described in the SPI HCP, with an increase in potential habitat areas (PHAs) from 147 in 2016 to 498 by 2066. No barred owl research would occur, and adverse effects as the result of barred owl and NSO competition would continue. SPI would not conduct or maintain landscape analyses pertinent to NSO habitat management, and such information would not be provided to the Service.</p>	<p>Similar high canopy cover, large tree habitat availability and suitability, when compared to the No Action Alternative. Beneficial effect compared to the No Action Alternative because of additional conservation measures, such as Tier 1 Activity Center (AC) protections and habitat element retention during timber harvest. Barred owl research to be conducted throughout the 50-year permit term would indirectly benefit NSO populations by directly decreasing barred owl populations. SPI would conduct and maintain analyses of NSO habitat and occupancy on the Covered Lands, and such information would be shared with the Service, which is considered a direct benefit for conservation planning.</p>	<p>Similar effects when compared to the No Action Alternative, though the number of PHAs on the Covered Lands cannot be predicted. Timber harvest may be concentrated to a smaller amount of the Covered Lands due to the establishment of large habitat reserves. Barred owl research to be conducted throughout the 50-year permit term would indirectly benefit NSO populations by directly decreasing barred owl populations. SPI would provide the Service with analyses of NSO habitat and occupancy on the Covered Lands which is considered a direct benefit for conservation planning.</p>

Resource	No Action Alternative	HCP Alternative – Proposed Action	NWFP/SNFPA Alternative
California Spotted Owl	<p>CSO would be provided only minimal protection during timber harvest and management activities, though high canopy cover, large tree habitat is expected to increase similarly as described in the SPI HCP, with an increase in PHAs from 723 in 2016 to 1,231 by 2066. No barred owl research would occur, and adverse effects as a result of barred owl and CSO competition would continue as barred owls expand their range throughout the Sierra Nevada. SPI would not conduct or maintain landscape analyses pertinent to CSO habitat management, and such information would not be provided to the Service.</p>	<p>Beneficial effect compared to the No Action Alternative due to the requirement for surveys and habitat analysis, with the CSO being treated similar to the listed NSO. Additional conservation measures would be required, such as habitat element retention. CSO habitat suitability and availability is expected to be similar to the No Action Alternative. Barred owl research to be conducted throughout the 50-year permit term would indirectly benefit CSO populations by directly decreasing barred owl populations. SPI would conduct and maintain analyses of the Covered Lands, and such information would be shared with the Service, which is considered a direct benefit for conservation planning.</p>	<p>Beneficial effects compared to the No Action Alternative; possible adverse effects compared to the HCP Alternative (Proposed Action) due to harvest potentially being concentrated to smaller areas of the Covered Lands when compared to the other alternatives. More protections for CSO ACs when compared to the other considered alternatives. Barred owl research to be conducted throughout the 50-year permit term would indirectly benefit CSO populations by direct decreasing barred owl populations. SPI would provide the Service with analyses of CSO habitat and occupancy on the Covered Lands, which is considered a direct benefit for conservation planning.</p>
Water Resources	<p>No change from the status quo, with all timber harvest and associated activities being conducted in accordance with all applicable regulations.</p>	<p>Similar to the No Action Alternative, though the location and timing of effects may differ.</p>	<p>Similar to the No Action Alternative, though the location and timing of effects may differ.</p>

Resource	No Action Alternative	HCP Alternative – Proposed Action	NWFP/SNFPA Alternative
Air Quality and Climate Change	SPI would continue to practice forest management on the Covered Lands, contributing to overall carbon sequestration within the forest landscape. Air quality and climate change would continue to be addressed, and the effects would be minimized and mitigated during the Timber Harvest Plan (THP) process.	Similar to the No Action Alternative, though the location and timing of effects may differ.	Similar to the No Action Alternative, though the location and timing of effects may differ.
Socioeconomics and Environmental Justice	Timber harvest levels are expected to continue at approximately the same rate as current conditions; no changes to employment levels or yield tax revenues are expected. Impacts that would affect underserved populations are not expected.	Similar to the No Action Alternative, with comparable timber harvest rates.	If harvest rates were to decrease due to fewer acres being available for timber harvest on the Covered Lands, local tax revenues and employment levels may be affected. Effects on underserved populations would be similar to the No Action Alternative.
Cultural and Historic Resources	No effects.	No effects.	No effects.

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# CHAPTER 1. PURPOSE OF AND NEED FOR FEDERAL ACTION

## 1.1 BACKGROUND

The United States Fish and Wildlife Service (Service or USFWS) received an application on December 19, 2018, for an Incidental Take Permit (ITP), pursuant to the provisions of section 10(a)(1)(B) of the Endangered Species Act of 1973, as amended (ESA), 16 United States Code (U.S.C.) 1531, et seq., 1539(a)(1)(B), from Sierra Pacific Industries (SPI) regarding its forestland management activities. SPI is the largest private forest land owner in California, with operations currently encompassing approximately 1.6 million acres of timberland throughout northern California. SPI (Applicant) would serve as the permittee under the ITP and is liable for all obligations assigned to it under the ITP, Habitat Conservation Plan (HCP), and associated documents.

The ITP would authorize the incidental take of the federally-threatened northern spotted owl (NSO-*Strix occidentalis caurina*) and the California spotted owl (CSO-*Strix occidentalis occidentalis*) as the result of the Covered Activities. The CSO is not currently listed under the ESA, but the Service is currently reviewing the status of the CSO to determine whether a listing under the ESA is warranted (80 Federal Register [FR] 56423). The activities to be covered would include timber operations and other management activities that SPI conducts on its lands in the state of California (Figure 1-1). The Service has determined that issuance of an ITP may have a significant impact on the quality of the human environment and, therefore, requires the preparation of an Environmental Impact Statement (EIS). The United States Forest Service (USFS) is a cooperating agency with the Service for this draft EIS (DEIS), which evaluates the effects of SPI's Covered Activities as they relate to the Proposed Action (i.e., issuance of an ITP).

The Service listed the NSO as threatened on June 26, 1990 (55 FR 26114 26194). The current Revised Recovery Plan for the Northern Spotted Owl was released in 2011 (USFWS 2011). In 1992 and 2008, areas of critical habitat were designated to further protect this subspecies on Federal lands. Revised critical habitat was proposed again in 2012 (USFWS 2012). Effective January 3, 2013, the USFWS designated 9,577,969 acres in 11 units and 60 subunits in California, Oregon, and Washington as critical habitat for the NSO (50 Code of Federal Regulations [CFR] Part 17 2012-28714). SPI-managed lands fall within Recovery Units 8, 9, 10, and 11 (USFWS 2018a).

The CSO has been petitioned for listing three times since 2000. The CSO is again currently under review due to an initial finding by the Service pursuant to 16 U.S.C. §1533(b)(3)(A) that listing 'may be warranted' (80 FR 56423 56432) in response to two separate petitions that were submitted on December 23, 2014, by the John Muir Project of Earth Island Institute and the Wild Nature Institute and another submitted on August 25, 2015, by Defenders of Wildlife and Sierra Forest Legacy.

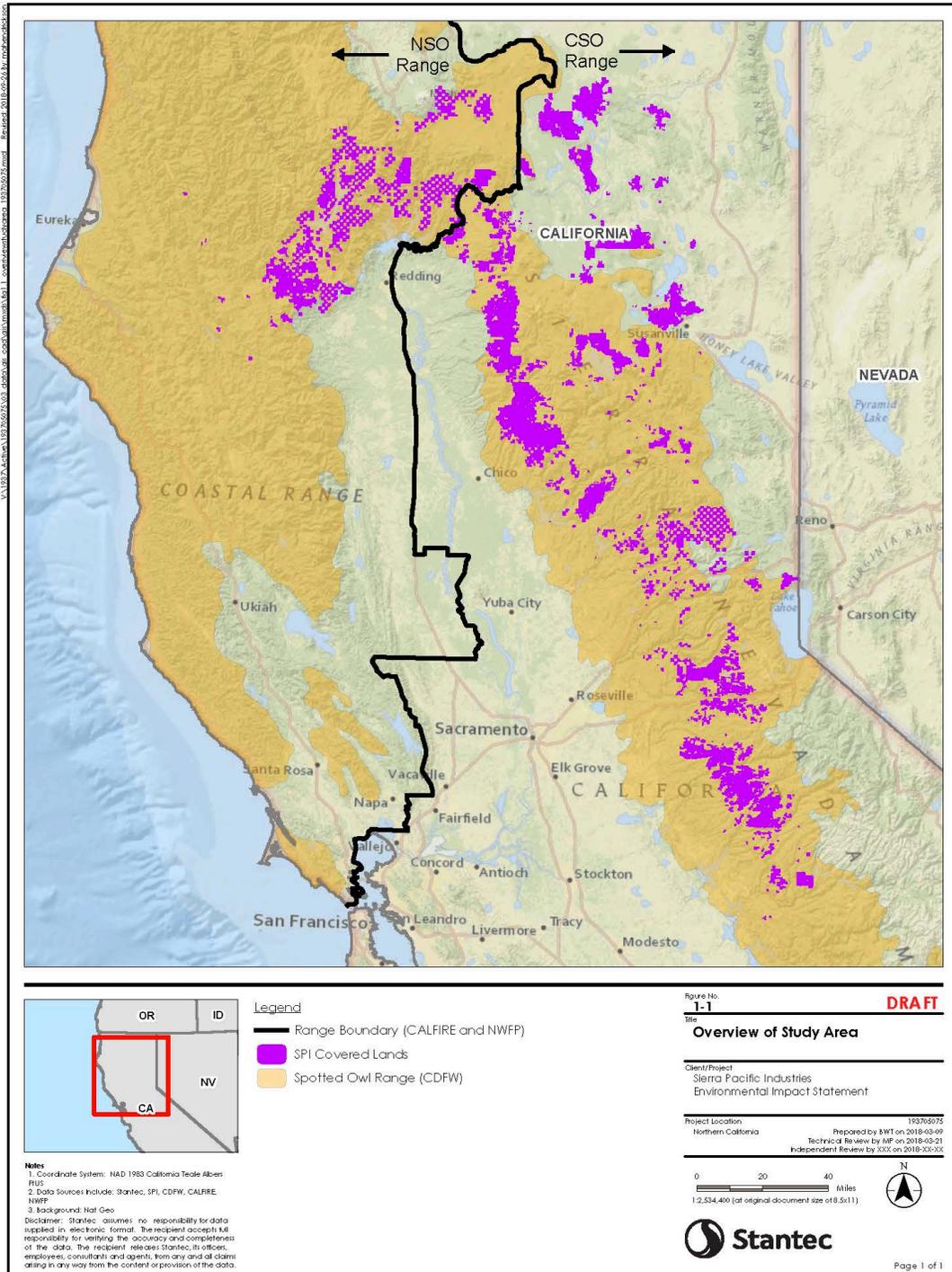


Figure 1-1. Overview of Study Area.

## 1.2 SIERRA PACIFIC INDUSTRIES

### 1.2.1 Current Operations

SPI's land holdings in California reside in the Klamath Mountains, Southern Cascades, and Sierra Nevada ecological sub regions. The land ownership pattern consists of both large contiguous tracts of land and a significant number of smaller non-contiguous tracts. Much of SPI's holdings are mixed with USFS lands in a "checkerboard" ownership pattern, such that spotted owls within a single territory utilize both privately- and federally-managed forestland. The private timberland operations are managed by SPI through 11 separate field operations. Planning and research staff are located at the main office in Anderson, California. Dominant forest types under SPI management in these sub regions include: ponderosa pine (*Pinus ponderosa*); Douglas-fir (*Pseudotsuga menziesii*); Klamath and Sierra mixed conifer (ponderosa pine, sugar pine [*Pinus lambertiana*], white fir [*Abies concolor*], Douglas-fir, incense cedar [*Calocedrus decurrens*]); mixed hardwood-conifer; black oak (*Quercus kelloggii*); red fir (*Abies magnifica*); and white fir and Jeffrey pine (*Pinus jeffreyi*). SPI carries out even-aged and uneven-aged silviculture regeneration systems, along with pre-commercial thinning and commercial thinning. All clear-cut stands are planted with trees grown from specific seed zones and 500-foot elevation bands.

SPI fiber sourcing operations in California are carried out by procurement foresters associated with sawmills located in Anderson (where there is also a pole plant), Burney, Shasta Lake, Oroville, Quincy, Chinese Camp, Sonora, and Lincoln. The percentage of the mills' fiber supply which is obtained through SPI's procurement program is approximately 50% across the California mills.

Logs are received at the sawmills from several sources, including SPI's own fee lands, stumpage sales on private or federal land, and direct log purchases from land managed or owned by Timber Investment Management Organizations, Real Estate Investment Trusts, family forest owners, tribal lands, private landowners, and other U.S. public lands. Most incoming logs originate from California, with small proportions of the total supply coming from Oregon and Nevada.

The log supply monitoring system in place for SPI's California mills includes a combination of establishing log purchase contracts with suppliers prior to acceptance of logs at the mills and Best Management Practices (BMPs) monitoring carried out by each mill's procurement forester on a sample of its suppliers and rule enforcement data received from the California Department of Forestry and Fire Protection (CAL FIRE).

### 1.2.2 Future Operations

Three demonstrations ("Option As") of Maximum Sustained Production (MSP) have been prepared and submitted for SPI's California operations—one each for the northern, southern, and coastal State Forest Districts. The Option As establish long-term goals and objectives for key timber and non-timber values consistent with the requirements of the California Forest Practices Rules (CFPR; 14 California Code of Regulations [CCR] Sec. 913.11, 923.11 and 953.11; 2018 CFPR can be found in Appendix D) and SPI's voluntary practices and commitments. They also establish the associated forest management approaches, standing inventory and growth and yield modeling scenarios, assumptions and timber production constraints to address these goals and objectives, as well as to model growth, harvest, and long term sustained yield (LTSY) levels over a 100-year strategic planning horizon.

To ensure that the harvest is sustainable over time, existing annual harvest levels have been established at levels well below the long term sustained yield (i.e., just over 523 million board feet of timber [MMBF] versus a LTSY of just over 1,332 MMBF). SPI's tracked actual harvest level over the 1999-2015 period averaged approximately 18% below the calculated allowed annual harvest level for its California

operations. SPI also operates under the auspices of the Sustainable Forestry Initiative (SFI), a third-party certification process that ensures forests are sustainably managed in order to protect water quality, biodiversity, wildlife habitat, species at risk, and Forests with Exceptional Conservation Value (SFI 2015).

Short-term (7-year), sub-district level Timber Harvesting Plans (THPs) are established to guide specific harvesting, road development, and silviculture scheduling/strategies on a sub-basin or larger basis. THPs incorporate specific operational approaches for addressing MSP goals and objectives, CFPR, SFI requirements, and company practices and commitments for identifying and protecting timber and non-timber resource values (wildlife and habitat features, aesthetic, recreation, range/forage, riparian, watersheds, fisheries, etc.).

### **1.2.3 Covered Activities**

The Service does not authorize the siting or operation of timber harvest activities. An ITP from the Service provides an applicant with coverage for take that is incidental to, and not the purpose of, otherwise lawful activities; an applicant must obtain any other necessary construction or operation-related permits from other entities, as necessary, to ensure that the activity is “otherwise lawful.” The only project activities for which the applicant has requested take coverage are timber operations and other management activities for the Covered Species. SPI has committed in the HCP to conservation measures to avoid or minimize take of the Covered Species from these activities. Several of the conservation measures exceed the requirements of the CFPR as they relate to the Covered Activities and protection of wildlife habitat and are therefore different from what would occur under the No Action Alternative (see Section 2.2). Therefore, this DEIS evaluates the effects of the Proposed Action (i.e., issuance of an ITP for the Covered Species) on the human environment.

Specific activities for which SPI has requested take coverage are listed below. Detailed descriptions of each activity can be found in Chapter 2 of the SPI HCP. The activities and actions are categorized by how they are regulated in the state of California. The THP serves as the functional equivalent of an Environmental Impact Report (EIR) prepared under the California Environmental Quality Act (CEQA). The THP is an environmental review document prepared by Registered Professional Foresters (RPFs), and the document evaluates all potential direct and cumulative impacts that may occur as a result of the proposed timber harvest, as well as the implementation of management measures that reduce these impacts to a level of insignificance. The public has the opportunity to review and comment on THPs. CAL FIRE approves a THP if it is in compliance with state and federal rules and laws. Under the CFPR, various resources and activities must be addressed during the THP process, including but not limited to water course and lake protection; site preparation; silvicultural methods; harvesting practices and erosion control; hazard reduction; fire protection; wildlife protection practices; climate change; logging roads, landings, and logging road water course crossings; and cumulative impacts (see Appendix D).

#### **1.2.3.1 Activities Conducted Under the CFPR and functionally equivalent CEQA process**

- Timber felling and bucking (see HCP Section 2.1.1.1)
  - Harvest of commercial-sized trees by cutting/felling the tree and cutting it into desired log lengths, typically using handheld chainsaws or machines, such as feller-bunchers or harvesters.
- Timber yarding (see HCP Section 2.1.1.2)
  - Movement of logs from the point of felling and/or bucking to the log landing, via ground-based, cable, or aerial techniques.
- Loading and landing operations (see HCP Section 2.1.1.3)

- Additional processing of logs, such as de-limbing, bucking, or cutting with handheld chainsaws or a mechanical de-limber.
  - Loading of logs onto trucks using shovel (heel-boom loader) or front-end loader.
- Transportation of forest products and equipment (see HCP Section 2.1.1.4)
  - Transport of logs and rocks along road by trucks/trailers *en route* to mill sites or road construction and maintenance sites.
- Chipping (see HCP Section 2.1.1.5)
  - Reduction of volume of post-harvest residue by chipping of branches and tops of trees, which may be hauled off site or left in place.
- Timber salvage (see HCP Section 2.1.1.6)
  - Removal of dead, dying, or deteriorating trees due to damage from fire, wind, insects, disease, flood, or another occurrence.
- Road and landing construction, reconstruction, maintenance, decommissioning, and abandonment (see HCP Section 2.1.1.7)
  - Construct and maintain roads/landings according to CFPR and local ordinances, to limit riparian impacts and sediment transport.
- Water drafting (see HCP Section 2.1.1.8)
  - Pumping water from streams or water bodies to fill trucks/trailers to be used for road maintenance, road construction, surfacing, managing prescribed burning, and/or wildfire suppression.
- Watercourse crossing facility placement, installation, and maintenance (see HCP Section 2.1.1.9)
  - Construction and maintenance of culverts, bridges, and/or fords.
- Site preparation (see HCP Section 2.1.1.10)
  - Improve site conditions, including slash management, control of weeds, brush, and undesirable trees species, and mechanical soil treatments, for regeneration of planted tree seedlings, generally conducted as soon as possible after a site has been logged.
- Machinery maintenance, fueling, and fuel storage (see HCP Section 2.1.1.11)
  - Proper location and disposal of petroleum products and cleaning agents.

### **1.2.3.2 Management Actions Covered by Other CEQA Analyses**

- Rock pit development and rock processing (see HCP Section 2.1.2.1)
  - Generate aggregate for use on SPI's forest roads, compliance with CFPR, generally adjacent to existing roads.
- Watercourse crossing installations not covered by THPs (see HCP Section 2.1.2.2)
  - Crossings installed and maintained outside a THP, as needed.
- Communication site construction, operation, and maintenance (see HCP Section 2.1.2.3)
  - Include metal lattice or pole towers, antennae, and equipment shelters, generally situated on high-elevation ridges or peaks.
  - Currently 32 communication sites on SPI Covered Lands.

### **1.2.3.3 Management Activities Covered by the CFPR Process but not requiring a THP (CEQA functionally equivalent status still applies)**

- Timber harvest plan preparation (see HCP Section 2.2.1)
  - THP preparation activities may include driving to the THP area and traversing the area on foot, flagging watercourse buffers, road alignments, and unit boundaries, as well as

performing archaeological/cultural resource reconnaissance and watercourse assessments and marking timber.

- Conversion of brush fields to timber plantations (see HCP Section 2.2.2)
  - Treatment of brush and preparation for planting with combined mechanical methods and prescribed fire.
- Fuel break construction and maintenance (see HCP Section 2.2.3)
  - Hand-cutting, mechanical methods, and prescribed fire in fuel break locations.
- Pre-commercial thinning (see HCP Section 2.2.4)
  - Felling of unwanted, small-diameter trees in plantations to achieve the desired crop density, typically using chainsaws.
- Fire suppression (see HCP Section 2.2.5)
  - Control wildfires during an emergency to limit fire impacts, completed by SPI contractors.
- Road maintenance (see HCP Section 2.2.6)
  - General maintenance is completed by SPI, as needed, to ensure integrity of the road prism, road drainage, and associated watercourse crossing facilities.
- Mastication of roadway rights-of-way (see HCP Section 2.2.7)
  - Mechanical mastication of vegetation to reduce flammability of fuels adjacent to the road.
- Transportation of materials and heavy equipment (see HCP Section 2.2.8)
- Research and data collection activities (see HCP Section 2.2.9)
  - Perform various surveys, such as botanical or wildlife surveys.
- Harvest of minor forest products (see HCP Section 2.2.10)
  - Harvest of products, including burls, stumps, greenery, cones, firewood, Christmas trees, and mushrooms, in pre-designated areas and subject to permit constraints.

### 1.3 PURPOSE AND NEED FOR ACTION

The purpose of our action is to provide long-term comprehensive conservation and protection of the NSO and CSO and their habitats at ecologically appropriate scales on SPI lands in California, which includes addressing the stressor of barred owls (*Strix varia*) on spotted owls. This action is needed in response to an application from SPI for an incidental take permit for the NSO and CSO, covering take which would result from its proposed timber harvest and management activities.

### 1.4 PROPOSED ACTION

The action proposed by the Service is to respond to an application from SPI for an ITP based on the submitted HCP that includes comprehensive conservation. The ITP would be issued to SPI pursuant to the provisions of section 10(a)(1)(B) of the ESA, which would authorize incidental take in the form of harm via habitat modification that is likely to cause injury or death of the federally-threatened NSO and the currently non-listed CSO, resulting from SPI's timber harvest and timber management activities in California.

Under section 10 of the ESA, applicants may be authorized, through issuance of an ITP, to conduct activities that may result in take of listed species, as long as the take is incidental to, and not the purpose of, otherwise lawful activities.

The purpose of the section 10(a)(1)(B) permit is to ensure that any incidental taking that might occur would be minimized and mitigated to the maximum extent practicable and would not appreciably reduce the likelihood of the survival and recovery of the species in the wild. The proposed permit term is 50 years.

The submission of the ESA section 10(a)(1)(B) permit application requires the development of an HCP designed to ensure that the taking will not appreciably reduce the likelihood of survival and recovery of the species in the wild, while allowing for limited incidental take of the species that might occur during timber harvest and timber management activities. The implementing regulations for section 10(a)(1)(B) of the ESA, as provided at 50 C.F.R. 17.22, specify the requirements and issuance criteria for obtaining an ITP.

The Service analyzed the effects of the Proposed Action on all elements of the natural and human environment that could be affected, including other wildlife species that occur within the Covered Lands.

## 1.5 DECISION TO BE MADE

The decision whether to issue an ITP to SPI will be based on the Service's ESA compliance determinations. These determinations will be documented in the ESA Section 10 findings document, ESA Section 7 Biological Opinion, and the NEPA Record of Decision (ROD), which will be developed at the conclusion of the ESA and NEPA processes.

The issuance criteria for an ITP are contained in section 10(a)(2)(B) of the ESA and the implementing regulations for the ESA (50 C.F.R. 17.22(b)(2) and 17.32(b)(2) and 50 C.F.R. 222.307(c)(2)). SPI would serve as the permittee under the ITP and is liable for all obligations assigned to it under the ITP, HCP, and associated documents. An ITP shall be issued to SPI if the Service makes the following determination with respect to SPI's ITP application (USFWS and NMFS 2016):

1. The take would be incidental to, and not the purpose of, carrying out an otherwise lawful activity.
2. The Applicant would, to the maximum extent practicable, minimize and mitigate the impacts of such takings.
3. The Applicant would ensure that adequate funding for the HCP (implementation and mitigation) and procedures to deal with changed circumstances will be provided (including what the applicant will do in the face of changed circumstances and the funding to implement those actions).
4. The taking would not appreciably reduce the likelihood of the survival and recovery of the NSO and CSO in the wild.
5. The Applicant would ensure that other measures that the Director of the Service may require as being necessary or appropriate would be provided.
6. The Service has received such other assurances as may be required that the HCP would be implemented. See 50 C.F.R. 17.22(b)(2), 17.32(b)(2).

In addition, the most recent Habitat Conservation Planning Handbook (USFWS and NMFS 2016) incorporated the Five-Point Policy (65 Fed. Reg. 35241-35257; June 1, 2000), which described five clarifying components that should be included in an HCP: 1) biological goals and objectives, 2) adaptive management, 3) monitoring, 4) permit duration, and 5) public participation.

## 1.6 NEPA ANALYSIS AREA

The Analysis Area evaluated in this DEIS is approximately 6,224,437 acres in size, including the 1,566,498 acres of SPI Covered Lands. A two-mile buffer around the Covered Lands was established for the Analysis Area to conservatively accommodate for the home ranges of the NSO and CSO (defined as 1.3-mile and 1.0-mile radii around Activity Centers [AC], respectively, in the SPI HCP). This defined Analysis Area bounds the geographical extent of the direct and indirect effects that may result from implementation of any alternative described in this DEIS.

## 1.7 PUBLIC INVOLVEMENT

The Notice of Intent (NOI) was published in the Federal Register on August 23, 2017, to solicit feedback from potentially affected federal, state, and local agencies, tribes, and the public in determining the scope of this DEIS (82 Fed. Reg. 40015-40016). The NOI asked for public comments on the proposal until the scoping period was closed on September 22, 2017. The Service issued a news release on August 22, 2017, to a database containing media outlets in the counties of Amador, Butte, Calaveras, El Dorado, Lassen, Modoc, Nevada, Placer, Plumas, Shasta, Sierra, Siskiyou, Tehama, Trinity, Tuolumne, and Yuba. On August 22, 2017, a letter was sent to local tribes<sup>1</sup> and an email was sent to county, state, and federal agencies and non-governmental organizations (NGOs) informing them that the Service was initiating scoping for development of this DEIS. In addition, public notices with the location and times of the public scoping meetings were published in the Record Searchlight of Redding (Shasta County) and Sacramento Bee of Sacramento (Sacramento County) on August 27, 2017, and in the Union Democrat of Sonora (Tuolumne County) on August 29, 2017.

The news release and NOI were also published on the Service's Sacramento and Yreka Office websites at [www.fws.gov/sacramento](http://www.fws.gov/sacramento) and [www.fws.gov/yreka](http://www.fws.gov/yreka), respectively. The Sacramento Office website also contains public project documents and meeting materials, including a map of the project area and presentation slides from the scoping meetings. As part of the public involvement process, the agency held public scoping meetings on September 13, 2017, in Redding, California, and on September 14, 2017, in Sacramento, California. An online webinar was held on September 14, 2017. Oral and written comments were accepted by the Service during both the in-person scoping meetings and the webinar. The full scoping report is found in Appendix A.

Using the comments from the public, other agencies, and conservation groups, we developed a list of issues to address (Section 1.8).

## 1.8 ISSUES

The Service categorized the issues into the following topics:

- General
- Notice of Intent
- Purpose and Need

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<sup>1</sup> Local tribes contacted during scoping include: Alturas Indian Rancheria, Berry Creek Rancheria, Cedarville Rancheria, Enterprise Rancheria, Fort Bidwell Indian Community of the Fort Bidwell Reservation, Greenville Rancheria, Jackson Rancheria Band of Miwok Indians, Mechoopda Indian Tribe of Chico Rancheria, Mooretown Rancheria, Pit River Tribe, Shingle Springs Rancheria Band of Miwok Indians, Susanville Indian Rancheria, Tuolumne Band of Me-Wuk Indians of the Tuolumne Rancheria, and United Auburn Indian Community of the Auburn Rancheria.

- Alternatives
- Wildlife Resources/Rare, Threatened, and Endangered Wildlife Species
- Vegetation
- Cultural and Historic Resources
- Water Resources
- Air Quality and Climate
- Health and Safety
- Socioeconomics and Environmental Justice
- Cumulative Impact Analysis
- Mitigation
- Monitoring and Adaptive Management
- Environmental Law Compliance
- Other Comments

For additional details and the specific comments received, refer to the scoping report found in Appendix A.

## **1.9 REQUIRED PERMITS, APPROVALS, AND OTHER ENTITLEMENTS**

Federal regulations applicable to the project include: the NEPA; the ESA sections 7, 9, and 10; the Migratory Bird Treaty Act (MBTA); the Bald and Golden Eagle Protection Act (BGEPA); Section 404 of the Clean Water Act (CWA); the National Historic Preservation Act (NHPA); and the Clean Air Act (CAA). State regulations applicable to the project include but are not limited to: the California Endangered Species Act (CESA), the California Fish and Game Code, the CEQA, the California Forest Practice Act, the California Timberland Productivity Act, the Native Plant Protection Act, the Porter-Cologne Water Quality Control Act, and the Surface Mining and Reclamation Act. See Appendix B for complete descriptions of the regulatory and legal framework.

## CHAPTER 2. ALTERNATIVES INCLUDING THE PROPOSED ACTION

### 2.1 INTRODUCTION

The NEPA requires that the environmental documents prepared for a proposed action discuss alternatives. Therefore, this chapter describes the development of alternatives and then alternatives considered in the DEIS relevant to the Proposed Action (i.e., issuance of an ITP by the Service pursuant to the provisions of section 10(a)(1)(B) of the ESA).

Each alternative was evaluated for its ability to meet the purpose and need requirements of the project and potential environmental impacts, and only those alternatives that passed the screening process were selected for detailed analysis.

Under any alternative, SPI would continue to implement the Candidate Conservation Agreement with Assurances (CCAA) that addresses fisher (*Pekania pennanti*) habitat conservation measures, on the same SPI Covered Lands defined in the SPI HCP, until the expiration of that 10-year permit (i.e., through October 2026; SPI 2016). The conservation measures in the SPI Fisher CCAA include: 1) maintaining approximately 80% of existing Landscape Evaluation Areas for Fisher (LEAFs) as Conservation LEAFs, 2) maintaining at least 50% of existing capable Enrolled Lands in the Mixed land class, 3) identifying and maintaining habitat elements important to fishers, 4) mitigating substantially damaged timberlands, 5) reducing potential impacts on fisher den sites, 6) minimizing risk of fishers drowning in water tanks, 7) reducing potential impacts from illegal marijuana cultivation and firewood cutting, and 8) reducing potential for catastrophic fire. For all alternatives analyzed, it was assumed that the SPI Fisher CCAA would expire after October 2026, and these conservation measures would no longer be implemented after that time.

Under any alternative, SPI would also continue to implement the Memorandum of Understanding (MOU) between USFS, National Fish and Wildlife Foundation (NFWF), CAL FIRE, and SPI for fuel reduction efforts (Appendix 5.6 of the HCP). With respect to California spotted owls, the purpose of the MOU is to help identify areas near owl Activity Centers (ACs) in need of fuel treatments to lessen potential impacts on owl habitat from largescale, high-severity wildfire and to coordinate fire suppression planning and response efforts on Federal, State, and SPI lands with an emphasis on preserving habitat.

During the public scoping period, comments were received related to alternatives that should be considered in the DEIS (see the Scoping Report in Appendix A). All comments were taken into consideration, and where applicable were either incorporated into an alternative (e.g., a no-action alternative, shorter permit term alternative) or were otherwise analyzed in this DEIS (e.g., potential effects of climate change, barred owls, and declining NSO populations).

### 2.2 ALTERNATIVES CONSIDERED IN DETAIL

The Service developed three alternatives, including the No Action and Proposed Action Alternatives. All alternatives include the Covered Activities described in Section 1.2.3, unless otherwise noted. This includes activities that have historically occurred on SPI Covered Lands and are likely to continue in the future.

## 2.2.1 No Action Alternative

Under the No Action Alternative, the Service would not issue an ITP. The current management practices are assumed to continue to guide management of SPI Covered Lands. No additional conservation measures (see Section 2.2.2), beyond what is required by the CFPR (Appendix D), the SPI Fisher CCAA (see Section 2.1; SPI 2016), and the SFI standards (see Section 1.2.2; SFI 2015), would be implemented to accomplish HCP goals. For the purposes of analysis, it is assumed that future MBTA Scientific Collecting Permits for barred owl research would not be pursued/issued (i.e., no additional research on barred owls would be conducted). The No Action Alternative does not assume future action by the Service. Essentially, this alternative presents a way to legally harvest timber without issuance of an ITP by the Service (i.e., this alternative avoids incidental “take” of listed species). The Covered Activities described in Section 1.2.3 would continue to occur throughout on SPI Covered Lands under the No Action Alternative, provided they avoid incidental take of listed animals.

This alternative is the baseline against which other alternatives will be compared in the analysis of environmental consequences.

### 2.2.1.1 Conservation of NSO, CSO, and Other Sensitive Species

Currently implemented conservation measures would continue under the No Action Alternative and are described by species below.

#### Northern Spotted Owl

Incidental take of the NSO would continue to be avoided via application of the CFPR and the THP review, approval, and enforcement process. Habitat retention and avoidance would occur as stated in the CFPR, by maintaining functional nesting habitat within 500 feet of NSO ACs, with no timber operations conducted in that area during the breeding season. Within 500-1,000 feet, sufficient functional characteristics to support roosting and protection must be maintained, and no timber operations are allowed in this area during the breeding season, unless prior approval is obtained. A total of 500 acres of owl habitat must be provided within a 0.7-mile radius of the AC, with less than 50% of the retained habitat under operation in any one year. A total of 1,336 acres of owl habitat must be retained within 1.3 miles of each AC, with the shape of all areas adjusted to conform to the landscape.

Based upon the 2016 NSO surveys, there are 122 ACs on the Covered Lands or within 1.3 miles (see Section 3.1.3.1 for more details). Thus, under this alternative 162,992 acres would need to be retained around these ACs, though not all of this protection would necessarily fall within the Covered Lands, and depending on the location of ACs, there may be some overlap in acreages.

#### California Spotted Owl

Conservation of CSO ACs would continue to include the protection of a minimum of an 18-acre no harvest buffer around all occupied nesting sites. If the CSO is listed under the ESA, conservation measures would increase in order to avoid take by harm of the CSO.

Based upon the 738 documented CSO ACs within the Covered Lands and a 1-mile buffer (see Section 3.1.3.1 for more details), up to 13,284 acres would need to be retained around these ACs, though not all of this protection would necessarily fall within the Covered Lands, and depending on the location of ACs, there may be some overlap in the acreages.

### 2.2.2 HCP Alternative (Proposed Action)

SPI has developed an HCP to cover incidental take of the NSO and CSO on SPI Covered Lands. Under the HCP Alternative (Proposed Action), an ITP would be issued for the NSO and CSO for the Covered Activities occurring on SPI Covered Lands. The ITP would include incidental take by harm of spotted owls at occupied ACs due to timber harvest activities altering the habitat suitability. Habitat modification may cause death or injury to spotted owls by displacing them from ACs during timber harvesting, or by making them more susceptible to competition from barred owls. The likelihood of directly killing a spotted owl through timber harvest activities is thought to be insignificant and discountable.

The HCP models future take using SPI's growth and yield projections, estimating take in those instances where habitat is removed in an area that is a currently known occupied owl AC and the residual amount of habitat is below the threshold established in the HCP. There are a number of assumptions built into this modeled take estimation that may serve to limit the amount of actual incidental take by harm through habitat modification that occurs. The modeling of future conditions over 50 years does not allow for the prediction of locations of spotted owls across the planning horizon. Actual incidental take would be quantified annually based on known owl locations at the time that timber harvest is occurring. This amount of incidental take would be quantified based on the removal of habitat using the thresholds defined in the HCP. If the amount of habitat remaining following harvesting is below these thresholds, incidental take is assumed to have occurred based on known spotted owl habitat requirements and associations.

The permitted incidental take level for take by harm through habitat modification would be an average of 2.3 ACs per year for the NSO and 13.0 ACs per year for the CSO, or a total of 115 NSO ACs and 649 CSO ACs over the permit term. Modeled take by habitat modification over the permit term by decade, with an average take of 23 NSO ACs and 130 CSO ACs per decade, is shown in Table 5.5 in the SPI HCP. No direct killing or injury of either species is anticipated due to the high level of detection during pre-harvest surveys, protection of occupied sites during harvesting operations, and the long-term monitoring efforts of ACs.

The fundamental premise of SPI's HCP is the implementation of eight conservation measures (see SPI HCP Chapter 5) over the 50-year permit with the intent to: 1) maintain landscape-scale habitat conditions equivalent to habitat currently used by spotted owls on SPI lands over the permit term; 2) increase opportunities for spotted owl occupancy over the permit term; 3) accelerate the recovery of lands degraded by catastrophic events to provide future owl habitat; and 4) minimize and mitigate impacts to spotted owls that result from the Covered Activities. SPI's timber harvest and land management activities would continue to include the Covered Activities described in Section 1.2.3, with the addition of the conservation measures described in Section 2.2.2.1 below.

State and federal regulations prohibiting take, either directly or via habitat modification, exist only for the NSO. Current NSO take avoidance guidance requires: 1) surveys to locate NSO ACs, 2) direct protection of nest sites, and 3) protection of prescribed habitat amounts near nest sites and within representative home ranges (see Section 2.2.1.1). If the CSO becomes listed under the ESA, similar prohibitions and protections will likely become required for the CSO as well. The conservation measures described below that SPI is committing to under the HCP Alternative (Proposed Action) provide protections that exceed the take avoidance measures for the NSO, address subjects that are not currently included in the present regulations regarding take of listed species, and exceed the current protections offered to the CSO (see Section 2.2.1.1).

Some of the conservation measures included in the HCP Alternative (Proposed Action) (Conservation Measures 3 and 7 [retention standards, management for habitat elements] below) are currently being implemented under the SPI Fisher CCAA, which are enforceable under the CCAA permit conditions until

2026 and exceed the requirements under the CFPR. The inclusion of these same conservation measures in the HCP Alternative (Proposed Action) extends the requirements for the 50-year permit term of the ITP. These conservation measures are much more specific and protective for the Covered Species, as compared to the currently required regulations regarding timber harvest and forest management.

### 2.2.2.1 Conservation of NSO and CSO

The eight conservation measures outlined in SPI's HCP would be implemented throughout the 50-year permit term (see HCP Section 5.2), which are summarized below:

1. Increase Potential Habitat Areas (PHAs; a 1,000-acre area consisting of a pair of 500-acre hexagons in SPI's habitat model) across the landscape over the permit term
  - Increase aggregations of habitat (as measured by the number of PHAs) composed of at least 50% nesting habitat (as defined by SPI's habitat forms HF4 [large tree, closed canopy cover forest habitat] and HF2H [medium tree, high canopy cover forest habitat]; see Appendix 4.3 of the SPI HCP, Table 4.3.3). A PHA consists of two adjacent hexagons, including one Nest Hexagon and one Support Hexagon. PHAs are anticipated to increase from 37.6% of hexagons (870,000 acres) at the beginning of the 50-year permit term to 72.5% of hexagons (1,729,000 acres) by the end of the 50-year permit term, though not all of those acres would be on the SPI Covered Lands. To qualify as a PHA, there must be a minimum of 250 acres (25% of the 1,000 acres) of SPI-owned land in the pair of hexagons that make up the PHA. For the ownership distribution within the hexagon network, see the SPI HCP (Table 4.3.4 in Appendix 4.3).
2. Protection of habitat at known spotted owl Yearly Activity Centers (YACs [a 500-foot-radius circle around the location of a nest site or day roost site of the spotted owl(s) in a territory, creating an 18-acre circle]) and surrounding areas
  - Direct protection of habitat around occupied spotted owl ACs
    - Protection Zones (PZs) established around all known and newly discovered NSO and CSO YACs. PZs are initially drawn to include a minimum of 72 acres, without considering ownership. There are currently 367 PZs that overlap SPI lands, and SPI ownership averages 59 acres in size, covering 21,747 acres of the SPI Covered Lands.
    - Incidental take is assessed using occupied hexagons (500 acres) around occupied NSO and CSO PZs.
    - NSO ACs were also ranked into four levels with varying degrees of protections:
      1. Tier 1 ACs receive the highest level of protection. Within 1.3 miles of the AC, the best available habitat was designated for retention up to a target of 1,336 acres (regardless of ownership). A total of 11,762 acres of SPI Covered Lands will be retained as part of this conservation measure. No harvest would occur on SPI lands within this area for the duration of the permit (regardless of occupancy status) with the exception of trees damaged during high severity wildfire, which may be salvaged and voluntarily reforested or approved activities which have minimal effect on habitat function and avoid the PZ [e.g., road building/maintenance].
      2. Tier 2 ACs would have a PZ established around the YACs and would then be managed according to Conservation Measure 1 (above).
      3. Tier 3 ACs are those ACs that are not anticipated to be impacted by SPI activities, as the amount of SPI land within the home range circle (1.3 miles) surrounding the AC is insignificant. If a Tier 3 AC moves during the permit term onto SPI lands or within 0.25 mile of SPI Covered

- Lands, a PZ would be designated, and the AC would receive the same protection measures as the Tier 2 ACs.
4. Tier 4 ACs are those ACs considered to be of low conservation value (e.g., ACs that have not been known to be occupied for a number of years despite recent and often long-term survey efforts, or ACs located a considerable distance from SPI Covered Lands). If a Tier 4 AC moves during the permit term onto SPI lands or within 0.25 mile of SPI Covered Lands, a PZ would be designated, and the AC would receive the same protection measures as the Tier 2 ACs.
3. Mitigation of substantially damaged timberlands
    - Retention of important habitat elements as specified in HCP Section 5.2.3 during salvage harvesting, would continue to accelerate the development of future habitat for spotted owls.
  4. Reduction of potential for catastrophic fire
    - Reduce risk of catastrophic fire that may consume suitable owl habitat by the establishment of fuel breaks and other fuel reductions strategies (including use of even-aged management to create a discontinuous fuel profile).
      - Approximately 55% of SPI Covered Lands would be composed of even-aged timber stands with controlled stocking levels and spacing after 50 years.
      - Fuel breaks are anticipated to compose approximately 2-3% of SPI Covered Lands over the 50-year permit term.
    - Coordination with USFS, NFWF, and CAL FIRE (via the signed MOU) for fuel reduction efforts.
  5. Reduction of potential impacts to reproductive sites
    - When timber harvesting will occur under a THP or suitable habitat will be significantly altered, conduct pre-harvest surveys and designate 0.25-mile seasonal buffers around all active nest sites from March 15 to August 31, with no harvest or vegetation-disturbing activities allowed within the buffer during that time. When harvesting operations are conducted under emergency of exemption notices (CFR 14 CCR 1038 or 1052), full protocol surveys might not be conducted, but efforts will be made to locate and avoid spotted owls. These efforts include AC searches, spot checking other known ACs near the project, checking databases, and communicating with adjacent landowners
  6. Reduction of potential impact from illegal activities
    - Implement control activities and cooperate with local, state, and federal law enforcement agencies to eradicate illegal marijuana plantations and prevent illegal firewood cutting.
      - In 2017, SPI and law enforcement agencies eradicated six marijuana sites on SPI Covered Lands.
  7. Management for habitat elements and operational standards
    - Retain habitat elements as specified in HCP Section 5.2.7 and summarized below:
      - Trees containing Spotted Owl Nest Structures: wherever they exist
      - Habitat Retention Areas (HRAs): at a rate of 2% of each harvest area
      - Wildlife Trees: at a rate of one per five acres
      - Legacy Trees: wherever they exist
      - Additionally, Retained Trees: in regeneration harvest units such that there are no locations that exceed a distance of 150 feet from other retained elements (HRAs, Wildlife Trees, Legacy Trees)
      - Hardwoods: retain and recruit as follows:
        1. In all non-regeneration harvest areas, SPI would retain at least 2 hardwoods greater than 22 inches diameter at breast height (DBH), when

- available. If unavailable, the next largest diameter hardwoods would be retained at a rate of 2 per acre.
2. In regeneration harvest units, SPI would retain small hardwoods (<6 inches DBH) or regenerate (recruit) stump-sprouting hardwoods at a rate of 2 per regenerated acre where they exist.
    - Snags and Green Culls: during all regeneration or non-regeneration harvest activities, as feasible, unless determined to be a safety hazard or a regulation requires their removal
    - Thinning in Plantations: portions of plantations would not be thinned, in order to promote within stand heterogeneity and maintain density-induced mortality processes.
8. Addressing barred owl as a stressor on NSO and CSO
- Proposing to conduct several studies with the following objectives: 1) assess the genetic differentiation of barred owl populations across northern and central California, 2) analyze allele frequency changes on the front of the range expansion, 3) estimate the amount of spotted owl – barred owl admixture in each population, and 4) identify wildlife species that barred owls prey upon in California.
  - Includes the collection of barred owls at an expected rate of 50 per year, for a potential total of 2,500 barred owls collected over the 50-year permit term, as described in Appendix 5.5 of the SPI HCP. If barred owl populations increase throughout the SPI Covered Lands, this estimate could rise to 150 barred owls collected per year, for a potential total of 7,500 barred owls collected over 50 years.

### **2.2.3 Adaptation of the Northwest Forest Plan and Sierra Nevada Forest Plan Amendment Alternative (NWFP/SNFPA Alternative)**

Under this alternative, an HCP for NSO and CSO would be developed under which SPI would manage known and suspected nest stands according to the Northwest Forest Plan (NWFP) within the range of the NSO (United States Department of Agriculture [USDA] and United States Department of the Interior [USDOI] 1994) and the Sierra Nevada Forest Plan Amendment (SNFPA) within the range of the CSO (USFS 2004a).

SPI's timber harvest and land management activities would continue to include the Covered Activities described in Section 1.2.3, with the addition of the conservation measures described in Section 2.2.3.1 below.

#### **2.2.3.1 Conservation of NSO and CSO**

##### **Northern Spotted Owl**

The NWFP protects large blocks of late-successional forest from commercial timber harvest and provides habitat for species that depend on these forests, including the NSO. Late-Successional Reserves (LSRs) were designated to contain significant amounts of the “best” late-successional forests. Management of the LSRs emphasizes retention of the existing late-successional forests and uses silvicultural practices to speed development of beneficial structural conditions in younger forest stands.

The adaptation of the NWFP would include maintaining 100 acres of the best NSO habitat as close to all known NSO ACs, regardless of occupancy. In addition, 30% of SPI Covered Lands within the NSO range

(113,365 acres of the 377,882 acres within the range) would be placed into a Late-Successional Reserve<sup>2</sup> (assumed to be within the high density NSO areas). The 100-acres surrounding known NSO sites and the LSRs would be managed as a Late Successional Reserve<sup>3</sup> (USDA and USDOJ 1994), which includes the following:

- In areas west of the Cascades, no harvest would be allowed where stands are over 80 years old, while thinning may occur in stands up to 80 years old.
- East of the Cascades and in the California Klamath Provinces, fire risk may be reduced for younger stands within the 100-acre reserve.
- Salvage logging would only occur where disturbance has reduced canopy closure to less than 40%.

### California Spotted Owl

The Sierra Nevada Forest Plan Amendment (USFS 2004a) outlines forest management practices for national forest lands within the Sierra Nevada to address the problems of: (1) old forest ecosystems and associated species; (2) aquatic, riparian, and meadow ecosystems and associated species; (3) fire and fuels; (4) noxious weeds; and (5) lower westside hardwood forests.

The adaptation of the Sierra Nevada Forest Plan Amendment (USFS 2004a) for CSO conservation would include maintaining the best available 300 acres of CSO habitat surrounding an AC, regardless of current occupancy. These designated Protected Activity Centers (PACs) around known and suspected nest stands, regardless of occupancy status, would encompass the best available 300 acres of habitat in as compact a unit as possible, as described in the Sierra Nevada Forest Plan Amendment. This best available habitat would be selected to include the following (using aerial photography interpretation and field verification where necessary):

- Two or more tree canopy layers
- Trees in the dominant and co-dominant crown classes averaging 24 inches DBH or greater
- At least 70% tree canopy cover (including hardwoods)
- In descending order, at least 50% canopy cover (including hardwoods) within the following California Wildlife Habitat Relationships (CHWR): classes 6, 5D, 5M, 4D, and 4M and other stands (Table 2-1)

In addition, SPI would establish a Home Range Core Area (HRCA) within 1.5 miles of each known AC (recorded after 1986), to include 600 to 2,400 acres of the best available habitat.

Within the PACs, vegetation and fuel management activities would be avoided to the greatest extent feasible. Hazardous fuels in the PACs would be reduced when they create an unacceptable fire threat to communities. When PACs cannot be avoided during treatments, SPI would ensure effective treatment of surface, ladder, and crown fuels within the treated areas. If nesting or foraging habitat in the PAC is mechanically treated, SPI would mitigate by adding acreage to the PAC where possible. Cumulatively, vegetation treatments within the PACs would not impact more than 5% of the total acres in the PACs in any given year, and no more than 10% per decade.

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<sup>2</sup> Based on 30% of the land covered by the NWFP being set aside as a Late Successional Reserve (see ROD).

<sup>3</sup> Mature and old-growth age classes. Structural attributes include live old-growth trees, standing dead trees (snags), fallen trees or logs on the forest floor, and logs in streams. There are typically multiple canopy layers, smaller understory trees, gaps in the canopy, and a patchy understory.

**Table 2-1. California Wildlife Habitat Relationships (CHWR) standards related to the Sierra Nevada Forest Plan Amendment. Tree size is diameter at breast height (DBH).**

CWHR Class	Tree Size	Canopy Closure
6	Multi-layered (medium/large trees [ $>24$ inches DBH] over a distinct layer of small trees [11-24 inches DBH] or pole trees [6-11 inches DBH])	Dense Cover (60-100%)
5D	Medium/large ( $>24$ inches DBH)	Dense Cover (60-100%)
5M	Medium/large ( $>24$ inches DBH)	Moderate Cover (40-59%)
4D	Small tree (11-24 inches DBH)	Dense Cover (60-100%)
4M	Small tree (11-24 inches DBH)	Moderate Cover (40-59%)

Within the HRCA, treatments would be designed and patterned to avoid the highest quality habitat (CWHR 5M, 5D, and 6) wherever possible. SPI would establish and maintain a pattern of fuels treatment that is effective in modifying wildfire behavior.

In addition, at active nests, a Limited Operating Period (LOP) would prohibit vegetation treatments within approximately 0.25 mile of the AC during the breeding season (March 1 – August 31).

## 2.3 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

Federal agencies are required by NEPA to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the Proposed Action provided suggestions for alternative methods for achieving the purpose and need. Some of these alternatives may have been outside the scope of responding to SPI's application for an ITP, duplicative of the alternatives considered in detail, or determined to be components that would not result in equivalent conservation of the Covered Species and potentially cause unnecessary environmental harm. Therefore, a number of alternatives were considered, but dismissed from detailed consideration for reasons summarized below.

### 2.3.1 Shorter Permit Duration Alternative

Under the Shorter Permit Duration Alternative, the conservation measures outlined in the HCP would be implemented, but the HCP would be modified to reflect a 25-year permit term, and an ITP would be issued for a 25-year term. Upon nearing the end of the 25-year permit term, SPI would seek an extension of the ITP if they deemed that appropriate. The length of the renewal period would be decided at the time of renewal and would be based on the results of monitoring and adaptive management implemented. The initial permit would authorize less take than the HCP Alternative (Proposed Action), but if renewed, would likely have similar long-term take as the HCP Alternative (Proposed Action).

The timeframe of forest management planning is typically longer than 25 years since forest development is a relatively slow process. Thus, this alternative does not meet our purpose and need, because a permit of a shorter duration would not allow sufficient time for growth and development of spotted owl habitat. Additionally, this puts a considerable financial and labor-intensive burden on the Applicant and the

Service to repeat the permitting process multiple times. This alternative would not further reduce any estimated annual incidental take, would create an additional administrative burden, and would likely have similar long-term biological effects as the HCP Alternative.

This alternative was eliminated because the shorter term is not consistent with the time needed to grow spotted owl habitat and would provide fewer long-term conservation benefits to the Covered Species and other wildlife. Habitat development takes time; thus, a longer permit term has enhanced conservation benefits. In addition, because this alternative does not provide substantially different protection for known NSO or CSO sites beyond what is proposed in SPI's HCP, it does not fulfill our need to examine a range of reasonable alternatives. A 50-year permit term was selected because it would allow for SPI's timberlands to be managed for various seral stages throughout its ownership, while also providing the most conservation benefits.

### **2.3.2 Listed Species Only Alternative**

Under the Listed Species Only Alternative, the HCP would be revised to only cover SPI lands within the range of the NSO, and an ITP would be issued for the NSO only. The CSO would not be a Covered Species in the HCP, and no ITP would be issued for the CSO. Should the CSO be listed during the 50-year permit term, the Applicant and the Service may need to repeat the permitting process, increasing the financial and labor burden on both parties.

SPI is currently seeking incidental take coverage for both the NSO and CSO, and a greater majority of SPI's land holdings fall within the range of the CSO; thus, significantly more conservation benefits exist when the HCP addresses both species. While the CSO is not currently listed, it is currently under review for federal listing. The HCP Alternative (Proposed Action) would apply the same conservation practices to both the listed NSO and the non-listed CSO, extending the same conservation benefits to both species and across a larger portion of SPI's lands.

This alternative was eliminated from detailed analysis as it would not further reduce any estimated annual incidental take (and may increase take of CSO), may create an additional administrative burden should the CSO be listed, and would result in decreased conservation benefits by restricting the HCP to the range of the NSO.

### **2.3.3 HCP/CCAA Alternative**

The HCP/CCAA Alternative would include a revised HCP covering just the NSO and the issuance of an ITP for the NSO for the 50-year permit term. The CSO would be addressed via a CCAA, which would include conservation measures for CSO and would authorize incidental take if the CSO would become listed under the ESA.

SPI is currently seeking incidental take coverage for both the NSO and CSO, and a greater majority of SPI's land holdings fall within the range of the CSO. While the CSO is not currently listed, it is currently under review for federal listing. The HCP Alternative (Proposed Action) would apply the same conservation practices to both the listed NSO and the non-listed CSO, extending the same conservation benefits to both species and across a larger portion of SPI's lands. A CCAA may include similar conservation practices for the CSO as those described in SPI's HCP but could also include less stringent measures, since the CSO is not currently listed and CCAAs do not have the same requirements as HCPs (e.g., mitigation is not required under a CCAA). Additionally, the preparation and administration of separate plans would essentially double the costs and effort required by the Applicant and the Service while also adding long-term administrative burden.

This alternative was eliminated from further analysis because the conservation and impacts would largely be the same as the Proposed Action and thus it does not fulfill our need to examine a range of reasonable alternatives, would create an additional administrative burden, and may have lower long-term conservation benefits when compared to the HCP Alternative (Proposed Action).

### **2.3.4 Reduced Even-Aged Management**

The Reduced Even-Aged Management Alternative would include development of a system of even-aged and uneven-aged management on the Covered Lands and would assume that SPI would continue to plan harvests to obtain their proposed yield. Even-aged management is generally characterized by the removal of the majority of the existing stand (often by clear-cutting) and replanting the area with tree seedlings. The future result is a timber stand with trees of the same age and a predictable amount of timber volume per acre. This type of intensive forest management is used to increase growth rates of trees and to regulate the forest so as to be able to predict a sustainable annual rate of harvest. In a regulated forest, a specified proportion is harvested annually, and a rotational age is established when planted trees are expected to reach the desired size to be cut. Uneven-aged management is the practice of removing individual trees or groups of trees to maintain a desired distribution of trees of all ages. Some mature trees as well as younger trees that are regenerating to replace the mature trees are harvested. An uneven-aged forest can also be managed on a regulated basis, but the growth rates and volume yields are less predictable because trees of different ages and spatial arrangements grow at different rates.

The CFPR require that land owners achieve a MSP of high quality forest products, balancing growth and harvest over time. These growth and yield projections are based on models that are evaluated and approved by CAL FIRE. The CFPR also describe even-aged methods and uneven-aged methods, either of which can be used to achieve MSP (14 CCR 913-953.1, and 913-953.2; Appendix D)

To achieve this sustained production and grow timber stands to reach tree size and density that are expected to provide spotted owl habitat, SPI currently proposes to manage the majority of its property by clear-cutting on a rotation of approximately 60-80 years. Stands of about 20-30 acres in size would be entered once every 30 to 50 years to control stocking by thinning.

In addition, SPI uses uneven-aged management (thinning, single tree selection, group selection, etc.) in sensitive locations, such as areas near streams and meadows. As proposed in the HCP, approximately 55% of SPI Covered Lands would be comprised of even-aged timber stands with controlled stocking levels and spacing after 50 years (SPI 2019). In total, 30 to 35% of SPI Covered Lands would be maintained as mixed-aged forests (43% of the current SPI Mixed Land Class, as defined in the HCP Appendix 4.1).

As an alternative, SPI could use uneven-aged harvesting methods more frequently, cut individual mature trees as they reach a harvestable size, and capture the volume to trees with declining vigor before they die. Using this selective approach, stands would need to be entered approximately every 10 to 15 years.

Assuming SPI would aim for the same proposed yield, this alternative could require more intensive use of the land with more frequent harvesting. Thus, this alternative was eliminated from detailed analysis because it could delay or prevent several of the key conservation benefits described in the HCP and does not align with SPI's long-term growth and yield analysis. Overall, this alternative would result in fewer or delayed conservation benefits when compared with the HCP Alternative (Proposed Action) over the 50-year permit term, as described below:

- Forest heterogeneity at the landscape scale would be decreased because uneven-aged stands are generally larger than even-aged stands and lack sharp contrast between stands. This decreases the juxtaposition between older forests used by spotted owls for nesting and roosting and younger

even-aged stands where spotted owls often forage. Within-stand heterogeneity would be greater in uneven-aged stands, but heterogeneity among stands would be lower. This would result in a decrease in roosting and nesting habitat for the CSO and NSO, as forest stands subject to uneven-aged management generally contain fewer large trees per acre and also become more open.

- The development of habitat for forest-dependent species is largely a function of time. The repeated selection harvest entries would occur every 10-15 years and gradually decrease the density of trees in the upper size classes without allowing for extended periods of re-growth. Because of the shorter re-entry periods (10-15 years versus the 60-80 year even-aged rotation length), decadent features, such large mistletoes brooms, trees with cavities, or large snags that spotted owls use as nest platforms, may not develop to the extent that they would if there were longer intervals between entries.
- The stands of large diameter trees that would be present in Habitat Form 4 (as described in the HCP) would generally not be present under a single tree selection harvesting approach. Mixed age class stands may feature large trees, but generally these large trees are more widely spaced than in even-age stands. Moreover, overstory canopy closure is less dense since large trees are rarely adjacent to one another or occur in small clusters rather than entire stands.
- Fewer PHAs would be established when compared with the HCP Alternative (Proposed Action), as the use of even-aged management promotes rapid growth and is integral to SPI's creation of PHAs as stands develop into HF2H and HF4 (see Appendix 4.3 and 4.6 of the HCP).
- Harvest activities would affect a greater number of acres since the productivity per acre would be reduced when compared to even-aged management. Further, the time it takes to achieve a "regulated" forest increases. In a regulated forest, fewer acres must be harvested each year to achieve the same sustainable volume because there is more volume per acre on the stands that have been artificially regenerated once they reach maturity. As planned, SPI predicts that the number of even-aged acres harvested would systemically decline in each decade of the first rotation across all land classes.
- More infrastructure (e.g., roads, skid trails, and landings) would be needed for single tree selection harvest activities since the harvest would be more spatially widespread and trees would not be yarded to a centralized location.
- The effective reduction in fire severity would be decreased. As stated in the SPI HCP, even-aged management dramatically decreases fuel ladders and, over time, creates stands that reduce the tendency for ground fires to become large crown fires (see HCP Section 5.2.4).
- Prey base would be decreased. Hamm and Diller (2009) found that uneven-aged management resulted in a decrease in the population of dusky-footed woodrats (*Neotoma fuscipes*) when compared with younger even-aged forests. For northern flying squirrels (*Glaucomys sabrinus*), frequent re-entries may limit hypogynous fungi populations that are a key component of flying squirrel diets.
- Under a single tree selection regime, stands are entered every 10-15 years. This frequent disturbance of the forest floor disrupts the development of complex accumulations of downed woody material, grasses and forbs, fungi, and organic detritus that provide high quality habitat for small mammals, including northern flying squirrels and woodrats.

## CHAPTERS 3 – 7. AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

These chapters summarize the physical, biological, social, and economic environments of the Analysis Area (described in Chapters 3 through 7 below) and the effects of implementing each alternative on that environment. It also presents the scientific and analytical basis for the comparison of alternatives presented in Chapter 2. The Proposed Action considered in this DEIS is the Service's issuance of an ITP in response to an application submitted by SPI for the Covered Activities associated with SPI's HCP.

The Affected Environment describes the resource areas or issues that may be affected by the Proposed Action. The description should be no longer than needed to understand the effects of the alternatives. The description should be commensurate with the level of importance of the effect, **with less important information briefly summarized, consolidated, or referenced**. Additional details on resources are provided in the appendices to this EIS, the SPI HCP and various other technical reports. The description of the affected environment also discusses, where relevant, trends in the conditions of resources and environmental stressors.

NEPA requires Federal agencies to consider the direct, indirect, and cumulative effects of their actions (40 CFR 1502.16), along with similar and related actions. Direct effects are caused by the Federal action and occur at the same time and place as the action (40 CFR 1508.8(a)). Indirect effects are those that are "caused by the action and are later in time or farther removed in distance but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems" (40 CFR 1508.8(b)).

The level of detail in an analysis of effects is driven by the underlying action before the agency. The Federal action analyzed in this DEIS is the approval of the SPI HCP and the issuance of an ITP for the Covered Species, pursuant to Section 10(a)(1)(B) of the Federal ESA. The proposed Federal action would not approve or entitle any timber harvest actions or management projects. Future THPs will be authorized by CAL FIRE, and the conservation measure developed in the proposed HCP to protect and improve habitat for the Covered Species would be incorporated directly into the future THPs. As such, the scope of the effects analysis in this DEIS is focused principally on the effects that issuance of an ITP would have on the Covered Species and on the direct and indirect effects the Proposed Action would have on other resource areas. Other activities that occur on the Covered Lands or elsewhere may be subject to separate approval processes, including an environmental review process pursuant to the CEQA. Additional project-specific authorizations, such as permits from other Federal, state, regional, or local entities (e.g., United States Army Corps of Engineers [USACE], Central Valley Regional Water Quality Control Board) would also be required. Through these planning, review, and entitlement processes, mitigation measures for the direct and indirect effects described in this chapter would be anticipated. With the exception of potential effects on Covered Species (which would be addressed by the Service as part of the ESA Section 10 or Section 7 approval process), the implementation of these mitigation measures would be the responsibility of agencies other than the Service. This DEIS includes a general analysis of the direct and indirect effects that could result from the Proposed Action (see Table 2-2 below for a summary of potential effects).

**Table 2-2. Summary of potential effects by alternative.**

Resource	No Action Alternative	HCP Alternative – Proposed Action	NWFP/SNFPA Alternative
Land Use and Ownership	No effects.	No effects.	No effects.
Vegetation Communities	Effects to vegetation are expected during timber harvest and management activities. Beneficial effects for certain species that thrive in disturbed environments would be expected, while negative effects would be expected for species not adapted to disturbance.	Marginal beneficial effect compared to the No Action Alternative because of the implementation of the conservation measures included in the SPI HCP, such as habitat element retention and Tier 1 NSO AC protections.	No disturbance in no-harvest areas, with no effects to vegetation communities in those areas. Possible marginal beneficial effect compared to the No Action Alternative due to no harvest areas, as well as yet to-be-determined conservation measures. Possible increase in adverse effects in certain areas if harvest increases in the harvestable areas of the Covered Lands, when compared to the No Action Alternative.
Wildlife/Fishery Resources	Wildlife and fishery resources would continue to be affected by timber harvest and management activities, with habitat modification and loss being the primary effect. No barred owl research would occur, with their populations expected to increase throughout the Analysis Area.	Similar effect compared to the No Action Alternative because wildlife and fishery resources would continue to be affected by timber harvest and management activities, though the location and timing of those effects may differ due to implementation of the conservation measures (e.g., establishing PZs, habitat element retention). Barred owl research to be conducted throughout the 50-year permit term may result in reduced barred owl populations in the Analysis Area.	Potential adverse effect compared to the No Action Alternative because intense harvest may be concentrated on a smaller amount of the Covered Lands due to the establishment of large habitat reserves. Barred owl research to be conducted throughout the 50-year permit term may result in reduced barred owl populations in the Analysis Area.

Resource	No Action Alternative	HCP Alternative – Proposed Action	NWFP/SNFPA Alternative
Northern Spotted Owl	<p>High canopy cover, large tree habitat would increase at a similar rate to that described in the SPI HCP, with an increase in PHAs from 147 in 2016 to 498 by 2066. No barred owl research would occur, and adverse effects as the result of barred owl and NSO competition would continue. SPI would not conduct or maintain landscape analyses pertinent to NSO habitat management, and such information would not be provided to the Service.</p>	<p>Similar high canopy cover, large tree habitat availability and suitability, when compared to the No Action Alternative. Beneficial effect compared to the No Action Alternative because of additional conservation measures, such as Tier 1 AC protections and habitat element retention during harvest. Barred owl research to be conducted throughout the 50-year permit term would indirectly benefit NSO populations by directly decreasing barred owl populations. SPI would conduct and maintain analyses of NSO habitat and occupancy on the Covered Lands, and such information would be shared with the Service, which is considered a direct benefit for conservation planning.</p>	<p>Similar effects when compared to the No Action Alternative, though the number of PHAs on the Covered Lands cannot be predicted. Timber harvest may be concentrated to a smaller amount of the Covered Lands due to the establishment of large habitat reserves. Barred owl research to be conducted throughout the 50-year permit term would indirectly benefit NSO populations by directly decreasing barred owl populations. SPI would provide the Service with analyses of NSO habitat and occupancy on the Covered Lands, which is considered a direct benefit for conservation planning.</p>

Resource	No Action Alternative	HCP Alternative – Proposed Action	NWFP/SNFPA Alternative
California Spotted Owl	<p>CSO would be provided only minimal protection during timber harvest and management activities, though high canopy cover, large tree habitat is expected to increase similarly as described in the SPI HCP, with an increase in PHAs from 723 in 2016 to 1,231 by 2066. No barred owl research would occur, and adverse effects as a result of barred owl and CSO competition would continue as barred owls expand their range throughout the Sierra Nevada. SPI would not conduct or maintain landscape analyses pertinent to CSO habitat management, and such information would not be provided to the Service.</p>	<p>Beneficial effect compared to the No Action Alternative due to the requirement for surveys and habitat analysis, with the CSO being treated similar to the listed NSO. Additional conservation measures would be required, such as habitat element retention. CSO habitat suitability and availability is expected to be similar to the No Action Alternative. Barred owl research to be conducted throughout the 50-year permit term would indirectly benefit CSO populations by directly decreasing barred owl populations. SPI would conduct and maintain analyses of the Covered Lands, and such information would be shared with the Service, which is considered a direct benefit for conservation planning.</p>	<p>Possible beneficial effects compared to the No Action Alternative; possible adverse effect compared to the HCP Alternative (Proposed Action) due to harvest potentially being concentrated to smaller areas of the Covered Lands when compared to the other alternatives. More protections for CSO ACs when compared to the other considered alternatives. Barred owl research to be conducted throughout the 50-year permit term would indirectly benefit CSO populations by directly decreasing barred owl populations. SPI would provide the Service with analyses of CSO habitat and occupancy on the Covered Lands, which is considered a direct benefit for conservation planning.</p>
Water Resources	<p>No change from the status quo, with all timber harvest and associated activities being conducted in accordance with all applicable regulations.</p>	<p>Similar to the No Action Alternative, though the location and timing of effects may differ.</p>	<p>Similar to the No Action Alternative, though the location and timing of effects may differ.</p>

Resource	No Action Alternative	HCP Alternative – Proposed Action	NWFP/SNFPA Alternative
Air Quality and Climate Change	SPI would continue to practice forest management on the Covered Lands, contributing to overall carbon sequestration within the forest landscape. Air quality and climate change would continue to be addressed, and the effects would be minimized and mitigated during the THP process.	Similar to the No Action Alternative, though the location and timing of effects may differ.	Similar to the No Action Alternative, though the location and timing of effects may differ.
Socioeconomics and Environmental Justice	Timber harvest levels are expected to continue at approximately the same rate as current conditions; no changes to employment levels or yield tax revenues are expected. Impacts that would affect underserved populations are not expected.	Similar to the No Action Alternative, with comparable timber harvest rates.	If harvest rates were to decrease due to fewer acres being available for timber harvest on the Covered Lands, local tax revenues and employment levels may be affected. Effects on underserved populations would be similar to the No Action Alternative.
Cultural and Historic Resources	No effects.	No effects.	No effects.

In a general sense, all effects on resources are cumulative; however, it is the goal of this DEIS to provide analysis of the important resource issues and to discuss the effects that are of regional or local significance. In this case, cumulative effects are the incremental effects on the environment that would result from the issuance of the ITP under one of the alternatives, when added to other past, present, and reasonably foreseeable future actions in the region, regardless of what agency or person undertakes such actions. See Chapter 8 for the cumulative effects analysis.

While NEPA requires that an EIS describe any adverse environmental effects that cannot be avoided (42 U.S.C. 4332(C)(ii)), such a disclosure does not impose any additional legal obligations on the agency. The summary of potential adverse, substantial environmental effects and irreversible and irretrievable commitments of resources that cannot be avoided is provided in Chapter 9.

## **CHAPTER 3. BIOLOGICAL RESOURCES**

### **3.1 AFFECTED ENVIRONMENT**

This chapter describes the existing conditions within the area encompassed by the SPI Covered Lands (Figure 3-1) plus a two-mile buffer (collectively, the Analysis Area; two-mile buffer established to conservatively accommodate for the home ranges of the NSO and CSO [defined as 1.3-mile and 1.0-mile radii around ACs, respectively, in the SPI HCP]). As described in Chapter 2, the alternative selected would be implemented on SPI's Covered Lands and will also be analyzed in Chapters 3 through Chapter 7.

For the purposes of these chapters, resources were assessed using different spatial extents depending on the character of the resource and the extent to which Covered Activities may potentially affect the resource. The approach is consistent with the Service's regulations for implementing NEPA, which indicate that the scope of analysis is dependent upon the extent of reasonably foreseeable project-related impacts (USFWS 2003). For some resources, the spatial extent is SPI's Covered Lands; for others, the spatial extent may extend beyond the boundaries of the SPI Covered Lands to include a 2.0-mile buffer. The reason for the differing spatial extents is to account for potential effects on resources outside of the SPI Covered Lands that may be affected by SPI activities (i.e., timber operations and other management activities, see Section 1.2.3). The spatial extent and description of the Analysis Area for each resource is provided at the beginning of each resource section.

The United States Environmental Protection Agency (USEPA) Level III Ecoregions (i.e., regions defined by location, climate, vegetation, hydrology, terrain, wildlife, and land use/human activities) are used for analysis in these chapters (Figure 3-1; Wiken et al. 2011). The majority of the SPI Covered Lands and 2.0-mile buffer are within the Cascades, Klamath Mountains/California High North Coast Range, and Sierra Nevada ecoregions (Table 3-1).

**Table 3-1. Level III Ecoregions within the Analysis Area by NSO and CSO range. Values in acres.**

Level III Ecoregion	SPI Covered Lands NSO Range	SPI Covered Lands CSO Range	Analysis Area NSO Range	Analysis Area CSO Range
Cascades	57,544.2	471,301.4	238,579.1	1,338,475.4
Central Basin and Range	n/a	31.4	n/a	8,900.9
Central California Foothills and Coastal Mountains	2,031.7	4,209.6	28,806.7	81,363.2
Eastern Cascades Slopes and Foothills	n/a	85,132.2	n/a	457,974.8
Klamath Mountains/California High North Coast Range	318,305.7	11,572.7	1,266,599.8	49,905.3
Northern Basin and Range	n/a	n/a	n/a	469.6
Sierra Nevada	n/a	616,023.7	n/a	2,752,210.5
<b>Total</b>	<b>377,881.6</b>	<b>1,188,271.1</b>	<b>1,533,985.6</b>	<b>4,689,299.8</b>
<b>Grand Total</b>	<b>1,566,152.7</b>		<b>6,223,285.4</b>	

### 3.1.1 Land Use and Ownership

This section provides a discussion of the current land use with the Analysis Area, including land cover, land ownership, and recreation. Data resources evaluated for this section include publicly available information from the Protected Areas Database of the United States (PAD-US), United States Geological Survey (USGS), Natural Resources Conservation Service (NRCS), and California Department of Fish and Wildlife (CDFW).

PAD-US identified 3,694,306.1 acres of public land ownership within the Analysis Area, of which, the majority is federally owned (3,022,807.1 acres), followed by special designation lands (e.g., wild and scenic rivers, wilderness areas, national recreation areas, research or educational areas, etc. [577,875.9 acres]), and state lands (47,596.4 acres, Table 3-2, Figure 3-2). Within the Analysis Area and the range of the NSO, 832,513.4 acres are federally-owned, and 322,477.3 acres are special designation lands. A total of 2,190,293.7 acres are federally-owned within the CSO range in the Analysis Area, and 255,398.6 acres are classified as special designation lands (Table 3-2, Figure 3-2).

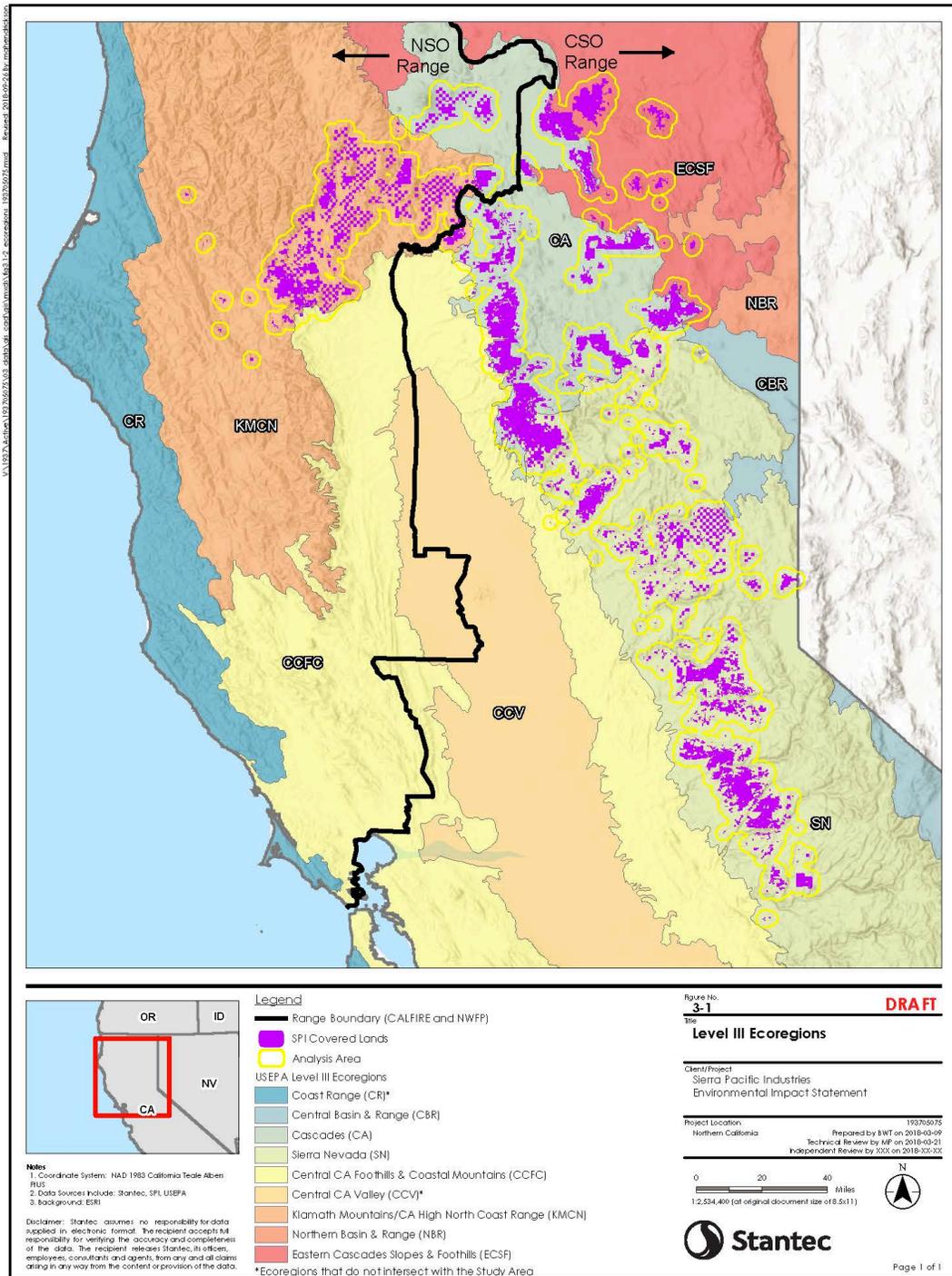


Figure 3-1. Level III Ecoregions.

**Table 3-2. Land ownership identified through Protected Areas Database of the United States within the Analysis Area by owl range. Values in acres.**

<b>Ownership Type</b>	<b>NSO Range</b>	<b>CSO Range</b>	<b>Total</b>
<b>Native American Lands</b>	<b>351.7</b>	<b>1,996.3</b>	<b>2,348.0</b>
<b>Special Designation Lands</b>	<b>322,477.3</b>	<b>255,398.6</b>	<b>577,875.9</b>
<b>Federal Lands</b>	<b>832,513.4</b>	<b>2,190,293.7</b>	<b>3,022,807.1</b>
<i>Bureau of Land Management</i>	<i>76,054.7</i>	<i>120,120.2</i>	<i>196,174.9</i>
<i>Bureau of Reclamation</i>	<i>220.0</i>	<i>6,266.3</i>	<i>6,486.3</i>
<i>Forest Service</i>	<i>740,218.0</i>	<i>2,063,204.8</i>	<i>2,803,422.8</i>
<i>National Park Service</i>	<i>16,002.4</i>	<i>702.4</i>	<i>16,704.8</i>
<i>Other or Unknown Federal Land</i>	<i>18.4</i>	<i>n/a</i>	<i>18.4</i>
<b>Local Government</b>	<b>6.1</b>	<b>1,146.9</b>	<b>1,152.9</b>
<i>City Land</i>	<i>n/a</i>	<i>26.0</i>	<i>26.0</i>
<i>County Land</i>	<i>6.1</i>	<i>1,120.9</i>	<i>1,127.0</i>
<b>Non-Governmental Organization</b>	<b>1,876.1</b>	<b>6,958.4</b>	<b>8,834.5</b>
<b>Private</b>	<b>58.5</b>	<b>11,804.4</b>	<b>11,862.9</b>
<b>Regional Agency Special District</b>	<b>80.6</b>	<b>4,842.0</b>	<b>4,922.6</b>
<i>Regional Agency Land</i>	<i>80.6</i>	<i>2,401.0</i>	<i>2,481.6</i>
<i>Regional Water Districts</i>	<i>n/a</i>	<i>2,441.0</i>	<i>2,441.0</i>
<b>State</b>	<b>7,340.4</b>	<b>40,256.0</b>	<b>47,596.4</b>
<i>Other or Unknown State Land</i>	<i>n/a</i>	<i>629.2</i>	<i>629.2</i>
<i>State Department of Land</i>	<i>n/a</i>	<i>&lt;0.1</i>	<i>&lt;0.1</i>
<i>State Department of Natural Resources</i>	<i>158.0</i>	<i>16,419.7</i>	<i>16,577.7</i>
<i>State Fish and Wildlife</i>	<i>297.1</i>	<i>2,985.2</i>	<i>3,282.3</i>
<i>State Land Board</i>	<i>3,361.3</i>	<i>2,545.2</i>	<i>5,906.5</i>
<i>State Park and Recreation</i>	<i>3,524.1</i>	<i>17,676.7</i>	<i>21,200.8</i>
<b>Unknown</b>	<b>4,564.9</b>	<b>12,340.9</b>	<b>16,905.8</b>

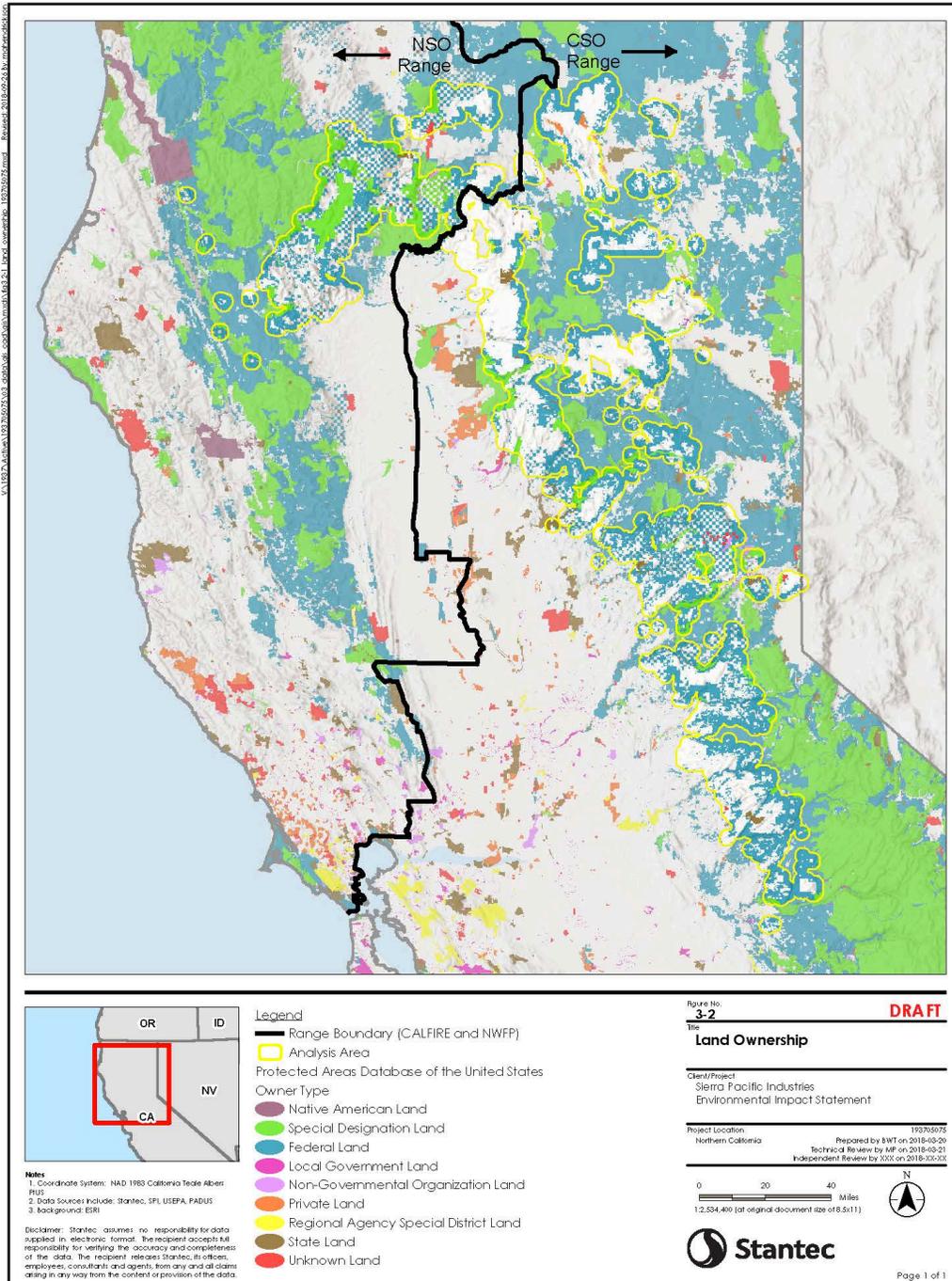


Figure 3-2. Land Ownership.

Publicly owned lands provide opportunities for outdoor recreational activities, including but not limited to: hiking, camping, hunting, and wildlife viewing. Many national forests, recreational areas, and parks are within the boundaries of the Analysis Area. These areas see millions of visitors each year. Annual attendance statistics for National Parks and California State Parks can be found at: <https://irma.nps.gov/Stats/> and [http://www.parks.ca.gov/?page\\_id=23308](http://www.parks.ca.gov/?page_id=23308), respectively.

Native American archaeological resources within the Analysis Area are diverse, given the large area, variable terrain, and more than 10,000 years of activity within the region (USFWS 2016a). Approximately 2,348.0 acres of Native American land falls within the Analysis Area. These include the California Public Domain Allotment, the Burney Tract, and the Berry Creek, Big Bend, Enterprise, Greenville, Montgomery Creek, Roaring Creek, and Susanville Rancherias. Current use of SPI timberlands by Native American tribal groups is infrequent and limited in the number of places visited, and typically results from requests for a specific use (USFWS 2016a). Records of use are reviewed during THP development and associated activities (USFWS 2016a).

The National Land Cover Database (NLCD) provides spatial reference and descriptive data for the characteristics of the land's surface, including the functioning land class (e.g., open water, developed, forest, etc.), which is further divided into land cover based on the percent impervious surface and percent tree cover (Table 3-3, Figure 3-3; land cover definitions can be found in Table A-1 in Appendix C). Within the Analysis Area, the dominant land class is forest (72.3%), which includes evergreen, deciduous, and mixed forest, with the vast majority represented by evergreen forest. The second most dominant land class is shrubland, making up 20.5% of the Analysis Area (Table 3-3). Within the range of the NSO in the Analysis Area, there are 1,037,902.1 acres of evergreen forest, while 3,304,379.4 acres of evergreen forest are located within the CSO range of the Analysis Area. For full descriptions of the various land classes, refer to Table A-1 in Appendix C.

**Table 3-3. Acreage of land cover by owl range within the Analysis Area.**

<b>Land Cover</b>	<b>NSO Range (acres)</b>	<b>CSO Range (acres)</b>	<b>Analysis Area (acres)</b>
<b>Open Water</b>	19,505.0	66,455.3	85,960.3
<b>Developed, Open Space</b>	31,673.6	53,728.5	85,402.1
<b>Developed, Low Intensity</b>	2,770.5	9,284.8	12,055.2
<b>Developed, Medium Intensity</b>	860.4	2,820.6	3,681.0
<b>Developed, High Intensity</b>	142.4	759.1	901.5
<b>Barren Land</b>	14,475.5	8,513.9	22,989.4
<b>Deciduous Forest</b>	37,222.0	30,932.0	68,154.0
<b>Evergreen Forest</b>	1,037,902.1	3,304,379.4	4,342,281.5
<b>Mixed Forest</b>	42,213.2	45,123.3	87,336.6
<b>Shrub/Scrub</b>	312,035.0	964,092.5	1,276,127.5
<b>Grassland/Herbaceous</b>	32,920.0	151,598.5	184,518.5
<b>Pasture/Hay</b>	685.9	15,735.0	16,420.9
<b>Cultivated Crops</b>	490.9	12,229.7	12,720.6
<b>Woody Wetlands</b>	517.3	361.4	878.7
<b>Emergent Herbaceous Wetlands</b>	214.9	23,285.8	23,500.7
<b>Perennial Snow/Ice</b>	357.0	n/a	357.0

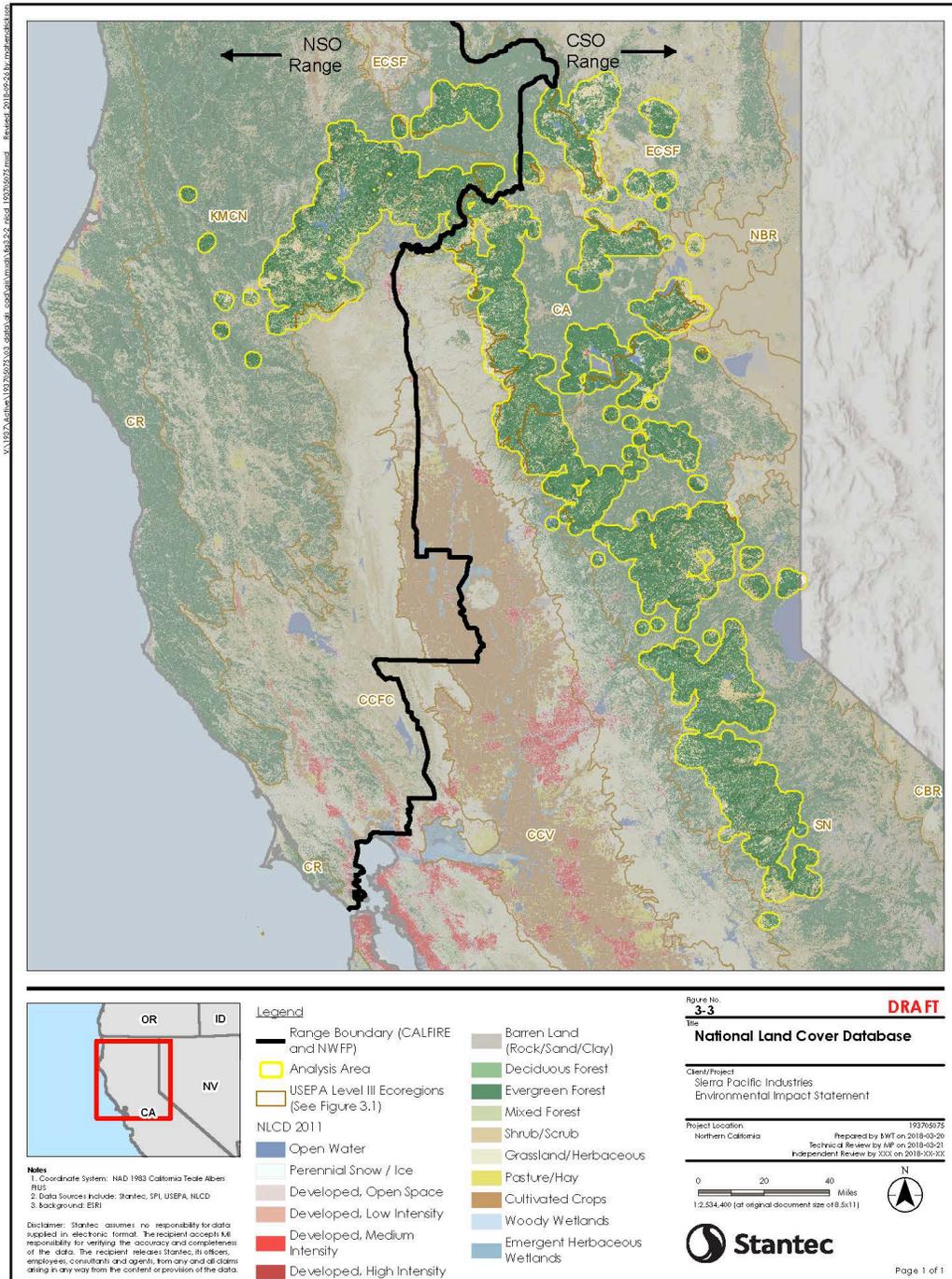


Figure 3-3. National Land Cover Database.

### 3.1.2 Vegetation Communities

Information from the USGS (Griffith et al. 2016), the NLCD (2006), and the Commission for Environmental Cooperation (Wiken et al. 2011) was used to describe typical native vegetation. Rare, threatened, and endangered plant species are discussed below in Section 3.1.2.1.

Native vegetation throughout the Analysis Area is diverse and varies drastically by geographic and topographic location. A description of general vegetation by Level III Ecoregion is summarized in Table 3-4.

**Table 3-4. Description of native vegetation within the Analysis Area by Level III Ecoregion.**

Level III Ecoregions	Description of Native Vegetation <sup>1</sup>
<p style="text-align: center;"><b>Cascades</b> <i>Within NSO and CSO Range</i></p>	<p>Highly productive coniferous forests. Lower elevations consist of Douglas-fir, western hemlock (<i>Tsuga heterophylla</i>), western red cedar (<i>Thuja plicata</i>), big leaf maple (<i>Acer macrophyllum</i>), red alder (<i>Alnus rubra</i>). Higher elevations consist of Pacific silver fir (<i>Abies amabilis</i>), mountain hemlock (<i>Tsuga mertensiana</i>), subalpine fir (<i>Abies lasiocarpa</i>), noble fir (<i>Abies procera</i>), lodgepole pine (<i>Pinus contorta</i>). Highest elevations contain subalpine meadows and rocky alpine zones. Southern portion of region consists of Shasta red fir and white fir.</p>
<p style="text-align: center;"><b>Central California Foothills and Coastal Mountains</b> <i>Within NSO and CSO Range</i></p>	<p>Primarily chaparral and oak woodlands. Low elevations consist of grasslands and high elevations contain patches of pine. Native vegetation includes coast live oak woodlands (<i>Quercus agrifolia</i>), Coulter pine (<i>Pinus coulteri</i>), and unique native stands of Monterey pine (<i>Pinus radiata</i>) in the west, and blue oak (<i>Quercus douglasii</i>), black oak (<i>Quercus velutina</i>), and grey pine (<i>Pinus sabiniana</i>) woodlands in the east.</p>
<p style="text-align: center;"><b>Klamath Mountains/California High North Coast Range</b> <i>Within NSO and CSO Range</i></p>	<p>Northern Californian and Pacific Northwest conifers and hardwoods. Mixed conifer forests feature Douglas-fir, white fir, incense cedar (<i>Calocedrus decurrens</i>), tanoak (<i>Notholithocarpus densiflorus</i>), Jeffrey pine (<i>Pinus jeffreyi</i>), Shasta red fir, sugar pine (<i>Pinus lambertiana</i>), ponderosa pine, chinkapin (<i>Chrysolepis</i> spp.), canyon live oak (<i>Quercus chrysolepis</i>), and, in some lower areas, chaparral and western juniper (<i>Juniperus occidentalis</i>). Oregon oak woodlands consist of Oregon white oak (<i>Quercus garryana</i>), madrone (<i>Arbutus menziesii</i>), California black oak, ponderosa pine, and grasslands.</p>

Level III Ecoregions	Description of Native Vegetation <sup>1</sup>
<p><b>Northern Basin and Range</b> <i>Within CSO Range Only</i></p>	<p>Non-mountain areas consist of sagebrush steppe vegetation and cool season grasses. Mountain big sagebrush (<i>Artemisia tridentata</i> var. <i>vaseyana</i>), Wyoming big sagebrush, low sagebrush (<i>Artemisia arbuscular</i>), bluebunch wheatgrass, rabbitbrush, Idaho fescue (<i>Festuca idahoensis</i>), Thurber needlegrass (<i>Achnatherum thurberianum</i>) are dominant species with scattered juniper (<i>Juniperus</i> spp.). Ranges are generally covered in mountain big sagebrush, mountain-mahogany (<i>Cercocarpus ledifolius</i>), juniper, and Idaho fescue at lower and mid-elevations. Higher elevations consist of Douglas-fir and aspen with scattered limber pine.</p>
<p><b>Sierra Nevada</b> <i>Within CSO Range Only</i></p>	<p>Diverse temperate coniferous forests. The vegetation transitions from chaparral and woodland to mostly ponderosa pine at the lower elevations on the west side, and lodgepole pine on the east side, to mixed conifer forests of ponderosa pine, sugar pine, Douglas-fir, and white fir. Giant sequoias (<i>Sequoiadendron giganteum</i>) occur in some areas. Higher elevations consist of white fir and red fir forests. Highest elevations consist of lodgepole pine, Jeffrey pine, western white pine (<i>Pinus monticola</i>), limber pine, and aspen and spruce (<i>Picea</i> spp.) in subalpine zone.</p>
<p><b>Central Basin and Range</b> <i>Within CSO Range Only</i></p>	<p>Basins are covered by Great Basin sagebrush or saltbush-greasewood vegetation. Shadscale (<i>Atriplex confertifolia</i>), winterfat (<i>Krascheninnikovia lanata</i>), black sagebrush (<i>Artemisia nova</i>), Wyoming big sagebrush (<i>Artemisia tridentata</i> var. <i>wyomingensis</i>), ephedra (<i>Ephedra</i> spp.), rabbitbrush (<i>Ericameria nauseosa</i>), Indian ricegrass (<i>Oryzopsis hymenoides</i>), and squirreltail (<i>Elymus elymoides</i>) are typical. Greasewood (<i>Sarcobatus vermiculatus</i>), Nuttall saltbush (<i>Atriplex nuttallii</i>), seepweed (<i>Suaeda nigra</i>), and alkali sacaton (<i>Sporobolus airoides</i>) occur in more saline areas. Lower mountains consist of singleleaf pinyon (<i>Pinus monophylla</i>), Utah juniper (<i>Juniperus osteosperma</i>), sagebrush, bitterbrush (<i>Purshia tridentata</i>), serviceberry (<i>Amelanchier</i> spp.), snowberry (<i>Symphoricarpos</i> spp.), and bluebunch wheatgrass (<i>Pseudoroegneria spicata</i>). High mountains may contain some Douglas-fir, white fir, limber pine (<i>Pinus flexilis</i>), whitebark pine (<i>Pinus albicaulis</i>), or aspen (<i>Populus tremuloides</i>).</p>
<p><b>Eastern Cascades Slopes and Foothills</b> <i>Within CSO Range Only</i></p>	<p>Open forests of ponderosa pine and some lodgepole pine. Vegetation is adapted to the prevailing dry continental climate and is highly susceptible to wildfire. Higher elevations consist of Douglas-fir and other fir species, such as grand fir (<i>Abies grandis</i>) and white fir. Lowest elevations transition to sagebrush and steppe vegetation.</p>

<sup>1</sup> Data provided directly from Griffith et al. 2016 and Wiken et al. 2011.

Invasive plant species are typically non-native and whose introduction is likely to cause economic or environmental harm or harm to human health (Executive Order 13112). California’s Mediterranean

climate and broad range of habitats make it ideal for the invasion and spread of non-native plants. Invasive plants threaten ecosystem health in California forest and rangeland ecosystems, reducing biological diversity, altering water patterns, impacting rare species, changing wildlife habitat, modifying vegetation structure and species composition, changing fire and nutrient cycles, and degrading soil structure (USFS 2018a). The California Invasive Species Advisory Committee (CISAC 2018) lists approximately 1,000 invasive species for California in varying degrees of establishment. The list includes plants, as well as vertebrate and invertebrate species. From a forest management perspective, invasive plant species are especially problematic.

The distribution of California's invasive flora is described in detail by Randall et al. 1998 (cited in USFS 2004b), who reports that species richness (i.e., number of species) of invasive plants is highest near the California coast and declines toward the interior of the state and that the number of invasive species is greater at lower elevations. California's National Forest System (USFS Region 5) lands remain relatively free of large infestations of invasive plants, making the prevention of existing invasive populations expansion and introduction of new species a priority (USFS 2018a). The USFS (2018a) considers the yellow starthistle (*Centaurea solstitialis*), Scotch broom (*Cytisus scoparius*), French broom (*Genista monspessulana*), giant reed (*Arundo donax*), tamarisk (*Tamarix* spp.), spotted knapweed (*Centaurea maculosa*), and diffuse knapweed (*Centaurea diffusa*) as the primary flora threats to forest ecosystems.

### 3.1.2.1 Rare, Threatened, and Endangered Plant Species

This section describes the rare, threatened, and endangered plant species, including both federal- and state-listed species, whose geographic range includes the Analysis Area. Online databases and documents produced by federal and state agencies such as the Service, CDFW, California Natural Diversity Database (CNDDB), and Calflora were used to analyze existing conditions.

Eleven federally-listed plant species were identified on the county level with ranges that include the Analysis Area (USFWS 2018b). After further review of the species' habitat preferences and the ecological make-up of the Analysis Area, the following species were considered not to be present or potentially occur within the Analysis Area, and therefore they were excluded from further review:

- Butte County Meadowfoam (*Limnanthes floccosa* ssp. *Californica*)
- Gentner's Fritillary (*Fritillaria gentneri*)
- Yreka Phlox (*Phlox hirsuta*)
- Hoover's Spurge (*Chamaesyce hooveri*)

An overview of federally-listed plant species considered to occur within the Analysis Area is provided in Table 3-5.

Nine state-listed plant species were identified on the county level to potentially occur within the Analysis Area (CNDDB 2018). An overview of state-listed plant species known to occur within the Analysis Area is provided in Table 3-6.

**Table 3-5. Federally-listed threatened and endangered plant species whose range includes the Analysis Area. Bold (star) format signifies counties that intersect the Analysis Area.**

Species Name	Federal Listing Status	Distribution <sup>1</sup>	Habitat Preference <sup>2</sup>	Occurrence in Analysis Area <sup>3</sup>
Greene's tuctoria <i>Tuctoria greenei</i>	Endangered	<b>Butte*</b> , Fresno, Glenn, Madera, Merced, <b>Modoc*</b> , <b>Shasta*</b> , San Joaquin, Stanislaus, <b>Tehama*</b> , Tulare	Valley Grassland, Freshwater Wetlands, Wetland-riparian, Vernal Pools	Yes (confirmed by CNDDDB)
Layne's ragwort <i>Packera layneae</i>	Threatened	<b>El Dorado*</b> , <b>Placer*</b> , <b>Tuolumne*</b> , <b>Yuba*</b>	Chaparral, Foothill Woodland	Yes (confirmed by CNDDDB)
Mcdonald's rock-cress <i>Arabis macdonaldiana</i>	Endangered	Del Norte, <b>Humboldt*</b> , <b>Mendocino*</b> , <b>Siskiyou*</b>	Dry Jeffrey Pine, Knobcone Pine, Incense Cedar Woodlands, Brushy Open, Rocky Scree Slopes	Unknown
Pine hill flannelbush <i>Fremontodendron decumbens</i>	Endangered	<b>Butte*</b> , <b>El Dorado*</b> , <b>Nevada*</b> , <b>Yuba*</b>	Chaparral, Foothill Woodland	Potential – Historic record (confirmed by CNDDDB)
Slender orcutt grass <i>Orcuttia tenuis</i>	Threatened <i>Critical habitat present</i>	<b>Butte*</b> , Lake, <b>Lassen*</b> , <b>Modoc*</b> , <b>Plumas*</b> , Sacramento, <b>Shasta*</b> , <b>Siskiyou*</b> , <b>Tehama*</b>	Valley Grassland, Foothill Woodland, Freshwater Wetlands, Wetland-riparian, Vernal Pools	Yes (confirmed by CNDDDB)
Webber's ivesia <i>Ivesia webberi</i>	Threatened	<b>Lassen*</b> , <b>Plumas*</b> , <b>Sierra*</b>	Sagebrush Scrub, Yellow Pine Forest	Unknown

Species Name	Federal Listing Status	Distribution <sup>1</sup>	Habitat Preference <sup>2</sup>	Occurrence in Analysis Area <sup>3</sup>
Whitebark pine <i>Pinus albicaulis</i>	Candidate	Alpine, <b>Amador*</b> , <b>Butte*</b> , <b>Calaveras*</b> , Contra Costa, Del Norte, <b>El Dorado*</b> , Fresno, <b>Humboldt*</b> , Kern, Los Angeles, Madera, Mendocino, Mono, Modoc, <b>Mariposa*</b> , Napa, <b>Nevada*</b> , <b>Placer*</b> , <b>Plumas*</b> , San Bernardino, San Diego, <b>Shasta*</b> , <b>Sierra*</b> , <b>Siskiyou*</b> , <b>Tehama*</b> , <b>Trinity*</b> , Tulare, <b>Tuolumne*</b> , Ventura, <b>Yuba*</b>	Yellow Pine Forest, Red Fir Forest	No; Analysis Area is at higher elevation than plant species is known to occur

<sup>1</sup> Bold (star) format signifies counties that intersect the Analysis Area

<sup>2</sup> Data provided by Calflora (2018)

<sup>3</sup> Determinations based on known occurrences within the Analysis Area and through review of species distribution and habitat characteristics available within the Analysis Area

**Table 3-6. State-listed rare, threatened, and endangered plant species with ranges including the Analysis Area. Bold (star) format signifies counties that intersect the Analysis Area.**

Species Name	State Listing Status	Distribution <sup>1</sup>	Habitat Preference <sup>2</sup>	Occurrence in Analysis Area <sup>3</sup>
Boggs lake hedge-hyssop <i>Gratiola heterosepala</i>	Endangered	Fresno, Lake, <b>Lassen*</b> , Madera, Mendocino, Merced, <b>Modoc*</b> , <b>Placer*</b> , Sacramento, <b>Shasta*</b> , <b>Siskiyou*</b> , Solano, Sonoma, <b>Tehama*</b>	Freshwater Wetlands, Wetland-riparian, Vernal Pools	Yes (confirmed by CNDDDB)
Greene's tuctoria <i>Tuctoria greenei</i>	Rare	<b>Butte*</b> , Fresno, Glenn, Madera, Merced, <b>Modoc*</b> , <b>Shasta*</b> , San Joaquin, Stanislaus, <b>Tehama*</b> , Tulare	Valley Grassland, Freshwater Wetlands, Wetland-riparian, Vernal Pools	Yes (confirmed by CNDDDB)
Indian valley brodiaea <i>Brodiaea rosea</i>	Endangered	Colusa, Lake, <b>Placer*</b> , Sacramento, <b>Shasta*</b> , <b>Tehama*</b> , <b>Trinity*</b>	Chaparral, Valley Grassland, Closed-cone Pine Forest, Wetland-Riparian	Yes (confirmed by CNDDDB)
Layne's ragwort <i>Packera layneae</i>	Rare	<b>El Dorado*</b> , <b>Placer*</b> , <b>Tuolumne*</b> , <b>Yuba*</b>	Chaparral, Foothill Woodland	Yes (confirmed by CNDDDB)
Pine hill flannelbush <i>Fremontodendron decumbens</i>	Rare	<b>Butte*</b> , <b>El Dorado*</b> , <b>Nevada*</b> , <b>Yuba*</b>	Chaparral, Foothill Woodland	Potential – Historic record (confirmed by CNDDDB)
Scadden flat checkerbloom <i>Sidalcea stipularis</i>	Endangered	<b>Nevada*</b>	Freshwater Wetlands, Wetland-riparian	Unknown
Slender orcutt grass <i>Orcuttia tenuis</i>	Endangered	<b>Butte*</b> , Lake, <b>Lassen*</b> , <b>Modoc*</b> , <b>Plumas*</b> , Sacramento, <b>Shasta*</b> , <b>Siskiyou*</b> , <b>Tehama*</b>	Valley Grassland, Foothill Woodland, Freshwater Wetlands, Wetland-riparian, Vernal Pools	Yes (confirmed by CNDDDB)

Species Name	State Listing Status	Distribution <sup>1</sup>	Habitat Preference <sup>2</sup>	Occurrence in Analysis Area <sup>3</sup>
Tracy's eriastrum <i>Eriastrum tracyi</i>	Rare	<b>Nevada*</b>	Freshwater Wetlands, Wetland-riparian	Yes (confirmed by CNDDB)
Trinity buckwheat <i>Eriogonum alpinum</i>	Endangered	<b>Siskiyou*, Trinity*</b>	Subalpine Forest, Alpine Fell-fields, Red Fir Forest	Yes (confirmed by CNDDB)

<sup>1</sup> Bold (star) format signifies counties that intersect the Analysis Area;

<sup>2</sup> Data provided by Calflora (2018)

<sup>3</sup> Determinations based on known occurrences within the Analysis Area and through review of species distribution and habitat characteristics available within the Analysis Area

### 3.1.3 Wildlife and Fishery Resources

This section describes non-listed and non-covered (i.e., species not covered in the SPI HCP) wildlife and fishery resources. Threatened and endangered wildlife species, as well as the Covered Species, are discussed below in Section 3.1.3.1. This section includes general wildlife (e.g., game animals, bird species, amphibians, reptiles), aquatic species (fisheries), prey species<sup>4</sup> for the NSO/CSO (dusky-footed woodrat and the northern flying squirrel), and the barred owl.

The Analysis Area provides habitat for wildlife, both year-long residents and migratory species. Many of these species are economically valuable as game animals, including: American black bear (*Ursus americanus*), black-tailed deer (*Odocoileus hemionus columbianus*), mule deer (*Odocoileus hemionus hemionus*), Roosevelt elk (*Cervus canadensis roosevelti*), sooty grouse (*Dendragapus fuliginosus*), wild turkey (*Meleagris gallopavo*), and mountain quail (*Oreortyx pictus*). Additional species inhabit or migrate through the Analysis Area but are neither protected as listed, nor special status species, are not closely associated with the Analysis Area (e.g., waterfowl), nor harvested as game species.

The Analysis Area provides suitable habitat for a variety of amphibian and reptile species from the Klamath Mountains, Southern Cascades, and Sierra Nevada ecological subregions. Amphibians that may occur in the Analysis Area include the Southern long-toed salamander (*Ambystoma macrodactylum*), Mount Lyell salamander (*Hydromantes platycephalus*), coastal tailed frog (*Ascophus truei*), and the cascades frog (*Rana cascadae*). Reptiles that may occur in the Analysis Area include the southern rubber boa (*Charina umbratical*) and the western pond turtle (*Actinemys marmorata*).

With respect to fishery resources, 9 CDFW fish hatcheries are located within the 19 counties encompassed by the Analysis Area. The Thermalito Afterbay Annex and Feather River hatcheries (Butte County), the Mad River hatchery (Humboldt County), the Crystal Lake and Darrah Springs hatcheries (Shasta County), the Iron Gate and Mount Shasta hatcheries (Shasta County), the Trinity River hatchery (Trinity County), and the Moccasin Creek hatchery (Tuolumne County; CDFW 2018). There are five Salmon Strongholds in California and one that is within the Analysis Area (Sacramento Stronghold). The Sacramento River, Antelope Creek, Butte Creek, Deer Creek, and Mill Creek make up the Sacramento Stronghold and are considered the best remaining habitat in what was once the most productive salmon system in California (Wild Salmon Center [WSC] 2012).

The Service designated Bird Conservation Regions (BCRs) in 2008, of which four intersect with the Analysis Area: BCR 5 (Northern Pacific Rainforest), BCR 9 (Great Basin), BCR 15 (Sierra Nevada), and BCR 32 (Coastal California; USFWS 2008a; Figure A-1 in Appendix C). Within each BCR, Birds of Conservation Concern (BCC) species are identified as those species which have further causes for conservation concern. The BCC species are not afforded any additional Federal protection; however, they are recognized by the Service as species, subspecies, or populations of migratory nongame birds that are likely to become candidates for listing under the ESA without additional conservation measures (see Table A-2 in Appendix C).

The two primary prey species for the NSO and CSO, the dusky-footed woodrat and the northern flying squirrel (see HCP Appendix 3.7), make use of differing habitat types within the Analysis Area. The dusky-footed woodrat is known to utilize regenerating forest stands as its primary habitat and is the primary NSO and CSO prey species at lower elevations (i.e., below 2,500-3,000 feet of elevation for the NSO and below 4,500-5,500 feet of elevation for the CSO). Conversely, the northern flying squirrel uses

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<sup>4</sup> As summarized in HCP Appendix 3.7, by prey biomass, woodrats make up 39% of NSO diet and 57% of CSO diet, and flying squirrels make up 46% of NSO diet and 30% of CSO diet. Thus, these two species combined make up 85% of the NSO diet and 87% of the CSO diet.

mature second growth stands as its primary habitat and is the primary NSO and CSO prey species at higher elevations (i.e., above 2,500-3,000 feet of elevation for the NSO and below 4,500-5,500 feet of elevation for the CSO).

The presence of barred owls in the state of California is a relatively recent occurrence, with the first barred owls first documented in the state in 1976 (as cited in CDFW 2016). Barred owls historically only occurred in the eastern United States and southern Canada (as cited in Kelly and Forsman 2004), but they have expanded their range into western North America via either the boreal forests of Canada or the riparian forests of the Great Plains (CDFW 2016). The species now occupies the entire range of the NSO and a significant portion of the CSO's range (CDFW 2016). There is not a current population estimate for barred owls in California, but a total of 1,970 barred owl observations have been recorded from 1978 to 2014, with the majority of observations occurring in the past 10 years (CDFW 2016).

### **3.1.3.1 Rare, Threatened, Endangered, and Other Covered Wildlife Species**

This section describes federally and state-listed wildlife resources within the Analysis Area, including the NSO and CSO, which SPI has requested incidental take coverage for, and eagles, which are protected by the BGEPA. Resources used for analysis include publicly available data, including information from the Service, CDFW, and USFS.

#### **Bald and Golden Eagles**

The bald eagle and golden eagle remain protected under the MBTA and BGEPA (see Appendix B for regulatory framework). Both eagle species are known to occur throughout the State of California and within the Analysis Area (Table 3-7).

**Table 3-7. Distribution, habitat characteristics, and use of bald and golden eagles within the Analysis Area.**

Species Name	Distribution	Habitat Characteristics and Use	Occurrence in Analysis Area
<p>Bald eagle <i>Haliaeetus leucocephalus</i></p>	<p>Bald eagles are found throughout most of California. Breeding territories are majorly located in northern California (CDFW 2017a).</p>	<p>Found at lakes, reservoirs, rivers, and some rangelands and coastal wetlands during winter periods. Nesting territories known to occur in considerable numbers throughout this region, primarily in mountain and foothill forests and woodlands near a river or permanent waterbody (CDFW 2017b).</p>	<p>Yes; Confirmed accounts of this species within the Analysis Area by CNDDDB</p>
<p>Golden eagle <i>Aquila chrysaetos</i></p>	<p>Most golden eagles in California are considered residents (e.g., they remain in California all year), but some are migrants that travel to California for the winter. Breeding occurs from January to August and takes place on steep cliffs or in large trees (CDFW 2017a).</p>	<p>During migration and overwintering, golden eagles are associated with ridges, cliff lines, and escarpments, where they utilize uplift from deflected winds and forage over open landscapes (USFWS 2016b). Golden eagles may frequent grazed areas as well as open areas with native vegetation (Craig et al. 1986). Golden eagles may gather in communal roosts in areas near plentiful food sources (Kochert et al. 2002).</p> <p>Breeding golden eagles in California prefer open or semi-open areas in a wide variety of habitats (e.g., oak woodland, desert grassland, desert rimrock), but generally avoid urban and heavily-forested areas (Kochert and Steenhof 2002). Nests are built on cliffs or in the largest trees of forested stands that provide unobstructed views of the surrounding habitat (USFWS 2016b).</p>	<p>Golden eagles are unlikely to occur within the Analysis Area</p>

## Covered Species

This section provides a general overview of the Covered Species in SPI's HCP (NSO and CSO), as they occur on SPI's Covered Lands. The SPI HCP (2019) analyzes NSO and CSO populations on or within proximity of SPI Covered Lands (i.e., within 1.3 miles for the NSO and within 1.0 mile for the CSO [home ranges of the NSO and CSO; referred to as the Action Area in the SPI HCP]). In 2017, it was determined that there were 860 spotted owl ACs within this Action Area (SPI HCP Chapter 3). ACs are locations where a resident single owl or pair of owls were regularly detected during surveys and often found during daylight hours. Population estimates as they relate to NSO and CSO are summarized below. See the SPI HCP for a detailed population estimate discussion.

### *Northern Spotted Owl*

The NSO is a federally-threatened species (55 FR 26114-26194) that ranges the Pacific Northwest and is known to occur within the Analysis Area. The Revised Recovery Plan for the Northern Spotted Owl (*Strix occidentalis caurina*) was released in 2011 and can be found at: <http://www.fws.gov/species/nso>. In 2012, a petition to uplist the NSO to a federally-endangered species was filed, and the status is currently under review after a positive 90-day finding in 2015 (80 FR 19259-19263). In 2012, the Service designated 9,577,969.0 acres in 11 units and 60 subunits of California, Oregon, and Washington as critical habitat for the NSO (50 CFR Part 17 2012-28714), in addition to areas of critical habitat that were designated on Federal lands in 1992 and 2008. SPI Covered Lands share property lines with many federal lands that contain critical habitat. The Analysis Area falls within Recovery Unit 11, subunit ICC 7 (Figure 3-4). Full details related to NSO life history, habitat characteristics, and species survey information are available through the Environmental Conservation Online System (ECOS) webpage, The Northern Spotted Owl in California: Current Status and Threats (Hansen 2015), and the Evaluation of the petition from the environmental protection information center to list northern spotted owl (*Strix occidentalis caurina*) as threatened or endangered under the California Endangered Species Act (CDFW 2013).

SPI has been conducting NSO surveys and inventories on their Covered Lands since before the listing of the subspecies under the ESA in 1990. More intensive survey efforts have been conducted in regions of mixed ownership, specifically within the Shasta-Trinity National Forest. Survey efforts include landscape survey strategy (LSS), habitat use assessment, and Gradient Nearest Neighbor (GNN) analysis (SPI HCP Section 3.1.2, Appendix 3.4, and Appendix 3.6).

Surveys conducted in 2016 documented 122 occupied NSO ACs within SPI Covered Lands or within 1.3 miles of the SPI Covered Lands. Eighteen of these ACs were on SPI land, 88 on USFS land, 10 on Bureau of Land Management (BLM) land, and 6 on other private land ownership. Habitat studies showed high use of mature closed-canopy stands by NSO, supporting findings from similar studies (e.g., Solis et al. 1990, Dugger et al. 2005), and expanded on information regarding the use of earlier successional vegetation as foraging habitat during the nesting season, previously reported by Irwin et al. (2013; SPI HCP Section 3.1.2). Habitat suitability analysis looked at the proportion of NSO nesting habitat within 500 acres of known, occupied ACs (146 ACs). On average, 37% of habitat analyzed (within 500 acres of known ACs) was classified as suitable nesting habitat for NSO (SPI HCP Section 3.1.2).

### *California Spotted Owl*

The CSO is a subspecies closely related to the NSO and is currently under review for federal listing (80 FR 56423 56432). The CSO occurs within the Sierra Nevada and the peninsula and Transverse Ranges of southern California (Figure 3-4). The CSO range is immediately adjacent to the NSO range, divided by the Pit River (Gutiérrez et al. 2017). Full details related to CSO life history, habitat characteristics, and species survey information are available through The California Spotted Owl: Current State of Knowledge (Gutiérrez et al. 2017) and the California Spotted Owl (*Strix occidentalis occidentalis*) Conservation Objectives Report (USFWS 2017).

From 2012 to 2016, SPI conducted a long-term study of CSO within five watershed areas that intersect the Sierra Nevada (SPI HCP Section 3.2.2). Habitat preference and use for CSO is similar to that identified for NSO. SPI conducted a habitat suitability analysis using the GNN maps to estimate the proportion of CSO nesting habitat within 500 acres of 67 known, occupied ACs located within either SPI Covered Lands or 1-mile of SPI Covered Lands (SPI HCP Section 3.2.2). On average, 38% of habitat analyzed (within 500 acres of known ACs) was classified as suitable nesting habitat for the CSO (SPI HCP Section 3.2.2).

Overall, SPI has documented 189 CSO ACs within the Covered Lands, and an additional 549 CSO ACs within 1-mile of the Covered Lands (481 on USFS land, 5 on BLM land, 54 on other private lands, and 9 on other public lands), for a total of 738 CSO ACs. See Section 3.2.2 of the HCP for more details.

### **Federally- and State-Listed Species**

There are 16 federally-listed wildlife species whose range intersects with the Analysis Area (Table 3-8, see Figures A-2, A-3, A-4, A-5, and A-6 in Appendix C). For additional details regarding species life history, see footnotes within Table 3-8. Full scientific species accounts are available at: [https://www.fws.gov/sacramento/es\\_species/Accounts/](https://www.fws.gov/sacramento/es_species/Accounts/). There are 20 state-listed wildlife species, identified through CNBBD, that are known to occur within the Analysis Area (Table 3-9). For additional details regarding species life history, see footnotes within Table 3-9.

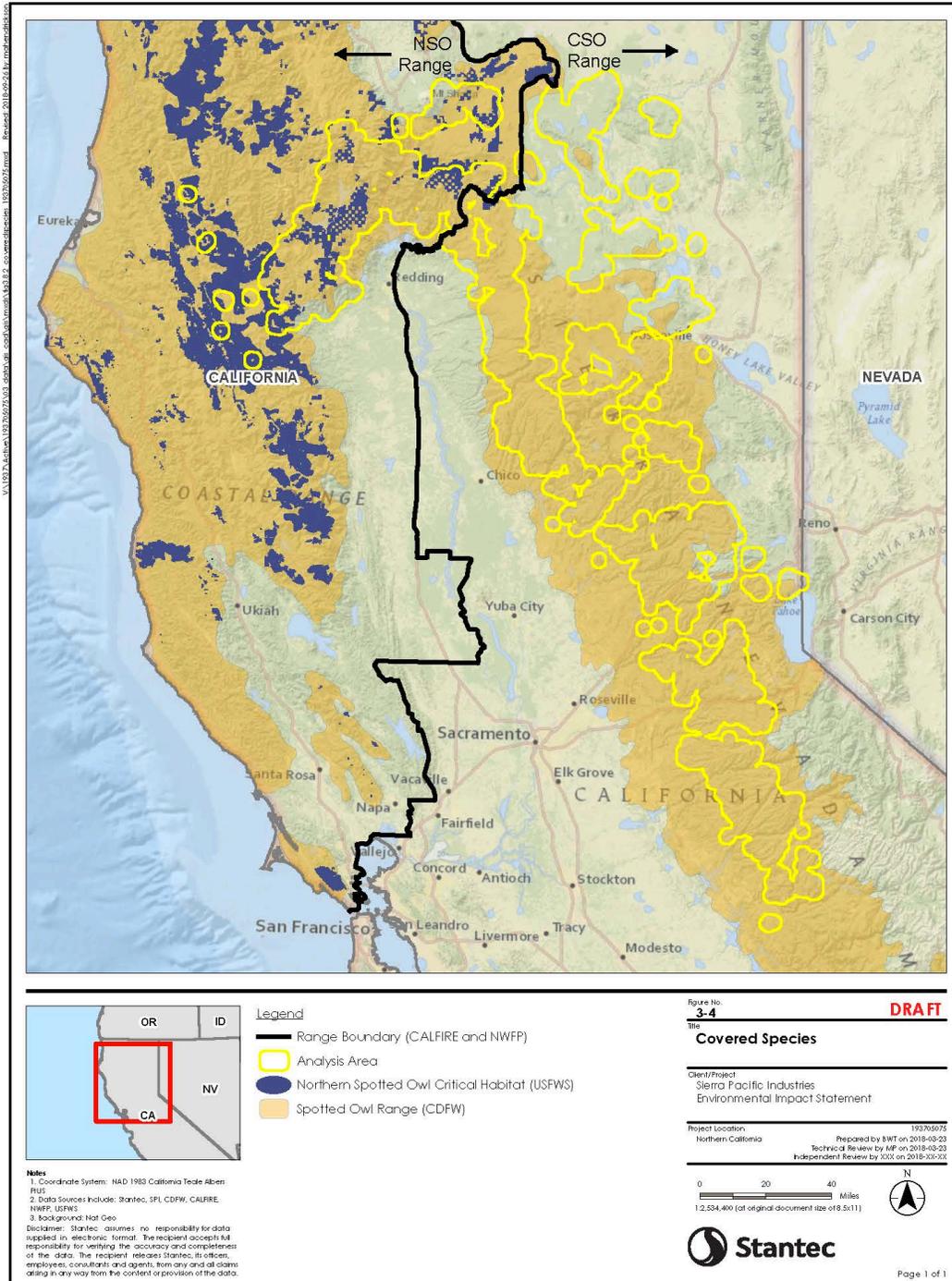


Figure 3-4. Covered Species.

**Table 3-8. Federally-listed threatened and endangered wildlife species with ranges including the Analysis Area.**

Group	Species Name <sup>1</sup>	Federal Listing Status	Distribution	Habitat Characteristics	Occurrence in Analysis Area <sup>2</sup>
Amphibian	California red-legged frog <sup>a</sup> <i>Rana draytonii</i>	Threatened <i>Critical habitat present</i>	California and Baja California, Mexico.  Elevations from sea level to approximately 5,000 feet	Slow-moving streams, perennial or ephemeral ponds, and upland sheltering habitat such as rocks, small mammal burrows, logs, densely vegetated areas, man-made structures	Yes (confirmed by CNDDDB)
	Sierra Nevada yellow-legged frog <sup>a</sup> <i>Rana sierrae</i>	Endangered <i>Critical habitat present</i>	Western Sierra Nevada north of the Monarch Divide and the eastern slope of the Sierra Nevada from Inyo County, through Mono County to areas north of Lake Tahoe	At lower elevations: rocky streambeds and wet meadows surrounded by coniferous forest.  At higher elevations: lakes, ponds, streams and small steep-banked mountain lakes or pools	Yes (confirmed by CNDDDB)
	Yosemite toad <sup>a</sup> <i>Anaxyrus canorus</i>	Threatened	Sierra Nevada Mountains (150-mile span) from Ebbetts Pass in Alpine County in the north to Fresno and northern Inyo counties in the south.  Elevations of 4,800 to 12,000 feet	Streams, lakes, wet meadows and forests	Unknown
Bird	California spotted owl <sup>a</sup> <i>Strix occidentalis</i>	Under review	<i>This species is described in Section 3.1.3.1.</i>	<i>This species is described in Section 3.1.3.1.</i>	Yes (confirmed by CNDDDB)
	Northern spotted owl <sup>b</sup> <i>Strix occidentalis caurina</i>	Threatened <i>Critical habitat present</i>	<i>This species is described in Section 3.1.3.1.</i>	<i>This species is described in Section 3.1.3.1.</i>	Yes (confirmed by CNDDDB)

Group	Species Name <sup>1</sup>	Federal Listing Status	Distribution	Habitat Characteristics	Occurrence in Analysis Area <sup>2</sup>
<b>Bird</b>	Yellow-billed cuckoo <sup>a</sup> <i>Coccyzus americanus</i>	Threatened	Historically, most North America from southern Canada to the Greater Antilles and northern Mexico. Recent years show contraction of distribution in the west with northern limit of breeding being the Sacramento Valley	Riparian habitats with abundant cottonwood and willow trees. Requires large blocks of habitat for nesting.	Unlikely
<b>Crustacean</b>	Shasta crayfish <sup>a</sup> <i>Pacifastacus fortis</i>	Endangered	Shasta County, California	Cool, clear, spring-fed lakes, rivers and streams, usually at or near a spring inflow source.  Prefers still and slow to moderate flowing waters. Key requirement is presence of adequate amount of volcanic rock rubble.	Yes (confirmed by CNDDDB)
<b>Fish</b>	Bull trout <sup>c</sup> <i>Salvelinus confluentus</i>	Threatened	Jarbridge River in Idaho and Nevada, downstream Bruneau River in Idaho if seasonally suitable	Cold streams with adequate cover	No, believed extinct in this region (confirmed by CNDDDB)
	Chinook salmon – central valley spring-run ESU <sup>e</sup> <i>Oncorhynchus tshawytscha</i>	Threatened	Sacramento-San Joaquin River system draining to the Pacific Ocean	Mid-to high-elevation streams, Pacific Ocean	Yes (confirmed by CNDDDB)
	Lahontan cutthroat trout <sup>c</sup> <i>Oncorhynchus clarkii henshawi</i>	Threatened	Lahontan basin of northern Nevada, eastern California, and southern Oregon	Cold water alpine lakes, terminal alkaline lakes, slow meandering rivers, mountain rivers, and small headwater tributary streams	Yes (confirmed by CNDDDB)

Group	Species Name <sup>1</sup>	Federal Listing Status	Distribution	Habitat Characteristics	Occurrence in Analysis Area <sup>2</sup>
<b>Fish</b>	Steelhead – central valley DPS <sup>f</sup> <i>Oncorhynchus mykiss</i>	Threatened	Pacific coast streams, from Kuskokwim River in Alaska to Baja California  Western slopes of the Sierra Nevada in waters draining to the Pacific Ocean	Streams at elevations less than 8,000 feet	Yes (confirmed by CNDDDB)
<b>Mammal</b>	Fisher – west coast DPS <sup>a</sup> <i>Pekania pennanti</i>	Proposed Threatened	Northern United States, Canada  Southern Sierra, Klamath-Siskiyou Mountains	Large, mixed forested landscaped with complex physical structure near the ground	Yes (confirmed by CNDDDB)
	Humboldt marten <sup>b</sup> <i>Martes americana humboldtensis</i>	Proposed Threatened	Coastal northwestern California	Closed canopy, late successional, mesic coniferous forest with complex physical structure near the ground	Yes (confirmed by CNDDDB)
	Gray wolf <sup>c</sup> <i>Canis lupus</i>	Endangered	Lassen County, Plumas County	Territories that range from 50 square to more than 1,000 square miles	Yes “range expanding, previous Shasta Pack and 2018’ Lassen pack near SPI lands”

Group	Species Name <sup>1</sup>	Federal Listing Status	Distribution	Habitat Characteristics	Occurrence in Analysis Area <sup>2</sup>
Mammal	Wolverine <sup>c</sup> <i>Gulo gulo</i>	Proposed Threatened	Sierra Nevada Mountains of California. North Cascades in Washington, Northern Rocky Mountains in Idaho, Montana, Oregon and Wyoming. Southern Rocky Mountains of Colorado.	High elevations in mountainous west	Yes (confirmed by CNDDB)
	Sierra Nevada red fox <sup>d</sup> <i>Vulpes vulpes necator</i>	Candidate	High mountains of the Sierra Nevada and southern Cascade mountains (eastern California)	Open conifer woodlands and mountain meadows at high elevations	Yes (confirmed by CNDDB)

<sup>1</sup> Additional information provided through the following references:

<sup>a</sup> Sacramento Fish & Wildlife office scientific species accounts available at: [https://www.fws.gov/sacramento/es\\_species/Accounts/](https://www.fws.gov/sacramento/es_species/Accounts/)

<sup>b</sup> Arcata Fish & Wildlife office scientific species accounts available at: <https://www.fws.gov/arcata/es/listedspecies.html>

<sup>c</sup> Nevada Fish & Wildlife scientific species accounts: [https://www.fws.gov/nevada/protected\\_species/index.html](https://www.fws.gov/nevada/protected_species/index.html)

<sup>d</sup> USFS Sierra Nevada Red Fox fact sheet: [https://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/stelprdb5282562.pdf](https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5282562.pdf)

<sup>e</sup> CalFish.org Chinook salmon information at: <http://www.calfish.org/FisheriesManagement/SpeciesPages/ChinookSalmon.aspx>

<sup>f</sup> CalFish.org Steelhead information at: <http://www.calfish.org/FisheriesManagement/SpeciesPages/SteelheadTrout.aspx>

<sup>2</sup> Determinations based on known occurrences within the Analysis Area and through review of species distribution and habitat characteristics available within the Analysis Area.

**Table 3-9. State-listed threatened and endangered wildlife species with ranges including the Analysis Area.**

Group	Species Name <sup>1</sup>	State Listing Status	Distribution <sup>2</sup>	Habitat Characteristics	Occurrence in Analysis Area <sup>3</sup>
Amphibian	Foothill yellow-legged frog <sup>b</sup> <i>Rana boylei</i>	State Candidate for Listing	Northern Sierra Nevada, Central Valley	Rocky streams and rivers with rocky substrate and open, sunny banks, in forests, chaparral, and woodlands, isolated pools, vegetated backwaters, deep, shaded, spring-fed pools	Yes (confirmed by CNDDB)
	Shasta salamander <sup>a</sup> <i>Hydromantes shastae</i>	Threatened	Cismontane Woodland and Lower Montane Conifer Forest in Shasta and Siskiyou counties	Moist limestone fissures and caves, volcanic and other rock outcroppings, under woody debris and duff in mixed pine-hardwood stands	Yes (confirmed by CNDDB)
	Sierra Nevada yellow-legged frog <i>Rana sierrae</i>	Threatened	Western Sierra Nevada north of the Monarch Divide and the eastern slope of the Sierra Nevada from Inyo County, through Mono County to areas north of Lake Tahoe	At lower elevations: rocky streambeds and wet meadows surrounded by coniferous forest.  At higher elevations: lakes, ponds, streams and small steep-banked mountain lakes or pools	Yes (confirmed by CNDDB)

Group	Species Name <sup>1</sup>	State Listing Status	Distribution <sup>2</sup>	Habitat Characteristics	Occurrence in Analysis Area <sup>3</sup>
<b>Bird</b>	Bald eagle <sup>a</sup> <i>Haliaeetus leucocephalus</i>	Endangered	Bald eagles are found throughout most of California. Breeding territories are majorly located in northern California (CDFW 2017a).	Found at lakes, reservoirs, rivers, and some rangelands and coastal wetlands during winter periods. Nesting territories known to occur in considerable numbers throughout this region, primarily in mountain and foothill forests and woodlands near a river or permanent waterbody (CDFW 2017b).	Yes; Confirmed accounts of this species within the Analysis Area by CNDDDB
	Bank swallow <sup>a</sup> <i>Riparia riparia</i>	Threatened	Central Valley streams, including the Sacramento River (upper reaches between Red Bluff and Butte City)	Sandy, vertical bluffs or riverbanks near vertical earthen banks along streams, coastal bluffs, and sand and gravel pits	Yes (confirmed by CNDDDB)
	California black rail <sup>a</sup> <i>Laterallus jamaicensis coturniculus</i>	Threatened	Sacramento-San Joaquin River delta, Yuba Butte, and Nevada counties	Saltwater, brackish, and freshwater marshes	Unknown
	Great gray owl <sup>a</sup> <i>Strix nebulosa</i>	Endangered	Holarctic  Observed within the Sierras	Meadows within forest habitats	Yes (confirmed by CNDDDB)
	Greater sandhill crane <sup>a</sup> <i>Grus Canadensis tabida</i>	Threatened	Lassen, Modoc, Plumas, Shasta, Sierra, and Siskiyou counties	Wet meadows, marshes, shallow ponds, hayfields, grain fields	Yes (confirmed by CNDDDB)

Group	Species Name <sup>1</sup>	State Listing Status	Distribution <sup>2</sup>	Habitat Characteristics	Occurrence in Analysis Area <sup>3</sup>
<b>Bird</b>	Swainson’s hawk <sup>a</sup> <i>Buteo swainsoni</i>	Threatened	Central Valley and Great Basin regions	Large, open grasslands with abundant prey in association with suitable nest trees	Yes (confirmed by CNDDDB)
	Tricolored blackbird <i>Agelaius tricolor</i>	Threatened (official Notice of Findings pending)	Central Valley and foothills, Klamath Basin in Siskiyou and Modoc counties and the Honey Lake Basin in Lassen County, central and southern California coastal counties.	Cattail or tule marshes, cultivated lands, large freshwater marshes.	Yes (confirmed by CNDDDB)
	Western yellow-billed cuckoo <i>Coccyzus americanus occidentalis</i>	Endangered	Historically, most North America from southern Canada to the Greater Antilles and northern Mexico. Recent years show contraction of distribution in the west with northern limit of breeding being the Sacramento Valley	Riparian habitats with abundant cottonwood and willow trees. Requires large blocks of habitat for nesting.	Unlikely
	Willow flycatcher <sup>a</sup> <i>Empidonax traillii</i>	Endangered	Isolated meadows of the Sierra Nevada, and along the Kern, Santa Margarita, San Luis Rey, and Santa Ynez Rivers	Extensive willow thickets	Yes (confirmed by CNDDDB)

Group	Species Name <sup>1</sup>	State Listing Status	Distribution <sup>2</sup>	Habitat Characteristics	Occurrence in Analysis Area <sup>3</sup>
<b>Crustacean</b>	Shasta crayfish <i>Pacifastacus fortis</i>	Endangered	Shasta County, California	Cool, clear, spring-fed lakes, rivers and streams, usually at or near a spring inflow source.  Prefers still and slow to moderate flowing waters. Key requirement is presence of adequate amount of volcanic rock rubble.	Yes (confirmed by CNDDB)
<b>Mammal</b>	Fisher (Southern Sierra Nevada ESU population) <i>Pekania pennanti</i>	Threatened	Northern United States, Canada  Southern Sierra, Klamath-Siskiyou Mountains	Large, mixed forested landscaped with complex physical structure near the ground	Yes (confirmed by CNDDB)
	Humboldt marten <sup>c</sup> <i>Martes caurina humboldtensis</i>	Candidate Endangered	Coastal northwestern California	Closed canopy, late successional, mesic coniferous forest with complex physical structure near the ground	Yes (confirmed by CNDDB)
	Sierra Nevada red fox <i>Vulpes vulpes necator</i>	Threatened	High mountains of the Sierra Nevada and southern Cascade mountains (eastern California)	Open conifer woodlands and mountain meadows at high elevations	Yes (confirmed by CNDDB)
<b>Fish</b>	Bull trout <i>Salvelinus confluentus</i>	Endangered	Jarbidge River in Idaho and Nevada, downstream Bruneau River in Idaho if seasonally suitable	Cold streams with adequate cover	No, believed extinct in this region (confirmed by CNDDB)

Group	Species Name <sup>1</sup>	State Listing Status	Distribution <sup>2</sup>	Habitat Characteristics	Occurrence in Analysis Area <sup>3</sup>
Fish	Chinook salmon (spring-run of the Sacramento River drainage) <i>Oncorhynchus tshawytscha</i>	Threatened	Sacramento-San Joaquin River system draining to the Pacific Ocean	Mid-to high-elevation streams, Pacific Ocean	Yes (confirmed by CNDDDB)
	Modoc sucker <sup>a</sup> <i>Catostomus microps</i>	Endangered	Drainages (2) of the upper Pit River drainage in Modoc and Lassen counties	Small streams characterized by large shallow pools with cover, soft sediments, and clear water	Yes (confirmed by CNDDDB)
	Rough sculpin <sup>a</sup> <i>Cottus asperrimus</i>	Threatened	Pit River in Shasta County, in the Burney area, including Hat Creek and Fall River and its tributaries	Vegetated runs and riffles of creeks and small to medium rivers, usually over mud in clear, deep water (3-6 feet)	Yes (confirmed by CNDDDB)

<sup>1</sup> Additional information provided through the following references:

<sup>a</sup> California Department of Fish and Wildlife scientific species accounts available at: [http://www.dfg.ca.gov/wildlife/nongame/t\\_e\\_spp/](http://www.dfg.ca.gov/wildlife/nongame/t_e_spp/).

<sup>b</sup> A Guide to the Amphibians and Reptiles of California available at: <http://www.californiaherps.com/index.html>

<sup>c</sup> Arcata Fish & Wildlife office scientific species accounts available at: <https://www.fws.gov/arcata/es/listedspecies.html>

<sup>2</sup> Distributions described within the State of California

<sup>3</sup> Determinations based on known occurrences within the Analysis Area and through review of species distribution and habitat characteristics available within the Analysis Area.

## 3.2 ENVIRONMENTAL CONSEQUENCES

### 3.2.1 Direct and Indirect Effects

#### 3.2.1.1 Land Use and Ownership

Timber harvest and management activities (see Section 1.2.3) are expected to continue to occur under any of the three alternatives under consideration. Under all alternatives, timber harvest and management activities are expected to occur throughout the Analysis Area and would continue at approximately the same rate for the next 50 years. Depending on the alternative, these effects could occur in different areas of the SPI Covered Lands, though all activities would follow applicable rules and regulations (i.e., ESA, CESA, CEQA, CFPR). Land use and ownership would not change, therefore, no direct or indirect effects to land use or ownership are expected for any of the considered alternatives. All timber harvest and management activities would be consistent with land use plans and policies, and ownership type distribution (i.e., federal, private, special designation lands) would be expected to remain approximately the same (see Section 3.1.1) under any of the considered alternatives.

Of the 1,566,153 acres of the SPI Covered Lands, approximately 30-35% are not available for clear-cutting due to watercourse protections and maintaining various non-timber values (SPI HCP Section 4.1), leaving approximately 1,017,999 to 1,096,307 acres available for even-aged management. The modeled decadal even-aged harvest is projected to start at 15.3% of the SPI Covered Lands and decline to 3.0% of the SPI Covered Lands over the next 50 years (15.3, 13.3, 10.7, 7.0, and 3.0% by decade, respectively; Table 3-10). The modeled decadal uneven-aged harvest (i.e., commercial thinning and selection harvest) will account for the remainder of SPI's total harvest and is projected to start at 10.0% of the SPI Covered Lands and increase to 22.1% of the SPI Covered Lands over the next 50 years (10.0, 6.8, 12.0, 14.7, and 22.1% by decade, respectively; Table 12). The modeled decadal harvest by harvest type is summarized in Table 3-10 and is also provided on an estimated annual basis (assuming that harvest is distributed evenly across the decade).

The SPI Covered Lands are distributed across 17 counties (see SPI HCP Table 1.2). The following estimates are based upon the forested land cover of these counties from the NLCD. Over the next 50 years, the average modeled decadal even-aged harvest is projected to begin at 1.6% of the total forested land cover of those counties and decline to 0.3% (1.6, 1.4, 1.1, 0.7, and 0.3% by decade, respectively). The projected decadal uneven-aged harvest types (i.e., commercial thinning and selection harvest) will account for the remainder of SPI's total harvest, starting at 1.1% in the first decade and resulting in a decadal harvest rate of approximately 2.4% of the 17-county forest land base by the fifth decade (1.1, 0.7, 1.3, 1.6, and 2.4% by decade, respectively).

Generally, the even-aged harvest will be distributed across the SPI Covered Lands in units of less than 20 acres (average clear-cut size). The increase in percentage harvested via uneven-aged methods over the next 50 years is largely due to increasing commercial thinning of predominately even-aged units over time. It should be noted that the actual percentages of harvest type and harvest location may vary from these projections based upon many factors, including but not limited to wildfire, markets, response by spotted owls, and model variance.

**Table 3-10. Projected even-aged and uneven-aged harvest on the SPI Covered Lands per decade over the next 50 years. Values in acres (percent of covered lands in parentheses).**

<b>Decade</b>	<b>Even-aged Decadal</b>	<b>Even-aged Annual</b>	<b>Uneven-aged Decadal</b>	<b>Uneven-aged Annual</b>
<b>Decade 1 (2019-2028)</b>	239,621 (15.3%)	23,962 (1.53%)	156,615 (10.0%)	15,661 (1.0%)
<b>Decade 2 (2029-2038)</b>	208,298 (13.3%)	20,830 (1.33%)	106,498 (6.8%)	10,650 (0.68%)
<b>Decade 3 (2039-2048)</b>	167,578 (10.7%)	16,758 (1.07%)	187,938 (12.0%)	18,794 (1.2%)
<b>Decade 4 (2049-2058)</b>	109,631 (7.0%)	10,963 (0.7%)	230,224 (14.7%)	23,022 (1.47%)
<b>Decade 5 (2059-2068)</b>	46,985 (3.0%)	4,698 (0.3%)	346,120 (22.1%)	34,612 (2.21%)

The location and timing of timber harvest on the SPI Covered Lands may differ, depending on the alternative, due to the establishment of no-harvest areas; however, timber harvest is projected to remain comparable to the rates stated above under the No Action Alternative and the HCP Alternative (Proposed Action). Under the NWFP/SNFPA Alternative, timber harvest rates may differ from those described above due to the establishment of larger no-harvest areas, with the possibility of reduced timber harvest rates or more intense timber harvest on the harvestable areas of the SPI Covered Lands.

All timber harvest and management activities would be consistent with land use plans and policies, and ownership type distribution (i.e., federal, private, special designation lands) would be expected to remain approximately the same (see Section 3.1.1) under any of the considered alternatives.

### **3.2.1.2 Vegetation Communities**

Timber harvest and management activities (see Section 1.2.3) are expected to continue to occur under any of the three alternatives under consideration. Under all alternatives, timber harvest and management activities are expected to occur throughout the Analysis Area, would continue at approximately the same rate for the next 50 years (see Section 3.2.1.1 for information on projected timber harvest rates), and would continue to effect vegetation. Depending on the alternative, these effects could occur in different areas of the SPI Covered Lands, though all activities would follow applicable rules and regulations (i.e., ESA, CESA, CEQA, CFPR). Direct effects to vegetation for each alternative would primarily result from disturbance in areas of even-aged and uneven-aged timber harvest. Indirect effects to vegetation for each alternative may include changes in forest structure and native plant diversity.

The primary timber harvest activities under any alternative would be performed under individual THPs. THPs evaluate potential impacts (including cumulative impacts) to a variety of resources, including vegetation, and apply avoidance and mitigation to minimize impacts to a CEQA determination of less-than-significant impact.

The Registered Professional Forester (RPF) preparing the THP is required to consider how the proposed operation is likely to affect plant species including site-specific field surveys, mitigation measure identification, review by CAL FIRE and other agencies (including the CDFW) and revise the THP as necessary based on agency comments. Sensitive areas such as Watercourse and Lake Protection Zones (WLPZs) are not allowed to be clear-cut harvested under the CFPR, and mandatory buffer zones are required<sup>5</sup>. Additionally, sites supporting sensitive plant locations (such as protected plant species) must be avoided or the impacts must be mitigated, in accordance with the CFPR and CEQA.

Direct effects to vegetation under all alternatives would primarily result from disturbance in areas of even-aged and uneven-aged timber harvest. Disturbances in forested landscapes, which are vital to ecosystem function, alter forest succession patterns and create habitat mosaics of various vegetation communities (California Forest Stewardship Program [CFSP] 2011). Ecological succession, caused by disturbances such as timber harvest, is characterized by rapid changes in community composition, with fast-growing species dominating the area initially. The community eventually experiences slower rates of change and reaches a stable climax community in late succession (CDFW 2015). Recently harvested lands are dominated by saplings, shrubs, and herbaceous understory vegetation, while established forested areas are dominated by large trees and other habitat features, such as standing and fallen dead trees (CDFW 2015).

Much of a forest's biodiversity and its associated ecosystem services come from the understory plant community (Whigham 2004). More intensive disturbance associated with timber harvest has been shown to increase understory species richness, while less intensive methods tended to preserve species typical of late-seral forests (i.e., forest development stage of ecological maturity; Battles et al. 2001). Timber harvest activities affect understory plant communities, though the extent of those effects is not well understood (Duguid and Ashton 2013). Mixed results on the effect of timber harvest on understory plant diversity have been reported, with both increases and decreases in plant species richness being observed for a variety of forest management strategies (Duguid and Ashton 2013).

Indirect effects to vegetation under all alternatives due to timber harvest activities on the SPI Covered Lands may include changes in forest structure, age class, and native plant diversity; this may vary in location, timing, and magnitude among the alternatives. Second-growth forests resulting from even-aged forest management have less structural diversity and varied habitat features. Forests managed specifically for timber harvest have shortened grass- and shrub-dominated stages, as single species stands are common in even-aged forest management. Overly dense forest land can also result if timber harvest does not occur and fire is suppressed, which can result in loss of open-forest habitat and herbaceous vegetation on the forest floor (CDFW 2015). Forest regeneration protocols generally do not include the goal of establishing diverse native plant communities; rather, timber production enhancement is the main objective (CDFW 2015). Timber harvest activities may fragment forest lands and introduce or spread invasive plant species (CDFW 2015).

Beneficial indirect effects can also result from timber harvest, such as the creation of canopy gaps and edge-habitats. Canopy gaps enable understory vegetation to grow, and edge-habitats provide habitat for herbaceous vegetation and some wildlife species (CDFW 2015). Under all alternatives, vegetation communities would be affected by timber harvest activities throughout SPI Covered Lands. Disturbance that results from timber harvest may have either beneficial or adverse effects (both direct and indirect) on vegetation, depending on the community present. Forest and shrubland would remain the dominant land classes throughout the Analysis Area.

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<sup>5</sup> More information on WLPZs available in Article 6 of the CFPR (Appendix D) and at [https://www.waterboards.ca.gov/water\\_issues/programs/nps/encyclopedia/2b\\_sma.html](https://www.waterboards.ca.gov/water_issues/programs/nps/encyclopedia/2b_sma.html).

### **No Action Alternative**

Under the No Action Alternative, SPI would continue to manage the Covered Lands in the same manner as currently managed, with vegetation communities subject to periodic disturbance because of SPI's timber harvest and forest management activities, in accordance with the SPI Fisher CCAA until 2026 and all other applicable regulations. Under the Fisher CCAA, until 2026, SPI is required to maintain roughly 700,000 acres of forested land that has not been subject to clear-cutting and artificial regeneration. After 2026, some or all of these 700,000 acres may become subject to harvest. However, approximately 30-35% of SPI lands are not subject to even-aged management (due to WLPZs, non-timber values constraining intense even-aged management, etc.; SPI HCP Section 4.1). As stated above in Section 3.2.1.1, projected timber harvest rates over the next 50 years are expected to begin with the even-aged harvest of approximately 15.3% and the uneven-aged harvest of approximately 10.0% of the SPI Covered Lands in the first decade (2019-2028). The modeled decadal uneven-aged harvest is projected to increase to 22.1% of the SPI Covered Lands by the fifth decade (2059-2068), with even-aged harvest projected to decrease to 3.0% of the SPI Covered Lands by the fifth decade (see Table 12).

Limited direct effects of disturbance to vegetation would occur within 1,000 feet of NSO ACs or within the 18-acre buffer of CSO ACs. Indirect effects may include changes in forest structural and native plant diversity. Beneficial indirect effects for certain species that thrive in disturbed environments (e.g., edge-adapted species) would be expected due to increased disturbance, while negative indirect effects would be expected for species not adapted to disturbance (e.g., interior forest species), which may no longer be able to persist in areas that are disturbed. In addition, 500 acres of owl habitat would need to be provided within a 0.7-mile radius of NSO ACs, and 1,336 acres within 1.3 miles, as described in Article 9 of the CFPR (Appendix D) for incidental take avoidance of the NSO. SPI would not be required to conduct or maintain landscape analyses pertinent to spotted owl habitat management, and information pertaining to habitat management on SPI Covered Lands would not be provided to the Service.

### **HCP Alternative – Proposed Action**

Under the HCP Alternative (Proposed Action), timber harvest and management activities and their direct and indirect effects on vegetation communities would be similar to both the No Action Alternative and the NWFP/SNFPA Alternative, with possible differences in the location and/or timing of timber harvest activities. Indirect effects may include changes in forest structure, age class and native plant diversity. Beneficial indirect effects for certain species that thrive in disturbed environments (e.g., edge-adapted species) would be expected due to increased disturbance, while negative indirect effects would be expected for species not adapted to disturbance (e.g., interior forest species), which may no longer be able to persist in areas that are disturbed. Timber harvest activities would continue to be conducted in accordance with the SPI Fisher CCAA until 2026 and all other applicable regulations, with the addition of the conservation measures outlined in the SPI HCP (see Section 2.2.2.1).

Non-harvested areas currently protected to avoid incidental take of the NSO could be harvested outside the breeding season and excluding areas surrounding Tier 1 ACs with the issuance of an ITP for the species, and some areas near CSO ACs that currently have minimal protection (i.e., areas beyond the 18 acres that would be protected under the No Action Alternative) would be avoided under the conservation measures proposed in the HCP. Of the 1,566,153 acres of SPI Covered Lands, approximately 30-35% are not available for clear-cutting due to watercourse protections and maintaining various non-timber values (SPI HCP Section 4.1), leaving approximately 1,017,999 to 1,096,307 acres available for even-aged. As stated in Section 3.2.1.1, projected timber harvest rates over the next 50 years are expected to begin with the even-aged harvest of approximately 15.3% and the uneven-aged harvest of approximately 10.0% of the SPI Covered Lands in the first decade (2019-2028). The modeled decadal uneven-aged harvest is

projected to increase to 22.1% of the SPI Covered Lands by the fifth decade (2059-2068), with even-aged harvest projected to decrease to 3.0% of the SPI Covered Lands by the fifth decade (see Table 12).

Modeled data from the SPI HCP predicts an increase in the percentage of large tree, closed canopy forests (HF4) and medium tree, high canopy forests (HF2H) over the 50-year permit term. For example, HF4 increases from 23% to 43% over the permit term, while HF2H increases from 27% to 35% of the landscape over the permit term. The distribution of habitat forms on SPI Covered Lands and their predicted change during the permit term are displayed in Figures 4.3.8 – 4.3.12 in Appendix 4.3 of the SPI HCP.

Under the HCP Alternative (Proposed Action), SPI would commit to the following:

- Conduct and maintain analyses of spotted owl habitat and occupancy on SPI Covered Lands and share this information with the Service (see HCP Sections 6.1-6.11).
- Submit annual monitoring reports to the Service and CDFW at specified intervals or meetings throughout the permit term (see HCP Section 6.10).
- Provide information on habitat forms and their distribution on SPI Covered Lands.

In summary, there would be marginal beneficial effects (both direct and indirect, as described above) under the HCP Alternative (Proposed Action) compared to the No Action Alternative because of the implementation of the conservation measures included in the SPI HCP, such as habitat element retention and Tier 1 NSO AC protections. Beneficial effects under the HCP Alternative (Proposed Action) may be similar or marginally less when compared to the NWFP/SNFPA Alternative due to no harvest areas and yet to-be-determined conservation measures under the NWFP/SNFPA Alternative.

#### **NWFP/SNFPA Alternative**

Under the NWFP/SNFPA Alternative, timber harvest and management activities and their direct and indirect effects on vegetation communities would be similar to both the No Action Alternative and the HCP Alternative (Proposed Action), with differences in the location and/or timing of timber harvest activities. Under the NWFP/SNFPA Alternative, vegetation communities within the LSRs and the protected ACs established within the NSO range on SPI Covered Lands would not be directly or indirectly affected by timber harvest and management activities. As such, there will be no direct disturbances in no-harvest areas, and no indirect effects to vegetation communities in those areas. Climax communities would likely develop and persist in these reserves, unless a disturbance (e.g., wildfire) would occur. In the range of the CSO, the 300-acre PACs, and additional habitat (best available) within the HRCA, would be protected from timber harvest. As such, there will be no direct disturbances in no-harvest areas, and no indirect effects to vegetation communities in those areas. Timber harvest activities may increase on SPI Covered Lands not under these protections in order to meet timber production demand. Thus, timber harvest under this alternative may be more intense in certain non-protected areas when compared to the No Action or HCP (Proposed Action) alternatives (see Section 3.2.1.1 for information on projected timber harvest rates), resulting in possible increased direct and indirect effects to vegetation communities in those areas while avoiding all effects to vegetation in areas that would be protected under this alternative due to the creation of PACs and LSRs. Indirect effects may include changes in forest structure and native plant diversity. Beneficial indirect effects for certain species that thrive in disturbed environments (e.g., edge-adapted species) would be expected, while negative effects would be expected for species not adapted to disturbance (e.g., forest interior species).

In summary, there may be potential marginal beneficial effects (both direct and indirect, as described above) compared to the No Action Alternative and HCP Alternative (Proposed Action) due no harvest areas and yet to-be-determined conservation measures; however, there may be a possible increase in adverse effects in certain areas if harvest activities increase in the harvestable areas of the Covered Lands, when compared to the No Action Alternative.

### 3.2.1.3 Wildlife and Fishery Resources

Timber harvest and management activities (see Section 1.2.3) are expected to continue to occur under any of the three alternatives under consideration. Under all alternatives, timber harvest and management activities are expected to occur throughout the Analysis Area and would continue at approximately the same rate for the next 50 years (see Section 3.2.1.1 for information on projected timber harvest rates), resulting in direct and indirect effects to wildlife and fishery resources. Depending on the alternative, these effects could occur in different areas of the SPI Covered Lands, though all activities would follow applicable rules and regulations (i.e., ESA, CESA, CEQA, CFPR). Direct and indirect effects to general wildlife and fisheries are anticipated to be similar under all three alternatives, though the location of and level of impact of the effects may vary. Direct effects to wildlife and fisheries may include mortality and habitat removal or damage from timber harvest or related activities; indirect effects may include habitat fragmentation, edge effects, decreased survivorship, displacement and/or decreased breeding success. While timber harvest activities have the potential to negatively affect wildlife both directly and indirectly, each individual THP is designed to avoid or mitigate any adverse effects, to ensure that the activity is in compliance with existing state and federal laws, and to have a CEQA determination of less-than-significant impact.

The primary timber harvest activities under any alternative would be performed under individual THPs. THPs evaluate potential impacts (including cumulative impacts) to a variety of resources, including wildlife, and apply avoidance and mitigation to minimize impacts to a CEQA determination of less-than-significant impact.

As discussed in Section 3.2.1.2 (Vegetation Communities), the RPF preparing THPs would be required to consider how the proposed operation is likely to affect animal species including site-specific field surveys, mitigation measure identification, review by CAL FIRE and other agencies (including the CDFW) and revise the THP as necessary based on agency comments. Where significant adverse impacts to non-listed species are identified, feasible practices to reduce the impacts must be incorporated in the THP, as described in 14 CCR 898.

Sensitive areas, such as WLPZs, are not allowed to be clear-cut harvested under the CFPR, and mandatory buffer zones are required. Additionally, sites supporting sensitive wildlife locations (such as raptor nests) are also not allowed to be clear-cut. THPs are designed using the Board of Forestry (BOF) anadromous salmonid protection rules package in stream systems with federal- or state-listed salmonids (see 14 CCR § 916.9 [936.9, 956.9] in the CFPR; Appendix D). The BOF anadromous salmonid protection rules recognize potential effects on anadromous salmonids through sedimentation and impacts to riparian zones that shade streams and contribute large woody debris. These rules provide a variety of additional protections for watercourses and lakes (e.g., increase WLPZ width and protection requirements [see 14 CCR § 916.9 (936.9, 956.9) in the CFPR (Appendix D) for full descriptions of protections for various water body classifications]). Site-specific investigation and application of the rule package is required for THPs where timber operations may affect anadromous salmonids. Objectives for timber operations in WLPZs in watersheds with listed anadromous salmonids must include implementing practices to maintain, protect, and contribute to restoration of properly functioning salmonid habitat and repair conditions detrimental to the species or species habitat. Practices that may meet these objectives include, but are not limited to the following: thinning for increased conifer growth; felling or yarding trees for wood placement in the channel; restoration of conifer deficient areas; management to promote a mix of conifers and hardwoods; abandonment and upgrading of non-functioning or high risk roads, watercourse crossings, tractor roads, and landings; and fuel hazard reduction activities that will reduce fire hazards and stand-replacing wildfires which would result in significant adverse effects to salmonid species or riparian habitat.

Direct and indirect effects to wildlife and fishery resources are considered for the following three groups for each alternative under consideration:

- General wildlife and fisheries
- Prey species for NSO/CSO
- Barred owls

Direct effects to wildlife and fisheries would include mortality from timber harvest or related activities (e.g., transportation of forest products and equipment, vegetation removal, ground disturbance), and habitat removal. Mortality would be largely limited to sedentary or slow-moving species (e.g., turtles, salamanders) unable to move out of the way of equipment or unable to leave areas of harvest, individuals unable to escape (e.g., unfledged birds in a nest), as well as species commonly killed on roads (e.g., deer).

Indirect negative effects to wildlife and fishery resources that may affect species' feeding, breeding or sheltering include, but are not limited to:

- Habitat modification and changes in microclimate (e.g., increased soil temperature) as the result of timber harvest, road construction, and site preparation may result in displacement, decreased survivorship, and/or decreased breeding success.
- Removal of vegetation or ground disturbance that may result in the incidental harassment of wildlife, which may result in displacement, decreased survivorship, and/or decreased breeding success.
- Habitat fragmentation due to timber harvest and roads may result in beneficial effects to edge-dwelling species and negative effects such as increased competition or predation for other species.
- Indirect degradation of aquatic resources due to increased sedimentation or increased water temperatures may result in displacement, decreased survivorship, and/or decreased breeding success.

However, there are also possible beneficial effects to wildlife and fishery resources, such as the creation of canopy gaps that allow for growth of understory vegetation and the creation of edge habitat, which can indirectly benefit certain species (CDFW 2015). Timber harvest often results in perturbation of habitat and changes in forest successional condition. These successional changes can be beneficial to some wildlife species while being detrimental to others, depending on which species find the habitat suitable (LeDoux 1997). For example, immediately after timber harvest resulting in removal of the forest canopy, negative effects on salamander relative abundance has been recorded (MacNeil and Williams 2014). Conversely, clear-cuts can provide ideal habitat for various shrubland bird species when early successional conditions prevail in the first 3 to 15 years following timber harvest (Dickson et al. 1993, Perry 2017).

The negative direct and indirect effects of timber harvest on aquatic species and their habitats are well known. Direct disturbance of hillslope and riparian areas can result in increased sediment delivery, which may result in decreased availability of deeper aquatic habitat, decreased survival of aquatic species' eggs, and/or increased turbidity (as cited in Nakamoto 1998). Indirect increased solar radiation due to the removal of riparian canopy cover, as well as decreased availability of woody debris to channels and water bodies, may also affect aquatic species due to the alterations in habitat suitability and availability (as cited in Nakamoto 1998). However, modern timber harvest and management practices have been designed to curtail these effects, and the effects are minimized and mitigated during the THP process, as stated above. Although negative effects to fishery resources can still occur if management practices are not executed

properly, measures in the state of California are in place to avoid, minimize, and mitigate the negative effects associated with timber harvest.

There are negative direct effects to terrestrial species including mortality from timber felling and transport, as well as indirect effects such as habitat modification, displacement, increased predation or competition, and decreased breeding success. SPI has BMPs in place to minimize impacts to terrestrial species and their habitats. SPI carries out even-aged and uneven-aged silviculture regeneration systems, along with pre-commercial thinning and commercial thinning which results in multi-aged forest stands which is beneficial to species diversity. All clear-cut stands are planted with native trees. THPs incorporate specific operational approaches for protecting timber and non-timber resource values.

The two primary prey species for the NSO and CSO, the dusky-footed woodrat and the northern flying squirrel (see HCP Appendix 3.7), make use of differing habitat types within the Analysis Area. The dusky-footed woodrat is known to utilize regenerating forest stands as its primary habitat (Hamm and Diller 2009) and is the primary NSO and CSO prey species at lower elevations (i.e., below 2,500-3,000 feet of elevation for the NSO and below 4,500-5,500 feet of elevation for the CSO [see HCP Appendix 3.7]). Timber harvest would likely have positive effects on their abundance and availability as prey, because it increases heterogeneity where woodrats live. Conversely, the northern flying squirrel uses mature second growth stands as its primary habitat and is the primary NSO and CSO prey species at higher elevations (i.e., above 2,500-3,000 feet of elevation for the NSO and above 4,500-5,500 feet of elevation for the CSO [see HCP Appendix 3.7]). The abundance of each of these prey species may be affected by SPI's timber harvest, though effects would likely differ between species based on where timber harvest may occur under each alternative.

The population of barred owls in the Analysis Area is also expected to differ between alternatives, as barred owl research would not be conducted under the No Action Alternative. Barred owls are generalists that make use of most cover types in proportion to their availability, though they prefer old growth forests when available (Hamer et al. 2007). The effect of timber harvest on barred owls is not well known, though the simplification of habitat as the result of even-aged management may result in conditions more suitable for generalist species. Thus, timber harvest expected to occur under all considered alternatives (see Section 3.2.1.1 for information on projected timber harvest rates) may indirectly benefit barred owls, though those benefits may differ in location depending on the alternative. Effects to barred owls are considered only in terms of whether or not barred owl research would be conducted under a given alternative due to timber harvest.

### **No Action Alternative**

Under the No Action Alternative, timber harvest and management activities on SPI Covered Lands, according to all applicable regulations and the SPI Fisher CCAA (until 2026), would continue to affect wildlife resources (see Section 3.2.1.1 for information on projected timber harvest rates). Timber harvest and management activities have the potential to directly remove and damage habitat and may result in the mortality of individuals. Indirect effects could include habitat fragmentation, edge effects, displacement, decreased survivorship, and/or decreased breeding success. Additionally, stressors may be introduced that could impair basic life history functions, such as breeding, feeding, and sheltering, though the THP review process mitigates these effects to the extent possible. Fish and amphibian populations would be affected by timber harvest activities and their associated effects on water resources (see Section 4.2.1), though effects to aquatic species would continue to be minimized through the THP review process and adherence to the CFPR. No change in the status quo for wildlife and fishery resources would occur under the No Action Alternative. However, some changes could potentially occur if the listing of a new species under the state or federal ESA or some other regulatory change resulted in new requirements designed to

avoid prohibited incidental take or minimize other environmental impacts resulting from any of the Covered Activities.

In areas of timber harvest, dusky-footed woodrat populations would likely increase in areas of lower elevation of the Analysis Area as forest stands regenerate in areas that have been timber harvested, serving as a prey source for the NSO and CSO, thereby indirectly affecting both species by increasing the prey base at the lower elevations. Northern flying squirrels would likely remain the primary prey source available in areas of mature second growth forest at higher elevations of the Analysis Area, though populations would be expected to decrease in the short term in areas of timber harvest. Overall, the impacts to prey species would continue in the same manner as the present day, with dusky-footed woodrat populations positively affected by timber harvest (Hamm and Diller 2009) throughout areas of lower elevation subject to timber harvest within the range of the CSO and NSO. No barred owl research would be conducted under the No Action Alternative, so it is assumed that barred owl populations would continue to increase within the Analysis Area.

Under the No Action Alternative, it is anticipated that SPI would continue to manage the Covered Lands in the same manner as the present day, with wildlife and fishery resources subject to periodic direct and indirect disturbances due to SPI's timber harvest and forest management activities. SPI would not be required to conduct or maintain landscape analyses pertinent to spotted owl habitat management, and information pertaining to habitat management on SPI Covered Lands would not be provided to the Service. Thus, this information would not be available for the development of management strategies applicable to wildlife and fishery resources that make use of habitat on and in proximity to the SPI Covered Lands.

#### **HCP Alternative – Proposed Action**

Under the HCP Alternative (Proposed Action), wildlife and fishery resources would likely be affected to a similar extent as under the No Action Alternative and NWFP/SNFPA Alternative (see Section 3.2.1.1 for information on projected timber harvest rates). Timber harvest and management activities have the potential to directly remove and damage habitat and may result in the mortality of individuals. Indirect effects could include habitat fragmentation, edge effects, displacement, decreased survivorship, and/or decreased breeding success. The location of these direct and indirect effects may be slightly different than either the No Action or NWFP/SNFPA alternatives, as non-harvested areas currently protected to avoid incidental take of the NSO could be harvested under the HCP Alternative (Proposed Action) and no harvest areas would be established under the NWFP/SNFPA Alternative.

Similar indirect effects, when compared to the No Action and NWFP/SNFPA alternatives, would be expected for prey species of NSO and CSO within the Analysis Area. A mosaic of habitat ages and types due to timber management would continue to promote a prey base for spotted owls, with dusky-footed woodrats and northern flying squirrels serving as the primary prey species for both the NSO and CSO within the Analysis Area (see HCP Appendix 3.7). Under the HCP Alternative (Proposed Action), impacts to prey species may be closer to NSO ACs and further away from CSO ACs when compared to the No Action Alternative, due to the issuance of an ITP and the establishment of PZs surrounding occupied NSO and CSO ACs (see Section 2.2.2).

Barred owl research, to be conducted throughout the 50-year permit term, would have a direct negative effect on barred owl individuals and would likely reduce barred owl populations on SPI Covered Lands, potentially having a beneficial indirect effect on NSO and CSO by reducing competition for resources (see Sections 3.2.1.5 and 3.2.1.6). It is not known whether this decline in the barred owl population would be offset by population increases that may be attributable to timber harvest in the area making habitat more suitable for barred owls and other generalist species. Barred owl research on the SPI Covered Lands, which includes approximately 1,566,153 acres, is expected to require the collection of 50 barred

owls per year over the 50-year permit term, for a total of 2,500 barred owls collected over the permit term (see SPI HCP Section 5.2.8). Collections would be carried out under all required permits from the Service and CDFW. If barred owl populations increase throughout the SPI Covered Lands, the barred owl collection rate could rise to 150 barred owls per year over the 50-year permit term, for a potential total of 7,500 barred owls over the permit term (see SPI HCP Section 5.2.8).

Under the HCP Alternative (Proposed Action), SPI would conduct and maintain analyses of spotted owl habitat and occupancy on the Covered Lands, and this information would be shared with the Service (see HCP Sections 6.1-6.11). SPI would submit annual monitoring reports and meet with the CDFW and the Service at specified intervals throughout the permit term (see HCP Section 6.10). Information about habitat forms and their distribution on the landscape would be available to the Service for SPI Covered Lands, and this information may be used by the agencies to develop management strategies applicable to wildlife and fishery resources that make use of habitat on and in proximity to the SPI Covered Lands.

### **NWFP/SNFPA Alternative**

Under the NWFP/SNFPA Alternative, wildlife communities within the LSRs (e.g., fisher, marten [*Martes americana*]) and within the protected ACs established within the NSO range on SPI Covered Lands would not be directly or indirectly affected by timber harvest and management activities. In the range of the CSO, the 300-acre PACs would be protected from timber harvest. Additional habitat (best available) within the HRCA would also be protected, and minimal direct and indirect effects to wildlife communities in these areas would occur. As a result, timber harvest activities would be expected to increase on SPI Covered Lands not under these protections in order to meet projected sustained yield timber volume demand. Thus, timber harvest would likely be more intense in non-protected areas, resulting in possible increased direct and indirect effects to wildlife and fishery resources there while avoiding activities that would affect the protected areas on SPI Covered Lands. Under the NWFP/SNFPA Alternative, wildlife and fishery resources would likely be affected similar to the No Action Alternative and HCP Alternative (Proposed Action) (see Section 3.2.1.1 for information on projected timber harvest rates), although the location of these direct and indirect effects may be slightly different than either the No Action or HCP (Proposed Action) alternatives. Timber harvest and management activities have the potential to directly remove and damage habitat and may result in the mortality of individuals. Indirect effects could include habitat fragmentation, edge effects, displacement, decreased survivorship, and/or decreased breeding success.

Compared to the No Action Alternative, and similar to the HCP Alternative (Proposed Action) indirect impacts to prey species due to timber harvest under the NWFP/SNFPA Alternative may be more localized to specific areas of the SPI Covered Lands. Harvestable areas would likely have increased populations of dusky-footed woodrats, while mature forests throughout the no-harvest areas would be inhabited by species that thrive in landscapes with less disturbance. Overall, a lower diversity of prey species may be available due to less habitat heterogeneity over the permit term.

The direct effects on barred owl populations would likely be similar to the HCP Alternative (Proposed Action; see above). Barred owl research, to be conducted throughout the 50-year permit term, would likely reduce barred owl populations on SPI Covered Lands. Barred owl research on the SPI Covered Lands, which includes approximately 1,566,153 acres, is expected to require the collection of 50 barred owls per year over the 50-year permit term, for a total of 2,500 barred owls collected over the permit term (see SPI HCP Section 5.2.8). Collections would be carried out under all required permits from the Service and CDFW. If barred owl populations increase throughout the SPI Covered Lands, the barred owl collection rate could rise to 150 barred owls per year over the 50-year permit term, for a potential total of 7,500 barred owls over the permit term (see SPI HCP Section 5.2.8). It is not known whether this decline in the barred owl population would be offset by population increases that may be attributable to timber

harvest in the area making habitat more suitable for barred owls and other generalist species. Declines in the barred owl population could potentially have a beneficial indirect effect for NSO and CSO by reducing competition for resources (see Sections 3.2.1.5 and 3.2.1.6).

Under the NWFP/SNFPA Alternative, SPI would conduct and maintain analyses of spotted owl habitat and occupancy on the Covered Lands, and this information would be shared with the Service (see HCP Sections 6.1-6.11). SPI would submit annual monitoring reports and meet with the CDFW and the Service at specified intervals throughout the permit term (see HCP Section 6.10). Information about habitat forms and their distribution on the landscape would be available to the Service for SPI Covered Lands, and this information may be used by the agencies to develop management strategies applicable to wildlife and fishery resources that make use of habitat on and in proximity to the SPI Covered Lands.

#### **3.2.1.4 Bald and Golden Eagles**

Timber harvest and management activities (see Section 1.2.3) are expected to continue to occur under any of the three alternatives under consideration. Under all alternatives, timber harvest and management activities are expected to occur throughout the Analysis Area and would continue at approximately the same rate for the next 50 years (see Section 3.2.1.1 for information on projected timber harvest rates). Depending on the alternative, these effects could occur in different areas of the SPI Covered Lands, though all activities would follow applicable rules and regulations (i.e., ESA, CESA, CEQA, CFPR). Timber harvest and forest management activities are likely to negatively affect bald and golden eagles, especially during the nesting season. Commercial forestry has been shown to adversely affect golden eagles, though the size of the effect is unknown (Whitfield et al. 2001). Direct effects to bald and golden eagles may include removal of nesting trees or other disturbances associated with operation of timber harvest machinery and human presence, potentially resulting in nest abandonment. Direct effects could also result from the unlikely event of a collision mortality on roadways, or the incidental take of a nestling. Indirect effects to bald and golden eagles may include, but are not limited to, alteration of habitat suitability, fragmentation of habitat, and changes in prey species' abundances. Under all alternatives, the effects of timber harvest and management activities on bald and golden eagles would be similar (see Section 3.2.1.1 for information on projected timber harvest rates), as SPI is expected to continue to adhere to the CFPR and its raptor policy, though eagles residing in protected areas under all the Alternatives would be afforded extra protections and may be subject to less nearby disturbance. Because of the protections afforded to bald and golden eagles under the CFPR and SPI's raptor policy, incidental take of bald and golden eagles under all alternatives would not be expected to occur on SPI Covered Lands.

An eagle's level of sensitivity to disturbance can vary throughout the nesting season (as cited in Naylor 2004), though most lost reproductive success occurs during the incubation period (Anthony et al. 1994, Steidl et al. 1997, Elliot et al. 1998). The operation of equipment within 440 yards of an eagle nest likely results in disturbance to nesting eagles, with an increased chance of disturbance for activities with a longer duration (Naylor 2004). Specifically, clear-cutting may affect the distribution, occupancy, and productivity of eagle nests, while partial cutting likely has limited effects on eagle nesting habitat (Naylor 2004). According to the National Bald Eagle Management Guidelines (USFWS 2007), clear-cutting or removal of overstory trees at any time should be avoided within 330 feet of a nest. During the breeding season, timber harvest operations should be avoided within 660 feet of a nest.

SPI would continue to adhere to its raptor policy under all alternatives, which follow the National Bald Eagle Management Guidelines and CFPRs guidelines, and thus additional permits are not required. SPI's raptor policy includes the establishment of at least a 10-acre no-harvest buffer (375-foot radius) around occupied bald and golden eagle nests (SPI 2013). Under the CFPR, the establishment of a 10-acre buffer is also required for occupied bald eagle nests, though the Director of CAL FIRE may increase the size of the buffer zone, in consultation with CDFW and the RPF, to ensure that timber operations will not result

in take of a bald eagle (14 CCR 919.3 [939.3, 959.3], Appendix D). Additionally, no clear-cutting is allowed within the 10-acre buffer around bald eagle nests under the CFPR. Selection, commercial thinning, sanitation-salvage, and the shelterwood regeneration method, except for the removal step, are allowed if all trees are marked prior to pre-harvest inspections and if occurring outside of the critical period for bald eagles (January 15 until either August 15 or four weeks after fledging). Under the CFPR, all nest trees containing active bald eagle nests, and all designated perch trees, screening trees, and replacement trees must be left standing and unharmed. The requirements of the CFPR for the golden eagle include the establishment of a minimum buffer zone of eight acres in size, which is slightly less than that which is required under SPI's raptor policy. No clear-cutting is allowed within the buffer zone, and all nest trees, designated perch trees, screening trees, and replacement trees must be left standing and unharmed. During the golden eagle critical period (January 15 until either April 15 or until the birds have fledged), operations are not permitted within the buffer zone, except for hauling on existing roads that normally receive use.

### **No Action Alternative**

Direct effects to bald and golden eagles may include removal of nesting trees or other disturbances associated with operation of timber harvest machinery and human presence, potentially resulting in nest abandonment. Direct effects could also result from the unlikely event of a collision mortality on roadways, or the incidental take of a nestling. Indirect effects to bald and golden eagles may include alteration of habitat suitability, fragmentation of habitat, and changes in prey species' abundances. Under the No Action Alternative, SPI would continue to adhere to its raptor policy and the CFPR. For the bald eagle, buffer zones would be a minimum of 10 acres in size (as stated in both SPI's raptor policy and the CFPR), though the buffer could be expanded by the Director of CAL FIRE, as needed. For the golden eagle, buffer zones would also be a minimum of 10 acres in size as per SPI's raptor policy (8 acres required under the CFPR). Clear-cutting would not be allowed within these buffer zones, with additional requirements under the CFPR, as stated above. Disturbance during the nesting season would be minimal under the No Action Alternative, as operations are not permitted within the buffer zones during critical periods. No change in the status quo for these species is anticipated under the No Action Alternative as the result of SPI's forest management and timber harvest activities. Forest management and timber harvest in the Analysis Area would continue to indirectly affect bald and golden eagles (through potential alteration of habitat suitability, fragmentation of habitat, and changes in prey species' abundances), with take of these species being avoided and addressed during the THP review process. Active bald and golden eagle nests located near NSO or CSO ACs, as well as those located within or near protected riparian areas, may be subject to less disturbance due to the habitat and resource protections.

### **HCP Alternative – Proposed Action**

Under the HCP Alternative (Proposed Action), it is anticipated that direct and indirect effects to bald and golden eagles would be similar to those of the No Action Alternative and NWFP Alternative. Forest management and timber harvest in the Analysis Area would continue to indirectly affect these species (through potential alteration of habitat suitability, fragmentation of habitat, and changes in prey species' abundances), with incidental take of bald and golden eagles being avoided and addressed during the THP review process. The location and timing of impact may be slightly different than under the No Action Alternative. Active bald and golden eagle nests located near NSO or CSO ACs, as well as those located within or near protected riparian areas, may be subject to less disturbance due to the habitat and resource protections afforded under this alternative. Due to the increase in CSO protections under the HCP Alternative (Proposed Action), eagles nesting within or near CSO ACs may be afforded additional protections when compared to the No Action Alternative.

### **NWFP/SNFPA Alternative**

Under the NWFP/SNFPA Alternative, it is anticipated that direct and indirect effects to bald and golden eagles would be similar to those of the No Action Alternative and HCP Alternative (Proposed Action). Forest management and timber harvest in the Analysis Area would continue to indirectly affect these species (through potential alteration of habitat suitability, fragmentation of habitat, and changes in prey species' abundances), with take of bald and golden eagles being avoided and addressed during the THP review process. The location and timing of impact may be slightly different than under the No Action Alternative. Active bald and golden eagle nests located near NSO or CSO ACs, as well as those located within or near protected riparian areas, may be subject to less disturbance due to the habitat and resource protections afforded under this alternative. Indirect effects to bald and golden eagles within the LSRs and within the protected ACs established within the NSO range on SPI Covered Lands would not occur, as timber harvest in these areas would not occur. In the range of the CSO, the 300-acre PACs would also be protected from timber harvest, and no effects on bald and golden eagles would occur. Additional habitat (best available) with the HRCA would also be protected, and minimal indirect effects to eagles in these areas would be anticipated. As a result, forest management and timber harvest activities would be expected to increase on SPI Covered Lands not under these protections in order to meet timber demand. Thus, timber harvest would likely be more intense in non-protected areas, though adherence to the CFPR and SPI's raptor policy would provide for the same protections for bald and golden eagles as under the other considered alternatives.

#### **3.2.1.5 Northern Spotted Owl**

Timber harvest and management activities (see Section 1.2.3) are expected to continue to occur under any of the three alternatives under consideration. Under all alternatives, timber harvest and management activities are expected to occur throughout the Analysis Area and would continue at approximately the same rate for the next 50 years (see Section 3.2.1.1 for information on projected timber harvest rates). Depending on the alternative, these effects could occur in different areas of the SPI Covered Lands, though all activities would follow applicable rules and regulations (i.e., ESA, CESA, CEQA, CFPR). The same types of direct and indirect effects may impact NSO under all three alternatives; however, the location or level of impact may vary among the alternatives. Direct effects could include harm through habitat modification leading to death or injury. The likelihood of directly killing an NSO through timber harvest activities is thought to be insignificant and discountable. Timber harvest and management activities may include alteration of habitat used for foraging, roosting, and nesting; indirect effects from these changes could result in increased competition for resources, decreased survivorship, or decreased breeding success.

The effects of timber harvest and management activities on the forest landscape throughout the Analysis Area is considered for each alternative, as certain demographic parameters (e.g., survival, fecundity) may increase or decrease because of timber management activities. The possibility of direct killing or injury of NSOs is considered insignificant and discountable, due to high detection rates of occupied NSO ACs (see SPI HCP Section 5.2.5.1) and the protections established for ACs, which vary by alternative (see Section 2.2). Direct killing or injury of a spotted owl would not be permitted under any alternative.

An additional indirect effect due to timber harvest and management activities may include alteration of habitat used for foraging, roosting, and nesting. Specific habitat elements, such as HRAs, Wildlife Trees, Legacy Trees, snags, and large hardwood trees, provide habitat complexity for NSO roosting and nesting. NSO occupancy rates, survival, and fecundity are generally positively associated with the amount of older forest habitat available (as cited in CDFW 2016), although a mix of old forest and more open areas create a higher fitness potential than uniform old forest conditions (Franklin et al. 2000). Since 1993, timber harvest on non-federal lands has been the primary mechanism of NSO habitat loss (Davis et al. 2016),

with 5.8% of nesting and roosting habitat removed by timber harvest on non-federal lands in California from 1994-2007 (Davis et al. 2011). However, state regulations on timber harvest in California are the most protective state regulations in the range of the NSO, which includes Washington and Oregon (CDFW 2016).

For the purposes of this DEIS analysis, incidental take in each alternative is based on the methodology used in the SPI HCP. Incidental take is assessed in the form of harm through habitat modification as the reduction of large tree, closed-canopy forests (HF4) and medium tree, high canopy forests (HF2H; see HCP Appendix 4.3, Table 4.3.3) below prescribed threshold levels (30% HF4 and 50% HF2H, for 500-acre nesting hexagon) around occupied NSO ACs (i.e., in occupied hexagons as described in HCP Appendix 4.3). Based on SPI's GPS telemetry data, 66.7% of NSO ACs were located in HF4 habitat, and 16.7% were located in HF2H habitat (see SPI HCP Appendix 3.6).

Effects on NSO are organized by the following types of effects due to timber harvest and forest management activities (see Section 3.2.1.1 for information on projected timber harvest rates) under the alternatives being considered:

- Incidental take by harm through habitat modification that results in death or injury: effects on NSO due to harm resulting from habitat modifications around occupied NSO ACs
- Habitat management: effects on NSO due to management for habitat (i.e., PHAs)
- Barred owl research: effects on NSO due to barred owl research

### **No Action Alternative**

Under the No Action Alternative, it is anticipated that existing management activities would continue in accordance with the CFPR, THPs developed for SPI lands, SPI's operational policies and guidelines, and the SPI Fisher CCAA (through 2026). The conservation measures included in the Fisher CCAA would continue to indirectly benefit NSO populations by protecting habitat and retaining habitat elements until 2026. Examples of current conservation measures under the CCAA benefiting NSO include: maintaining 80% of Conservation LEAFs, maintaining at least 50% (approximately 700,000 acres) of the Capable Land in the Mixed Land Class, and retaining habitat elements for both regeneration harvest and non-regeneration silvicultural practices. After 2026, the conservation measures included in the Fisher CCAA would no longer be required and would become voluntary.

### ***Take via Harm through Habitat Modification***

All SPI activities would operate under no-take restrictions.

### ***Habitat Management***

Retention of habitat elements (e.g., Wildlife Trees, Legacy Trees) would be voluntary under this alternative (after expiration of the Fisher CCAA in 2026), and SPI would have no legal obligation to retain these structures beyond what is required by the CFPR. It is conservatively assumed that SPI would discontinue their habitat element retention conservation measures upon expiration of the Fisher CCAA in 2026. Riparian and upland areas would continue to be managed in accordance with the watercourse and lake protection regulations in the CFPR (14 CCR § 936/956), resulting in 30% to 35% (approximately 469,846 – 548,153 acres) of SPI Covered Lands being exempt from even-aged timber management. Overall, any form of take of the NSO would not be permitted, and a similar amount of habitat would be retained on SPI Covered Lands over the 50-year permit term, when compared to the HCP Alternative (Proposed Action). Under the No Action Alternative, it is anticipated that SPI would continue to manage the Covered Lands in the same manner as the present day (see Section 3.2.1.1 for information on projected timber harvest rates). As of 2016, there were 147 PHAs within the range of the NSO on SPI Covered Lands. Assuming that high canopy cover, large tree habitat would increase at a similar rate to

that described in the SPI HCP, SPI estimates that over the next 50 years PHAs would increase to 498 by 2066 (a 339% increase over 50 years). However, SPI would not be required to conduct or maintain landscape analyses pertinent to NSO habitat management, and information pertaining to habitat management on SPI Covered Lands would not be provided to the Service.

### ***Barred Owl Research***

Barred owl research would not be conducted by SPI under the No Action Alternative. Without experimental removal of barred owls on SPI lands, the barred owl population is expected to continue to increase, likely resulting in NSO population declines. The Service has estimated that barred owl invasion may ultimately result in a 50% reduction in NSO populations rangewide, if current impacts resulting from barred owl invasion continue (USFWS 2011). Assuming a 50% reduction on the 122 NSO ACs on SPI Covered Lands or within 1.3 miles, the number of NSO ACs under the No Action Alternative may decrease to 61 ACs over the next 50 years due to competition with barred owls.

### **HCP Alternative – Proposed Action**

#### ***Take via Harm through Habitat Modification***

Under the HCP Alternative (Proposed Action), the expected incidental take of NSO ACs would be greater than either the No Action Alternative (where take of NSO would be avoided) or the NWFP/SNFPA Alternative (see below). Under the HCP Alternative (Proposed Action) it is anticipated that the loss of up to 115 NSO ACs over the 50-year permit term would occur, for an average of 2.3 NSO ACs (i.e., 4.6 NSO individuals) per year (see HCP Appendix 4.3, Section 4.3.9.1). No direct killing or injury would be permitted. The instances of incidental take from harm due to habitat modification that results in death or injury would meet the criteria for “harm” when SPI’s Habitat Forms HF4 (large tree, closed canopy cover forests habitat) and HF2H (medium tree, high canopy cover forest habitat) are reduced below the prescribed thresholds (habitat forms defined in Section 2.2.2.1), though the actual amount of take is expected to be less due to temporal and site-specific applications of other conservation measures.

A total of 3,128 NSO ACs within the NSO range in California are included in the CDFW Natural Diversity Database in 2017. Approximately 51% of those ACs (1,596 ACs) are located in the Klamath and California Cascades Provinces, which include SPI lands. The incidental take from harm through habitat modification that results in death or injury of an average of 2.3 NSO ACs per year would constitute 0.14% of NSO ACs in the provinces where SPI owns land, or 1.9% of the 122 NSO ACs within 1.3 miles of SPI Covered Lands.

#### ***Habitat Management***

Based on SPI’s modeling projections, the number of PHAs in the NSO’s range of SPI Covered Lands would be expected to increase from 147 PHAs (147,000 acres) in 2016 to 498 PHAs (498,000 acres) in 2066 (a 339% increase over 50 years; Figure 3-5). The majority of the PHAs would be added to the high density NSO areas of SPI Covered Lands, with the number of PHAs predicted to increase from 41 PHAs in 2016 to 257 PHAs in 2066 (627% increase over 50 years) in those areas. The increase in PHAs over the permit term is a benefit to the NSO that is expected to exceed the impact of the incidental take of NSO ACs. Overall, the increase in the number of PHAs would exceed the loss of PHAs due to timber harvest activities. The increase in the number of PHAs in the range of the NSO under the HCP Alternative (Proposed Action) is a direct result of forest management practices aimed at increasing the total amount and distribution of SPI land consisting of stands of high-canopy-closure larger trees. Retention conservation measures would also result in the preservation of older forest elements on SPI lands. Retention of habitat elements would become legally required under the HCP Alternative (Proposed Action), assuring the persistence of these elements critical to owl roosting, nesting, and foraging habitat. A steady increase in the number of PHAs is expected over the first 25 years of the permit term, with substantial increases in the later decades of the permit term due to ongoing growth in mixed stands (forest

of mixed ages) and ingrowth of even stands (forest of regenerated trees of similar age). The availability of Mixed HF4 and HF2H over the next 30 years remains consistent, with an increase in Even HF4 and HF2H during the latter half of the permit term (see HCP Appendix 4.3, Section 4.3.8). Modeled data from the SPI HCP predicts an increase in the percentage of large tree, closed canopy forests (HF4) and medium tree, high canopy forests (HF2H) over the 50-year permit term. For example, HF4 increases from 23% to 43% over the permit term, while HF2H increases from 27% to 35% of the landscape over the permit term. The distribution of habitat forms on SPI Covered Lands and their predicted change during the permit term are displayed in Figures 4.3.8 – 4.3.12 in Appendix 4.3 of the SPI HCP.

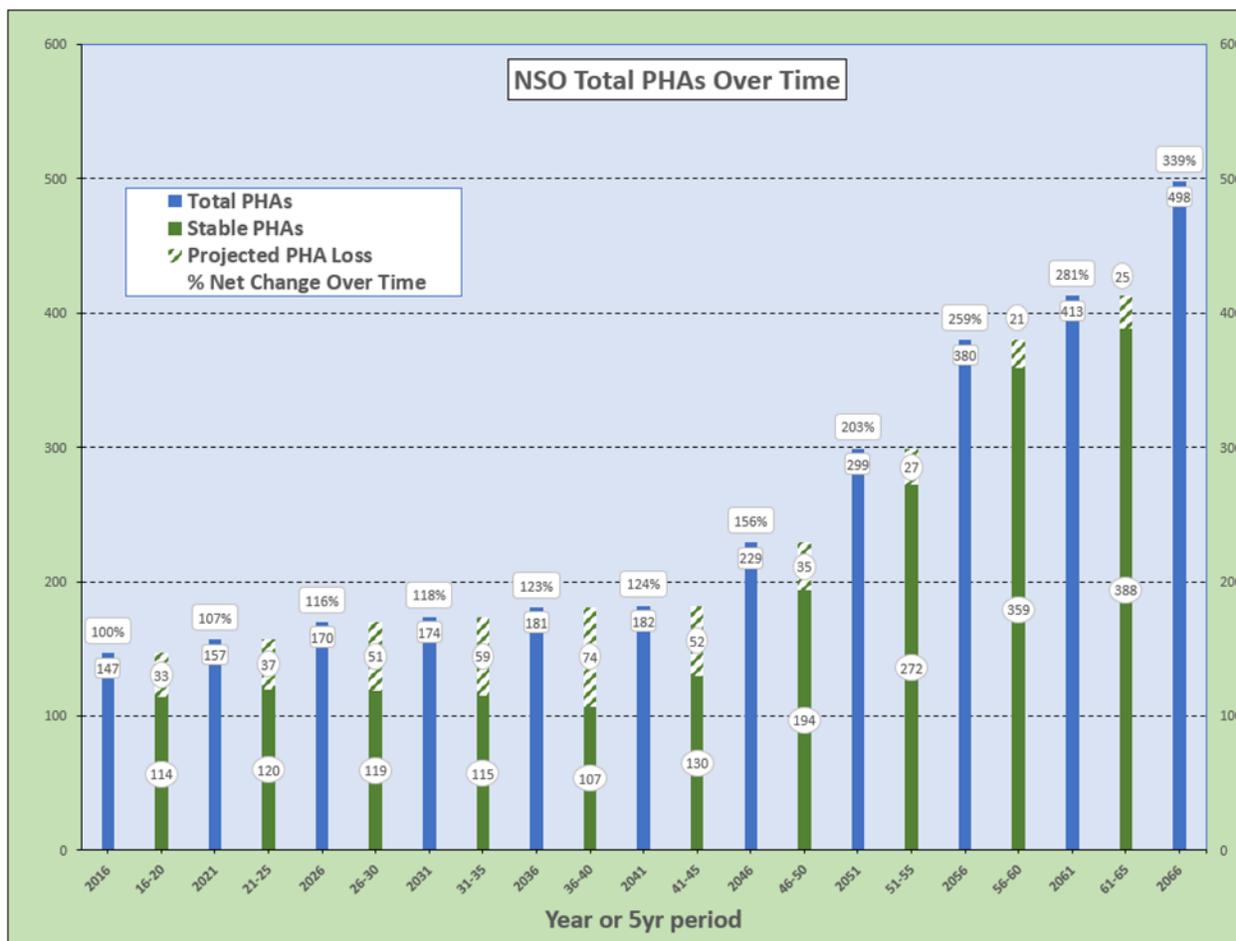


Figure 3-5. NSO PHAs Over Time (SPI 2019).

Additionally, under the HCP Alternative (Proposed Action), 34 NSO ACs (current Tier 1 ACs; see Section 2.2.2.1 for a description of Tier 1 ACs) would be afforded habitat refugia status during the permit term with approximately 11,762 acres of SPI land reserved from timber harvesting, regardless of occupancy status (see HCP Appendix 5.3 for tiering analysis). None of these measures are assured under the No Action Alternative (see Section 2.2.2). The establishment of the conservation measures under the HCP Alternative (Proposed Action) would provide habitat stability and accelerate the rate of habitat development for the NSO on SPI Covered Lands in the California range of the species.

Under the HCP Alternative (Proposed Action), SPI would conduct and maintain analyses of spotted owl habitat and occupancy on the Covered Lands, and this information would be shared with the Service (see HCP Sections 6.1-6.11). SPI would submit annual monitoring reports and meet with the CDFW and the

Service at specified intervals throughout the permit term (see HCP Section 6.10). Information about habitat forms and their distribution on the landscape would be available to the Service for SPI Covered Lands, and this information may be used by the agencies to develop management strategies for the NSO throughout its range.

PHAs are a measure of aggregations of large/medium tree, high canopy cover habitat on the landscape, as defined by SPI's Habitat Forms. There is some uncertainty surrounding the definition of a PHA in terms of providing sufficient spotted owl habitat. SPI's Habitat Forms do not consider other attributes that may be essential components of spotted owl habitat, such as slope position, downed logs and woody debris, and deformed trees with nesting features. Most efforts to estimate spotted owl habitat based on timber inventory data use tree diameter and canopy cover, which can act as a surrogate for stand age because, as forests become older, the features used by spotted owls become more abundant. SPI Habitat Forms and PHA thresholds, however, are on the lower end of what has typically been considered necessary for spotted owls, in terms of tree sizes and acreage in particular. Furthermore, over the permit term, the landscape will be converted from PHAs currently dominated by mixed stands to those dominated by even-aged stands. In the HCP it is assumed that these PHAs will similarly support spotted owls due to growth of large/medium trees and high canopy cover, plus the retention of habitat elements that will provide habitat structure and complexity; however, this assumption has not yet been tested. Due to this uncertainty, the HCP includes a robust monitoring and adaptive management program (see HCP Section 6.0).

#### ***Barred Owl Research***

Similar to the NWFP/SNFPA Alternative, barred owl research would be conducted under the HCP Alternative (Proposed Action) throughout the 50-year permit term and would be expected to indirectly benefit NSO populations by directly reducing competition with barred owls on SPI Covered Lands. Barred owl research would not be conducted under the No Action Alternative. Barred owl research on the SPI Covered Lands, which includes approximately 1,566,153 acres, is expected to require the collection of 50 barred owls per year over the 50-year permit term, for a total of 2,500 barred owls collected over the permit term (see SPI HCP Section 5.2.8). Collections would be carried out under all required permits from the Service and CDFW. If barred owl populations increase throughout the SPI Covered Lands, the barred owl collection rate could rise to 150 barred owls per year over the 50-year permit term, for a potential total of 7,500 barred owls over the permit term (see SPI HCP Section 5.2.8).

It is assumed that any decline in the barred owl population that may occur under the HCP Alternative (Proposed Action) would be an indirect benefit to the NSO, decreasing the competition between the species, and potentially slowing or altering the predicted 50% decline that may occur under the No Action Alternative. It is not known whether this decline in the barred owl population would be offset by population increases that may be attributable to timber harvest in the area making habitat more suitable for barred owls and other generalist species.

#### **NWFP/SNFPA Alternative**

##### ***Take via Harm through Habitat Modification***

Under the NWFP/SNR Alternative, the expected incidental take of NSO ACs would be reduced when compared to the HCP Alternative (Proposed Action), but would be greater than the No Action Alternative, where take of NSO would be avoided. This would primarily be due to the establishment of LSRs on 30% of the NSO range on SPI Covered Lands (113,365 acres in LSRs; see Section 2.2.3.1). Take through habitat modification could still occur at ACs outside of the LSRs, as the protected habitat surrounding NSO ACs is only 100 acres under this alternative. Thus, a 30% reduction in harm was applied to the estimated take of NSO ACs described in SPI's HCP. This would result in an approximate take of 80 NSO ACs over the 50-year permit term (average of 1.6 NSO ACs per year) under the

NWFP/SNFPA Alternative. It should be noted, however, that actual incidental take cannot be predicted, as it may be higher or lower depending on where the timber harvest activities would be located and when they would occur. The incidental take of an average of 1.6 NSO ACs per year would constitute 0.1% of NSO ACs in the provinces where SPI owns land (1,596 ACs), or 1.3% of the 122 NSO ACs within 1.3 miles of SPI Covered Lands.

Because 30% of SPI Covered Lands in the range of the NSO would be in LSRs, timber harvest activities would be expected to either shift to other locations on SPI Covered Lands or decrease due to the loss of harvestable acres. If timber harvest would be shifted to other portions of SPI Covered Lands, harm could be shifted to other NSO or CSO ACs, though it could also be shifted to unoccupied areas of SPI Covered Lands. If timber harvest would be reduced, a 30% reduction in take is expected, though actual reductions could be higher if the LSRs are focused in high density areas (i.e., if protection of 30% of the land results in protection of more than 30% of the NSO ACs).

### ***Habitat Management***

Habitat management within the LSRs would not occur, and there would be no requirement for management of other areas to increase PHAs. While the change of PHAs cannot be predicted under the NWFP/SNFPA Alternative, it is assumed that the change of PHAs on SPI Covered Lands would be similar to the No Action Alternative and the HCP Alternative (Proposed Action). It is difficult to predict how the number and distribution of PHAs would compare to the other considered alternatives, as it depends on how the forested areas within the LSRs would change over the 50 years, as well as how and where SPI would choose to harvest under this alternative.

Under the NWFP/SNFPA Alternative, SPI would conduct and maintain analyses of spotted owl habitat and occupancy on the Covered Lands, and this information would be shared with the Service (see HCP Sections 6.1-6.11). SPI would submit annual monitoring reports and meet with the CDFW and the Service at specified intervals throughout the permit term (see HCP Section 6.10). Information about habitat forms and their distribution on the landscape would be available to the Service for SPI Covered Lands, and this information may be used by the agencies to develop management strategies for the NSO throughout its range.

PHAs are a measure of aggregations of large/medium tree, high canopy cover habitat on the landscape, as defined by SPI's Habitat Forms. There is some uncertainty surrounding the definition of a PHA in terms of providing sufficient spotted owl habitat. SPI's Habitat Forms do not consider other attributes that may be essential components of spotted owl habitat, such as slope position, downed logs and woody debris, and deformed trees with nesting features. Most efforts to estimate spotted owl habitat based on timber inventory data use tree diameter and canopy cover, which can act as a surrogate for stand age because, as forests become older, the features used by spotted owls become more abundant. SPI Habitat Forms and PHA thresholds, however, are on the lower end of what has typically been considered necessary for spotted owls, in terms of tree sizes and acreage in particular. Furthermore, over the permit term, the landscape will be converted from PHAs currently dominated by mixed stands to those dominated by even-aged stands. In the HCP it is assumed that these PHAs will similarly support spotted owls due to growth of large/medium trees and high canopy cover, plus the retention of habitat elements that will provide habitat structure and complexity; however, this assumption has not yet been tested. Due to this uncertainty, the HCP includes a robust monitoring and adaptive management program (see HCP Section 6.0).

### ***Barred Owl Research***

Similar to the HCP Alternative (Proposed Action), barred owl research would be conducted under the NWFP/SNFPA Alternative throughout the 50-year permit term and would be expected to indirectly benefit NSO populations by directly reducing competition with barred owls on SPI Covered Lands.

Barred owl research would not be conducted under the No Action Alternative. Barred owl research on the SPI Covered Lands, which includes approximately 1,566,153 acres, which could include the collection of up to 50 barred owls per year over the 50-year permit term, for a total of 2,500 barred owls collected over the permit term (see SPI HCP Section 5.2.8). Collections would be carried out under all required permits from the Service and CDFW. If barred owl populations increase throughout the SPI Covered Lands, the barred owl collection rate could rise to 150 barred owls per year over the 50-year permit term, for a potential total of 7,500 barred owls over the permit term (see SPI HCP Section 5.2.8). It is assumed that any decline in the barred owl population that may occur under the NWFP/SNFPA Alternative would be an indirect benefit to the NSO, directly decreasing the competition between the species, and potentially slowing or altering the predicted 50% decline that may occur under the No Action Alternative. It is not known whether this decline in the barred owl population would be offset by population increases that may be attributable to timber harvest in the area making habitat more suitable for barred owls and other generalist species.

### **3.2.1.6 California Spotted Owl**

Timber harvest and management activities (see Section 1.2.3) are expected to continue to occur under any of the three alternatives under consideration. Under all alternatives, timber harvest and management activities are expected to occur throughout the Analysis Area and would continue at approximately the same rate for the next 50 years (see Section 3.2.1.1 for information on projected timber harvest rates). Depending on the alternative, these effects could occur in different areas of the SPI Covered Lands, though all activities would follow applicable rules and regulations (i.e., ESA, CESA, CEQA, CFPR). The same types of direct and indirect effects may impact CSO under all three alternatives; however, the location or level of impact may vary among the alternatives. Direct effects could include harm through habitat modification leading to death or injury. The likelihood of directly killing a CSO through timber harvest activities is thought to be insignificant and discountable. Timber harvest and management activities may include alteration of habitat used for foraging, roosting, and nesting; indirect effects from these changes could result in increased competition for resources, decreased survivorship, or decreased breeding success.

The effects of timber harvest and management activities on the forest landscape throughout the Analysis Area is considered for each alternative, as certain demographic parameters (e.g., survival, fecundity) may increase or decrease because of timber management activities. The possibility of direct harm to CSOs is considered insignificant and discountable, due to high detection rates of occupied CSO ACs (see SPI HCP Section 5.2.5.1) and the protections established for ACs, which vary by alternative (see Section 2.2). Direct killing of a spotted owl would not be permitted under any alternative.

An additional indirect effect of timber harvest and management activities may include alteration of habitat used for foraging, roosting, and nesting. Specific habitat elements, such as snags and large hardwood trees, provide habitat complexity for CSO roosting and nesting. Even-aged management has the potential to negatively affect the CSO, though it may increase prey populations (e.g., dusky-footed woodrat [Hamm and Diller 2009]). Thus, there is potential for both positive and negative indirect effects to the CSO in areas of timber harvest on SPI Covered Lands. Overall, the possible indirect effects of forest management on CSO populations is not well understood. Observational and correlational studies have generally concluded that important predictors of demographic rates included the amount of mature conifer forest and large tree density (as cited in Gutiérrez et al. 2017).

As described in the SPI HCP, incidental take is assessed as the reduction of large tree, closed canopy forests (HF4) and medium tree, high canopy forests (HF2H; see HCP Appendix 4.3, Table 4.3.3) below prescribed threshold levels (30% HF4 and 50% HF2H, for 500-acre nesting hexagon) around occupied CSO ACs (i.e., in occupied hexagons as described in HCP Appendix 4.3). Based on SPI's GPS telemetry

data, 81.3% of CSO ACs were located in HF4 habitat, and 18.7% were located in HF2H habitat (see SPI HCP Appendix 3.8).

Effects on CSO are organized by the following types of effects due to forest management activities under the alternatives being considered:

- Incidental take by harm through habitat modification that results in death or injury: effects on CSO due to harm resulting from habitat modifications around occupied CSO ACs due to changes to habitat
- Habitat management: Effects on CSO due to management for habitat (i.e., PHAs)
- Barred owl research: effects on CSO due to barred owl research

### **No Action Alternative**

Under the No Action Alternative, existing timber harvest and management activities are expected to continue in accordance with the CFPR, THPs developed for SPI lands, SPI's operational policies and guidelines, and the SPI Fisher CCAA (through 2026). The conservation measures included in the Fisher CCAA would continue to indirectly benefit CSO populations by protecting habitat and retaining habitat elements until 2026. Examples of current conservation measures under the CCAA benefiting CSO include: maintaining 80% of Conservation LEAFs, maintaining at least 50% (approximately 700,000 acres) of the Capable Land in the Mixed Land Class, and retaining habitat elements for both regeneration harvest and non-regeneration silvicultural practices. After 2026, the conservation measures included in the Fisher CCAA would no longer be required and would become voluntary.

#### ***Take through harm resulting from habitat modification***

Because the CSO is not currently listed, incidental take of the CSO is not prohibited and is anticipated to continue under the No Action Alternative. If the CSO were to become listed, take would need to be avoided. Though surveys for the CSO are not required, SPI avoids active CSO nests in accordance with its raptor policy (SPI 2013). Thus, no direct killing or injury is expected, as surveys for CSO would still occur, and active nests would be avoided.

Roosting, nesting, and foraging habitat would continue to be directly and indirectly negatively affected by timber harvest and management activities under the No Action Alternative, though these effects may be lessened if the species becomes listed in the future and if take avoidance becomes required (i.e., required habitat protections surrounding occupied CSO ACs, similar to current NSO protections). Thus, incidental take (i.e., reduction of HF4 [large tree, closed canopy cover forests habitat] and HF2H [medium tree, high canopy cover forest habitat] below prescribed threshold levels) of CSO would occur under the No Action Alternative if the CSO remains unlisted under the ESA. The exact level of incidental take cannot be estimated at this time, as it is unknown where and when timber harvest activities would occur in relation to CSO ACs, but no limit on take would be implemented since the species is not currently listed. All 335 CSO ACs subject to take (ACs on or within 0.25 mile of SPI Covered Lands and in hexagons with more than 50 acres of SPI ownership; see HCP Appendix 4.3), would be subject to potential take through harm under the No Action Alternative, as there are currently no restrictions. In addition, any CSO ACs established on or within 0.25 mile of SPI Covered Lands over the next 50 years would also potentially be subject to take. If the CSO becomes listed in the future, take avoidance would become required, resulting in modifications to the No Action Alternative, as incidental take of the CSO is not currently prohibited.

#### ***Habitat Management***

Retention of habitat elements (e.g., Wildlife Trees, Legacy Trees) would be voluntary under this alternative after expiration of the SPI Fisher CCAA, and SPI would have no legal obligation to retain these structures beyond what is required by the CFPR. It is conservatively assumed that SPI would

discontinue these additional habitat element retention conservation measures upon expiration of the Fisher CCAA in 2026. Riparian and upland areas would continue to be managed in accordance with current agreements and applicable regulations, resulting in 30% to 35 % of the SPI Covered Lands being exempt from even-aged timber management. Habitat element retention, management for PHAs, and PZs would not be required, likely resulting in less overall habitat availability for the CSO by the end of the permit term. Under the No Action Alternative, it is anticipated that SPI would continue to manage the Covered Lands in the same manner as the present day. As of 2016, there were 723 PHAs within the range of the CSO on SPI Covered Lands. Assuming that high canopy cover, large tree habitat would increase at a similar rate to that described in the SPI HCP, SPI estimates that over the next 50 years PHAs would increase to 1,231 by 2066 (a 170% increase over 50 years). However, SPI would not be required to conduct or maintain landscape analyses pertinent to CSO habitat management, and information pertaining to habitat management on SPI Covered Lands would not be provided to the Service.

### ***Barred Owl Research***

Barred owl research would not be conducted by SPI under the No Action Alternative. Barred owl populations are currently increasing and have entered the CSO range. Without experimental removal of barred owls on SPI lands, the barred owl population is expected to continue to increase and further expand into the Sierra Nevada, likely resulting in CSO population declines. Assuming that effects to the CSO are similar to those predicted for the NSO (see Section 3.2.2.5 above), a 50% reduction of the 738 CSO ACs on SPI Covered lands or within 1.0 mile, the number of CSO ACs may decrease to 369 ACs under the No Action Alternative over the next 50 years due to competition with barred owls.

### **HCP Alternative – Proposed Action**

#### ***Take through Harm resulting from habitat modification***

Under the HCP Alternative (Proposed Action), the expected removal of CSO ACs would be reduced from the No Action Alternative (where incidental take of CSO is not prohibited) and greater than the NWFP/SNFPA Alternative (see below). Under the HCP Alternative (Proposed Action) it is anticipated that modification of up to 649 CSO ACs over the 50-year permit term would occur, for an average of 13.0 CSO ACs (i.e., 26.0 CSO individuals) per year (see HCP Appendix 4.3, Section 4.3.9.1). No direct killing or injury is expected, and such take would not be permitted. The instances of habitat modification would meet the criteria for “take through harm that results in death or injury” when habitat forms HF4 (large tree, closed canopy cover forest habitat) and HF2H (medium tree, high canopy cover forest habitat) are reduced below the prescribed thresholds (habitat forms defined in Section 2.2.2.1), though the actual amount of take is expected to be less due to temporal and site-specific applications of other conservation measures.

The CSO population in the Sierra Nevada in 2006 was estimated at 1,865 CSO ACs (USFWS 2006). The removal of 13.0 CSO ACs per year would constitute approximately 0.70% of the 2006 known CSO ACs in the Sierra Nevada, or 1.8% of the 738 CSO ACs within 1.0 mile of SPI Covered Lands. While exact take cannot be predicted for the No Action Alternative, as take is not currently regulated for the CSO, it is anticipated that take under the HCP Alternative (Proposed Action) would be less than that which would occur under the No Action Alternative.

#### ***Habitat Management***

Based on SPI's modeling projections, the number of PHAs in the CSO's range on SPI Covered Lands would increase from 723 PHAs (723,000 acres) in 2016 to 1,231 PHAs (1,231,000 acres) in 2066 (a 170% increase over 50 years; Figure 3-6). The majority of the PHAs would be added to the high density CSO areas of SPI Covered Lands, with the number of PHAs predicted to increase from 681 PHAs in 2016 to 1,044 PHAs in 2066 (153% increase over 50 years) in those areas. The increase in PHAs over the

permit term is a benefit to the CSO that is expected to exceed the impact of the incidental take of CSO ACs. Overall, the increase in the number of PHAs would exceed the loss of PHAs due to timber harvest activities. The increase in the number of PHAs in the range of the CSO under the HCP Alternative (Proposed Action) is a direct result of forest management practices aimed at increasing the total amount and distribution of SPI land consisting of stands of high-canopy-closure larger trees. Retention conservation measures would also result in the preservation of older forest elements on SPI lands. None of these measures are assured under the No Action Alternative (see Section 2.2.2). Because the CSO is not currently listed, these conservation measures would far exceed the measures under the No Action Alternative and would continue whether or not the CSO becomes listed under the federal ESA. The establishment of the conservation measures under the HCP Alternative (Proposed Action) would provide habitat stability for the CSO on SPI Covered Lands. This increase in PHAs and retention of habitat elements would directly result in an increase in suitable habitat availability for the CSO when compared to the No Action Alternative. A steady increase in the number of PHAs is expected over the first 25 years of the permit term, with substantial increases in the later decades of the permit term due to ongoing growth in mixed stands (forest of mixed ages) and ingrowth of even stands (forest of regenerated trees of similar age). The availability of Mixed HF4 and HF2H over the next 30 years remains consistent, with an increase in Even HF4 and HF2H during the latter half of the permit term (see HCP Appendix 4.3, Section 4.3.8). Modeled data from the SPI HCP predicts an increase in the percentage of large tree, closed canopy forests (HF4) and medium tree, high canopy forests (HF2H) over the 50-year permit term. For example, HF4 increases from 23% to 43% over the permit term, while HF2H increases from 27% to 35% of the landscape over the permit term. The distribution of habitat forms on SPI Covered Lands and their predicted change during the permit term are displayed in Figures 4.3.8 – 4.3.12 in Appendix 4.3 of the SPI HCP.

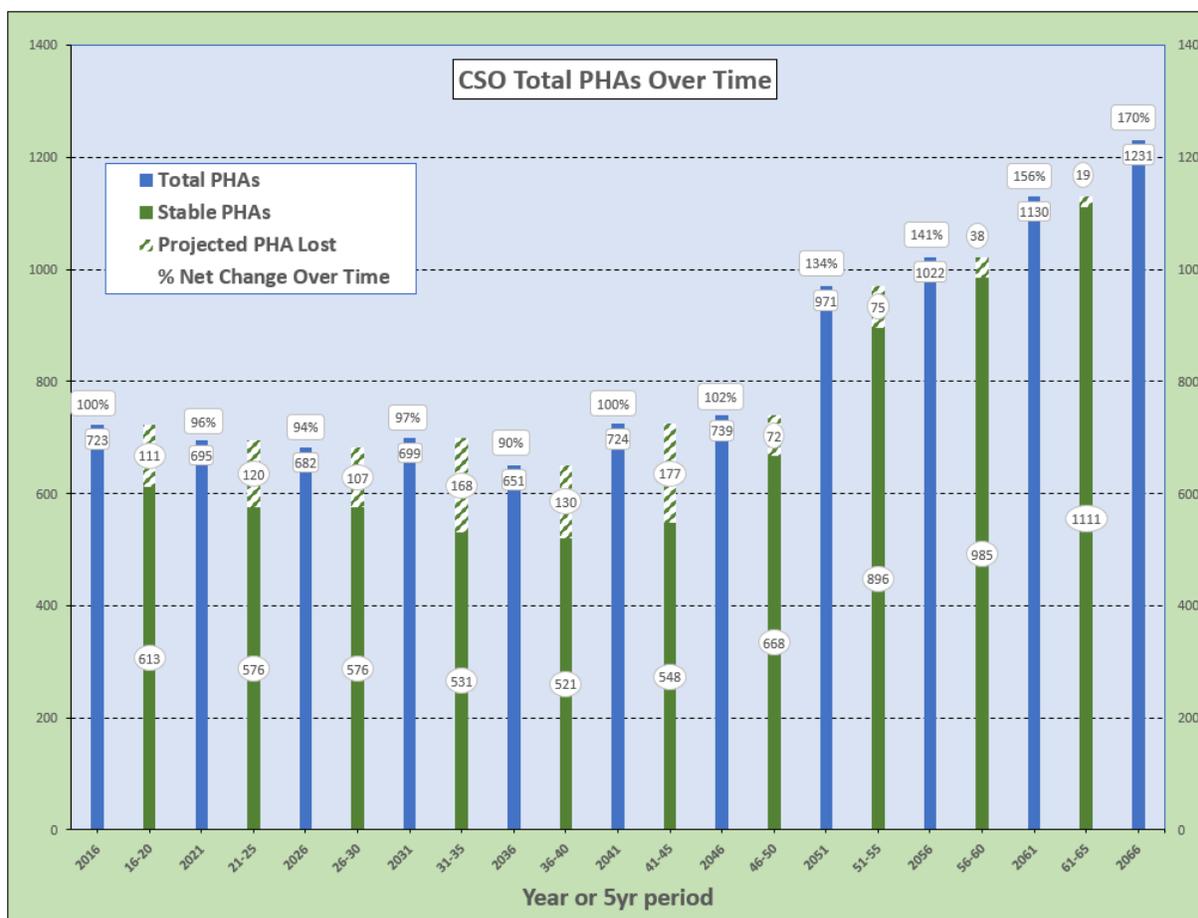


Figure 3-6. CSO PHAs Over Time (SPI 2019).

Under the HCP Alternative (Proposed Action), SPI would conduct and maintain analyses of spotted owl habitat and occupancy on the Covered Lands, and this information would be shared with the Service (see HCP Sections 6.1-6.11). SPI would submit annual monitoring reports and meet with the CDFW and the Service at specified intervals throughout the permit term (see HCP Section 6.10). Information about habitat forms and their distribution on the landscape would be available to the Service for SPI Covered Lands, and this information may be used by the agencies to develop management strategies for the CSO throughout its range.

PHAs are a measure of aggregations of large/medium tree, high canopy cover habitat on the landscape, as defined by SPI’s Habitat Forms. There is some uncertainty surrounding the definition of a PHA in terms of providing sufficient spotted owl habitat. SPI’s Habitat Forms do not consider other attributes that may be essential components of spotted owl habitat, such as slope position, downed logs and woody debris, and deformed trees with nesting features. Most efforts to estimate spotted owl habitat based on timber inventory data use tree diameter and canopy cover, which can act as a surrogate for stand age because, as forests become older, the features used by spotted owls become more abundant. SPI Habitat Forms and PHA thresholds, however, are on the lower end of what has typically been considered necessary for spotted owls, in terms of tree sizes and acreage in particular. Furthermore, over the permit term, the landscape will be converted from PHAs currently dominated by mixed stands to those dominated by even-aged stands. In the HCP it is assumed that these PHAs will similarly support spotted owls due to growth of large/medium trees and high canopy cover, plus the retention of habitat elements that will

provide habitat structure and complexity; however, this assumption has not yet been tested. Due to this uncertainty, the HCP includes a robust monitoring and adaptive management program (see HCP Section 6.0).

### ***Barred Owl Research***

Similar to the NWFP/SNFPA Alternative, barred owl research would be conducted under the HCP Alternative (Proposed Action) throughout the 50-year permit term and would be expected to indirectly benefit CSO populations by directly reducing competition with barred owls on SPI Covered Lands. Barred owl research would not be conducted under the No Action Alternative. Barred owl research on the SPI Covered Lands, which includes approximately 1,566,153 acres, is expected to require the collection of 50 barred owls per year over the 50-year permit term, for a total of 2,500 barred owls collected over the permit term (see SPI HCP Section 5.2.8). Collections would be carried out under all required permits from the Service and CDFW. If barred owl populations increase throughout the SPI Covered Lands, the barred owl collection rate could rise to 150 barred owls per year over the 50-year permit term, for a potential total of 7,500 barred owls over the permit term (see SPI HCP Section 5.2.8). Assuming that effects to the CSO are similar to those predicted for the NSO, declines in the barred owl population may potentially indirectly slow or alter the predicted 50% decline in CSO populations that may occur under the No Action Alternative by decreasing competition between the species. However, it is not known whether this decline in the barred owl population would be offset by population increases that may be attributable to timber harvest in the area making habitat more suitable for barred owls and other generalist species.

### **NWFP/SNFPA Alternative**

#### ***Take via Harm through habitat modification***

Under the NWFP/SNFPA Alternative, the expected removal of CSO ACs would likely be reduced when compared to the No Action or HCP alternatives. This would primarily be due to the expanded protection of habitat surrounding CSO ACs, regardless of occupancy, and as such, little to no take of the CSO would be expected under the NWFP/SNFPA Alternative.

#### ***Habitat Management***

Habitat element retention and management for PHAs would not be required, likely resulting in less overall habitat availability for the CSO by the end of the permit term, though this effect may be somewhat offset by the habitat protections described below.

Based on the 335 CSO ACs subject to take (ACs on or within 0.25 mile of SPI Covered Lands and in hexagons with more than 50 acres of SPI ownership; see HCP Appendix 4.3), 100,500 acres of land would be designated as PACs. An additional 502,500 acres of the best available habitat would also be retained, based on retaining an average of an additional 1,500 acres of the best surrounding habitat for the 335 CSO ACs subject to take. The total protected CSO habitat, based on the 335 CSO ACs subject to take, would include approximately 603,000 acres, though some of this protected land may not occur on SPI Covered Lands. If all 603,000 acres were on SPI lands, this would include 50.7% of the 1,188,271 acres of SPI Covered Lands within the range of the CSO. In reality, however, this value would be lower, as some of the protected lands would be on adjacent properties due to the ownership pattern and habitat suitability.

Due to the limited amount of acreage available for timber harvest under this alternative, it is anticipated that SPI Covered Lands that are available for harvest could experience intense harvest or timber harvest rates would have to decrease. Both of these results could have far-reaching effects on other resources (e.g., vegetation, socioeconomics).

Under the NWFP/SNFPA Alternative, SPI would conduct and maintain analyses of spotted owl habitat and occupancy on the Covered Lands, and this information would be shared with the Service (see HCP Sections 6.1-6.11). SPI would submit annual monitoring reports and meet with the CDFW and the Service at specified intervals throughout the permit term (see HCP Section 6.10). Information about habitat forms and their distribution on the landscape would be available to the Service for SPI Covered Lands, and this information may be used by the agencies to develop management strategies for the CSO throughout its range.

PHAs are a measure of aggregations of large/medium tree, high canopy cover habitat on the landscape, as defined by SPI's Habitat Forms. There is some uncertainty surrounding the definition of a PHA in terms of providing sufficient spotted owl habitat. SPI's Habitat Forms do not consider other attributes that may be essential components of spotted owl habitat, such as slope position, downed logs and woody debris, and deformed trees with nesting features. Most efforts to estimate spotted owl habitat based on timber inventory data use tree diameter and canopy cover, which can act as a surrogate for stand age because, as forests become older, the features used by spotted owls become more abundant. SPI Habitat Forms and PHA thresholds, however, are on the lower end of what has typically been considered necessary for spotted owls, in terms of tree sizes and acreage in particular. Furthermore, over the permit term, the landscape will be converted from PHAs currently dominated by mixed stands to those dominated by even-aged stands. In the HCP it is assumed that these PHAs will similarly support spotted owls due to growth of large/medium trees and high canopy cover, plus the retention of habitat elements that will provide habitat structure and complexity; however, this assumption has not yet been tested. Due to this uncertainty, the HCP includes a robust monitoring and adaptive management program (see HCP Section 6.0).

#### ***Barred Owl Research***

Similar to the HCP Alternative (Proposed Action), barred owl research would be conducted under the NWFP/SNFPA Alternative throughout the 50-year permit term and would be expected to indirectly benefit CSO populations by directly reducing competition with barred owls on SPI Covered Lands. Barred owl research would not be conducted under the No Action Alternative. Barred owl research on the SPI Covered Lands, which includes approximately 1,566,153 acres, is expected to require the collection of 50 barred owls per year over the 50-year permit term, for a total of 2,500 barred owls collected over the permit term (see SPI HCP Section 5.2.8). Collections would be carried out under all required permits from the Service and CDFW. If barred owl populations increase throughout the SPI Covered Lands, the barred owl collection rate could rise to 150 barred owls per year over the 50-year permit term, for a potential total of 7,500 barred owls over the permit term (see SPI HCP Section 5.2.8). Assuming that effects to the CSO are similar to those predicted for the NSO, declines in the barred owl population may potentially slow or alter the predicted 50% decline in CSO populations that may occur under the No Action Alternative. It is assumed that any decline in the barred owl population that may occur under the NWFP/SNFPA Alternative would be an indirect benefit to the CSO, directly decreasing the competition between the species. However, it is not known whether this decline in the barred owl population would be offset by population increases that may be attributable to timber harvest in the area making habitat more suitable for barred owls and other generalist species.

#### **3.2.1.7 Federally- and State-listed Species**

Timber harvest and management activities (see Section 1.2.3) are expected to continue to occur under any of the three alternatives under consideration. Under all alternatives, timber harvest and management activities are expected to occur throughout the Analysis Area and would continue at approximately the same rate for the next 50 years (see Section 3.2.1.1 for information on projected timber harvest rates). Depending on the alternative, these effects could occur in different areas of the SPI Covered Lands,

though all activities would follow applicable rules and regulations (i.e., ESA, CESA, CEQA, CFPR). Direct and indirect effects to listed species are anticipated to be similar under all three alternatives, though the location and level of impact of the effects may vary. Direct effects may include mortality and habitat removal or damage from timber harvest or related activities; indirect effects may include habitat fragmentation, edge effects, or displacement, leading to decreased survivorship, and/or decreased breeding success. While timber harvest activities have the potential to negatively affect listed species both directly and indirectly, each individual THP is designed to avoid or mitigate adverse effects, to ensure that the activity is in compliance with existing state and federal laws, and to have a CEQA determination of less-than-significant impact.

The CFPR have provisions that provide protections for listed wildlife species and their habitat. Under the rules, no listed species can be directly or indirectly adversely affected by proposed timber operations. For timber operations with potential to adversely affect listed species or the habitat of listed species, consultation with the USFWS or CDFW must be completed prior to plan approval.

Several of the federally- and state-listed species likely to occur within the Analysis Area may be directly or indirectly affected by management activities directed towards the NSO and CSO. Species that make use of the same habitats utilized as NSO and CSO nesting, roosting, and foraging habitats would be directly affected by the enhancement and protection of those areas. Amphibian and fish species are likely to be indirectly affected by NSO and CSO habitat management, as the practices can be expected to have effects on streams and wetlands in the Analysis Area. Similar effects as described for wildlife and fishery resources would be expected (see Section 3.2.1.3).

Under all alternatives under consideration, management of federally-listed and candidate species would continue under guidelines set by the federal government and the state of California. The potential effects to wildlife resulting from forest management and the mitigation and avoidance measures applied to reduce these effects would continue pursuant to the CFPR as administered by CAL FIRE and the multidisciplinary review team. There would be no change to the size and type of effects to listed species from what currently occurs. Take of federally-listed species would be avoided, though if the fisher is listed before 2026 take would be allowed under the terms of the existing SPI Fisher CCAA under any of the three alternatives under consideration until 2026.

### **No Action Alternative**

Under the No Action Alternative, timber harvest and management activities in the Analysis Area (see Section 3.2.1.1 for information on projected timber harvest rates) would continue to indirectly affect listed species through habitat fragmentation, edge effects, and displacement, potentially leading to decreased survivorship and/or decreased breeding success. Take (either direct mortality or injury, or harm due to habitat modification resulting in injury or death) of listed species (including the covered NSO) would be avoided in accordance with the ESA and CESA and addressed during the THP review process. No change in the status quo for federally- and state-listed species are anticipated under the No Action Alternative as the result of SPI's timber harvest activities. However, some changes could potentially occur if the listing of a new species under the state or federal ESA or some other regulatory change resulted in new requirements designed to avoid prohibited take or minimize other environmental impacts resulting from any of the Covered Activities. Under the No Action Alternative, it is anticipated that SPI would continue to manage the Covered Lands in the same manner as the present day. SPI would not be required to conduct or maintain landscape analyses pertinent to spotted owl habitat management, and information pertaining to habitat management on SPI Covered Lands would not be provided to the Service.

**HCP Alternative – Proposed Action**

Under the HCP Alternative (Proposed Action), it is anticipated that federally- and state-listed species would be affected to a similar extent as under the No Action and marginally greater than the NWFP/SNFPA alternatives. Timber harvest and management activities in the Analysis Area would continue to indirectly affect listed species (through habitat fragmentation, edge effects, and displacement, potentially leading to decreased survivorship, and/or decreased breeding success), with take (either direct mortality or injury, or harm due to habitat modification resulting in injury or death) of listed species (with the exception of the covered NSO and CSO) being avoided in accordance with the ESA and CESA and addressed during the THP review process. The location and timing of impact may be slightly different, as non-harvested areas currently protected to avoid take of the NSO could be harvested with the issuance of an ITP for the species and the protection of CSO ACs would be expanded under the SPI HCP.

Under the HCP Alternative (Proposed Action), SPI would conduct and maintain analyses of spotted owl habitat and occupancy on the Covered Lands, and this information would be shared with the Service (see HCP Sections 6.1-6.11). SPI would submit annual monitoring reports and meet with the CDFW and the Service at specified intervals throughout the permit term (see HCP Section 6.10). Information about habitat forms and their distribution on the landscape would be available to the Service for SPI Covered Lands, and this information may be used by the agencies to develop management strategies for federally- and state-listed species on and in proximity to the SPI Covered Lands.

**NWFP/SNFPA Alternative**

Under the NWFP/SNFPA Alternative, effects to federally- and state-listed species (both direct and indirect) may be reduced when compared to the No Action and HCP (Proposed Action) alternatives due to the establishment of no harvest areas. Timber harvest and management activities in the Analysis Area (see Section 3.2.1.1 for information on projected timber harvest rates) is anticipated to continue to indirectly affect listed species (through habitat fragmentation, edge effects, and displacement, potentially leading to decreased survivorship, and/or decreased breeding success), with take (either direct mortality or injury, or harm due to habitat modification resulting in injury or death) of listed species (with the exception of the covered NSO and CSO) being avoided in accordance with the ESA and CESA and addressed during the THP review process. Indirect effects to federally- and state-listed species within the LSRs and within the protected ACs established within the NSO range on SPI Covered Lands would not occur, as timber harvest in these areas would not occur. In the range of the CSO, the 300-acre PACs would also be protected from timber harvest, and no effects to federally- and state-listed species would occur. Additional habitat (best available) with the HRCAs would also be protected, and minimal indirect effects to listed species in these areas would be anticipated. As a result, timber harvest activities would be expected to increase on SPI Covered Lands not under these protections in order to meet timber demand. Thus, timber harvest would likely be more intense in non-protected areas, resulting in possible increased indirect effects to listed species there while avoiding activities that would affect the protected areas on SPI Covered Lands.

Under the NWFP/SNFPA Alternative, SPI would conduct and maintain analyses of spotted owl habitat and occupancy on the Covered Lands, and this information would be shared with the Service (see HCP Sections 6.1-6.11). SPI would submit annual monitoring reports and meet with the CDFW and the Service at specified intervals throughout the permit term (see HCP Section 6.10). Information about habitat forms and their distribution on the landscape would be available to the Service for SPI Covered Lands, and this information may be used by the agencies to develop management strategies for federally- and state-listed species on and in proximity to the SPI Covered Lands.

## **CHAPTER 4. WATER RESOURCES**

### **4.1 AFFECTED ENVIRONMENT**

This section describes the existing water resources in the Analysis Area, including surface water, floodplains, wetlands, and groundwater. The analysis of water resources is based upon online databases and documents produced by federal and state agencies, such as the Service, USGS, the Federal Emergency Management Agency (FEMA), and the National Wetlands Inventory (NWI).

A watershed is defined as an area of land that drains into a waterbody and is represented in many shapes and sizes, such as the area that drains into a local creek, or an area that drains into the Pacific Ocean. Hierarchical classification of watersheds created by the USGS and NRCS (2013) are identified by a Hydrologic Unit Code (HUC). The United States is divided into six levels of hydrologic code classifications (HUC 2, 4, 6, 8, 10, 12). The HUC 6 level classification (known as accounting units) is nested within, or equivalent to, a subregion (i.e., a subregion may have only one basin, in which case they are equivalent) and is used for analysis in this DEIS (USGS and NRCS 2013). Further information pertaining to the descriptions of HUC classifications is available at: <https://water.usgs.gov/GIS/huc.html>.

The Analysis Area intersects with 7 HUC 6 level accounting units with 70.2% of lands captured within the Lower and Upper Sacramento basins (Table 4-1, Figure 4-1).

**Table 4-1. Acres of HUC 6 accounting units within the Analysis Area by Level III Ecoregion.**

<b>HUC 6 Name (ID)</b>	<b>Cascades</b>	<b>Central Basin and Range</b>	<b>Central California Foothills and Coastal Mountains</b>	<b>Eastern Cascades Slopes and Foothills</b>	<b>Klamath Mountains /California High North Coast Range</b>	<b>Northern Basin and Range</b>	<b>Sierra Nevada</b>
Klamath (180102)	2,889.0	0	201.6	15,735.7	695,771.7	0	0
Lower Sacramento (180201)	672,804.6	5,782.3	109,965.6	0	164,022.2	0	1,837,603.7
North Lahontan (180800)	140,792.7	3,118.7	0	74,496.0	0	469.6	37,957.9
Northern California Coastal (180101)	0	0	0	0	5,890.3	0	0
San Joaquin (180400)	0	0	2.7	0	0	0	764,574.4
Truckee (160501)	0	0	0	0	0	0	112,074.5
Upper Sacramento (180200)	760,568.2	0	0	367,743.1	450,821.0	0	0

Water quality related to water resources identified throughout this section may be affected by timber operations. Site preparation, both pre- (e.g., forest/skid road construction, stream crossings) and post-harvest (seed bed preparation), may disturb soils and increase erosion. Removal of trees increases soil moisture and decreases shading, thereby increasing soil and water temperatures. Duff layers would decrease, and ground snow pack would increase resulting in increased runoff during snow melt, rain-on-snow, and rain events in harvested areas. These indirect effects may last for several years until sufficient forest regeneration occurs in harvested areas. Herbicide/pesticide use in these areas also have the potential to enter waterbodies (USFWS 2016a).

Streams, rivers, and lakes listed as impaired water bodies (CWA 303(d)) within the Analysis Area can be found in Table A-3 in Appendix C. A total of 51,414 acres of impaired waterbodies and 1,054 miles of impaired streams are located within the Analysis Area. Many of the listing categories (e.g., pollutants) may not relate to forestry operations. These include metals, metalloids and mercury (from current or former mining operations), pathogens (commonly from leaky septic systems), polychlorinated biphenyls (PCBs), and salinity (total dissolved solids). Listing categories that may affect water quality attributed to forestry activities conducted by SPI, are sediment, temperature, dissolved oxygen, toxicity (when related to herbicides), and nutrients (USFWS 2016a).

The Analysis Area contains 43,141 miles of waterways (including: rivers, streams, canals, ditches, and artificial path; Table 4-2; USGS 2018). Given the large spatial coverage of the Analysis Area, most of these waterways ultimately drain into major rivers in northeastern California. These rivers include the Pit River, Tuolumne River, Klamath River, Trinity River, and the Sacramento River both above and below Shasta Dam. There are four designated wild and scenic rivers that traverse through the Analysis Area: North Fork American River, Tuolumne River, Middle Fork Feather River, and Trinity River (Figure 4-2; NPS 2018).

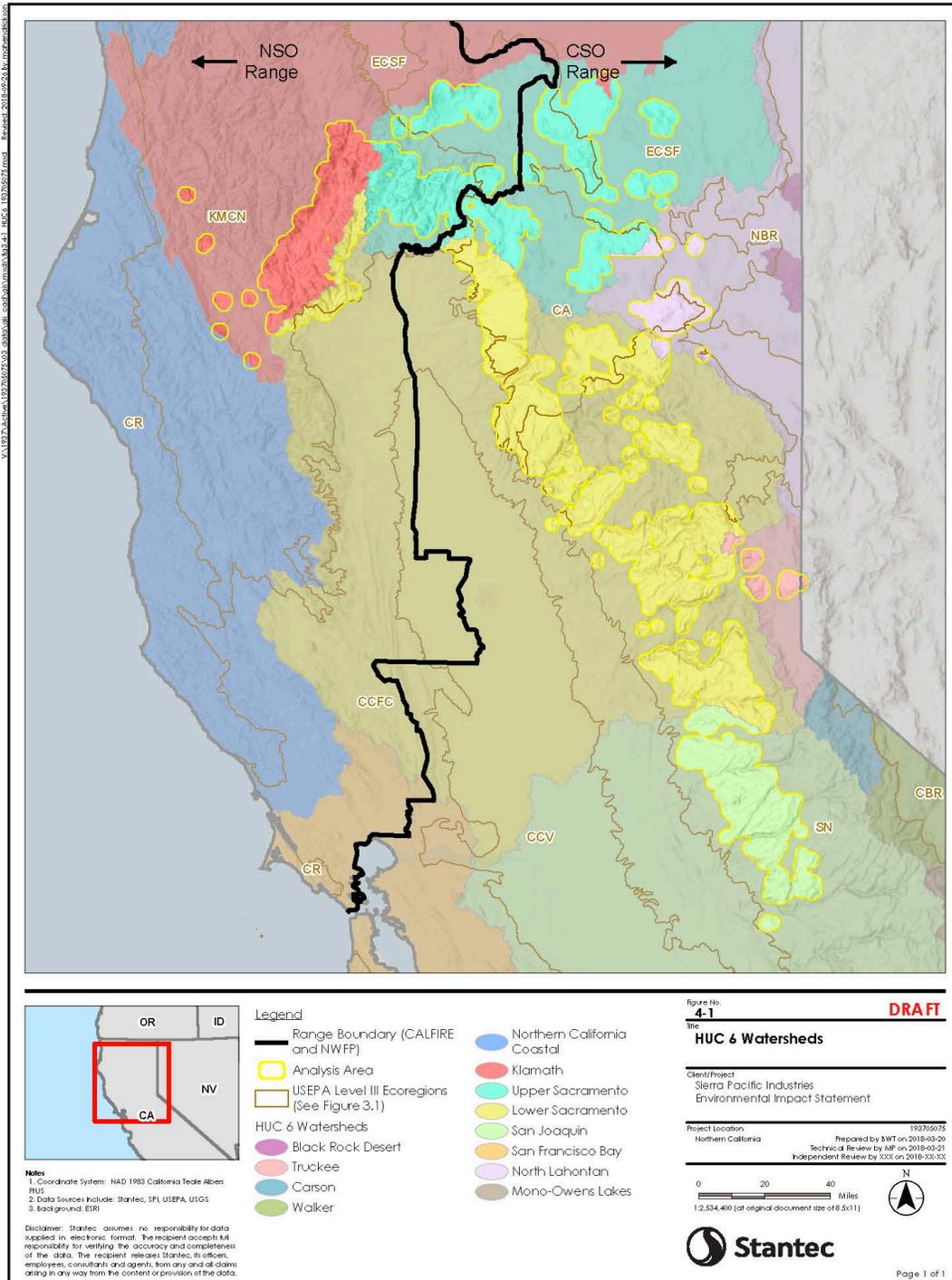


Figure 4-1. HUC 6 Watersheds.

**Table 4-2. Water features within the Analysis Area and SPI Covered Lands.**

<b>Waterways (miles)</b>	<b>Analysis Area</b>	<b>Covered Lands</b>
Stream/River	4.0	<0.1
Stream/River (Ephemeral)	22,108.6	4,827.6
Stream/River (Intermittent)	11,565.9	2,995.2
Stream/River (Perennial)	7,527.6	1,768.1
Canal/Ditch	524.1	64.4
Artificial Path	1,410.9	41.5
<b>Total Waterway Miles</b>	<b>43,141.2</b>	<b>9,696.8</b>

<b>Waterbodies (acres)</b>	<b>Analysis Area</b>	<b>Covered Lands</b>
Ice Mass	12.2	0
Lake/Pond	86,849.2	2,226.3
Playa	1,684.3	64.3
Reservoir	1,977.7	0.9
<b>Total Waterbody Acreage</b>	<b>90,523.4</b>	<b>2,291.5</b>

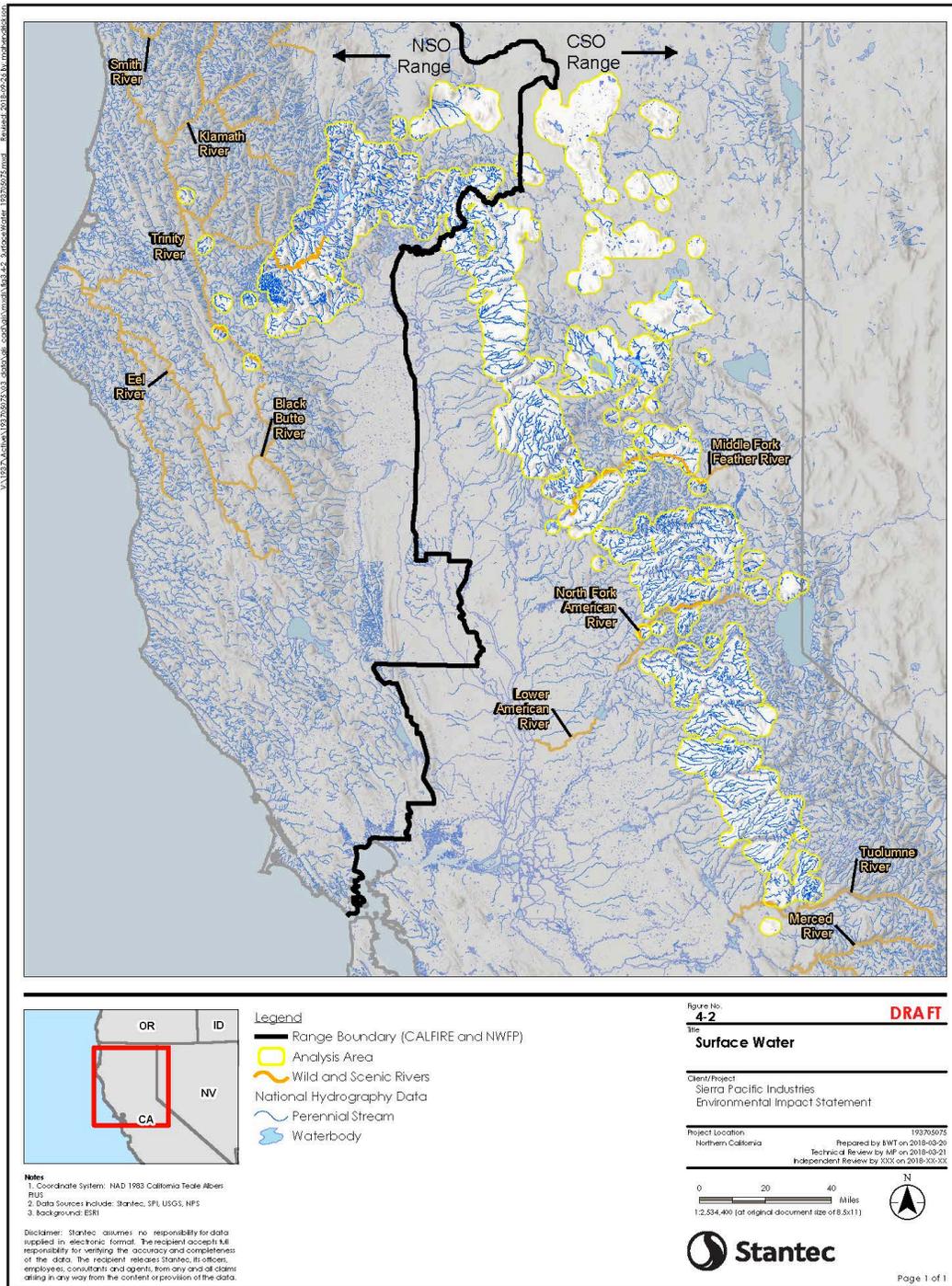


Figure 4-2. Surface Water.

Floodplains are defined as the channel of a waterway (i.e., floodway) and areas of land vulnerable to inundation, typically adjacent to waterways and/or associated with wetlands and other surface waters (i.e., flood fringe). Floodplains may vary based on topography, size of watershed drained by the waterway, flow rate, and soils associated with the watershed. FEMA has mapped the majority of floodplains within the United States. A total of 118,777.7 acres of 100-year floodplain (areas with a 1.0% annual probability of flooding) and 2,155.1 acres of 500-year floodplain (areas with a 2.0% annual probability of flooding) have been mapped within the Analysis Area (Table 4-3, FEMA 2018).

**Table 4-3. Acres of FEMA mapped 100-year and 500-year floodplain by Level III Ecoregion within the Analysis Area.**

Level III Ecoregion	100-year Floodplain (acres)	500-year Floodplain (acres)
Cascades	33,150.8	178.5
Central Basin and Range	447.5	31.6
Central California Foothills and Coastal Mountains	4,726.2	0
Eastern Cascades Slopes and Foothills	28,739.3	0.1
Klamath Mountains/California High North Coast Range	10,820.5	418.8
Northern Basin and Range	148.2	0
Sierra Nevada	40,745.3	1,526.1

Wetlands are areas with saturated soils and/or inundation that may support both aquatic and terrestrial organisms. Wetland types vary broadly depending on topography, hydrology, climate, soil type, vegetation, and other factors. Wetlands provide value to ecosystems by providing habitat for fish and wildlife, water quality improvement, and floodwater storage (USEPA 2002).

NWI data were used to determine the presence of wetlands within the Analysis Area. These data are based on a wetland classification system developed by Cowardin et al. (1979) and are now the federal standard for classifying wetlands. The NWI mapped wetland habitat makes up approximately 3.7% of the Analysis Area (233,220.1 acres). Primarily located in the Cascades and Sierra Nevada ecoregions, wetland habitat is mostly represented by freshwater emergent and lake wetland community types (Table 4-4, Figure 4-3).

**Table 4-4. Acres of wetlands by Level III Ecoregion within the Analysis Area.**

<b>Wetland Classification<sup>1</sup></b>	<b>Wetland Description</b>	<b>Cascades</b>	<b>Central Basin and Range</b>	<b>Central California Foothills and Coastal Mountains</b>	<b>Eastern Cascades Slopes and Foothills</b>	<b>Klamath Mountains /California High North Coast Range</b>	<b>Northern Basin and Range</b>	<b>Sierra Nevada</b>
Freshwater emergent wetlands	Erect, rooted, herbaceous hydrophytes, excluding mosses and lichens; vegetation present for most of the growing season in most years. Typically dominated by perennial plants.	29,994.1	3,210.1	73.7	18,592.5	1,189.2	22.0	21,290.9
Freshwater Forested/Shrub Wetland	Freshwater forest contains woody vegetation that is at least 20 feet tall.  Shrub wetlands are areas dominated by woody vegetation less than 20 feet tall.	8,521.1	60.7	270.4	1,107.5	3,589.0	3.2	12,191.5
Freshwater Pond	Unconsolidated bottom, rock bottom, aquatic bed, and unconsolidated shore.	642.1	3.8	47.2	347.7	428.7	0	1,545.1

Wetland Classification <sup>1</sup>	Wetland Description	Cascades	Central Basin and Range	Central California Foothills and Coastal Mountains	Eastern Cascades Slopes and Foothills	Klamath Mountains /California High North Coast Range	Northern Basin and Range	Sierra Nevada
Riverine	Wetlands and deep-water habitats that contain natural or artificial channels periodically or continuously containing flowing water or which forms a connecting link between two bodies of standing water.	8,579.2	52.2	989.3	1,929.7	17,519.8	1.3	24,428.5
Lake	Deep-water habitats associated with depressions or dammed channels greater than 20 acres in area, and which have less than 30% of their areas dominated by trees, shrubs, or emergent vegetation.	14,365.8	0	4,412.5	9,228.6	22,122.5	0	26,460.2

<sup>1</sup> United States Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI)

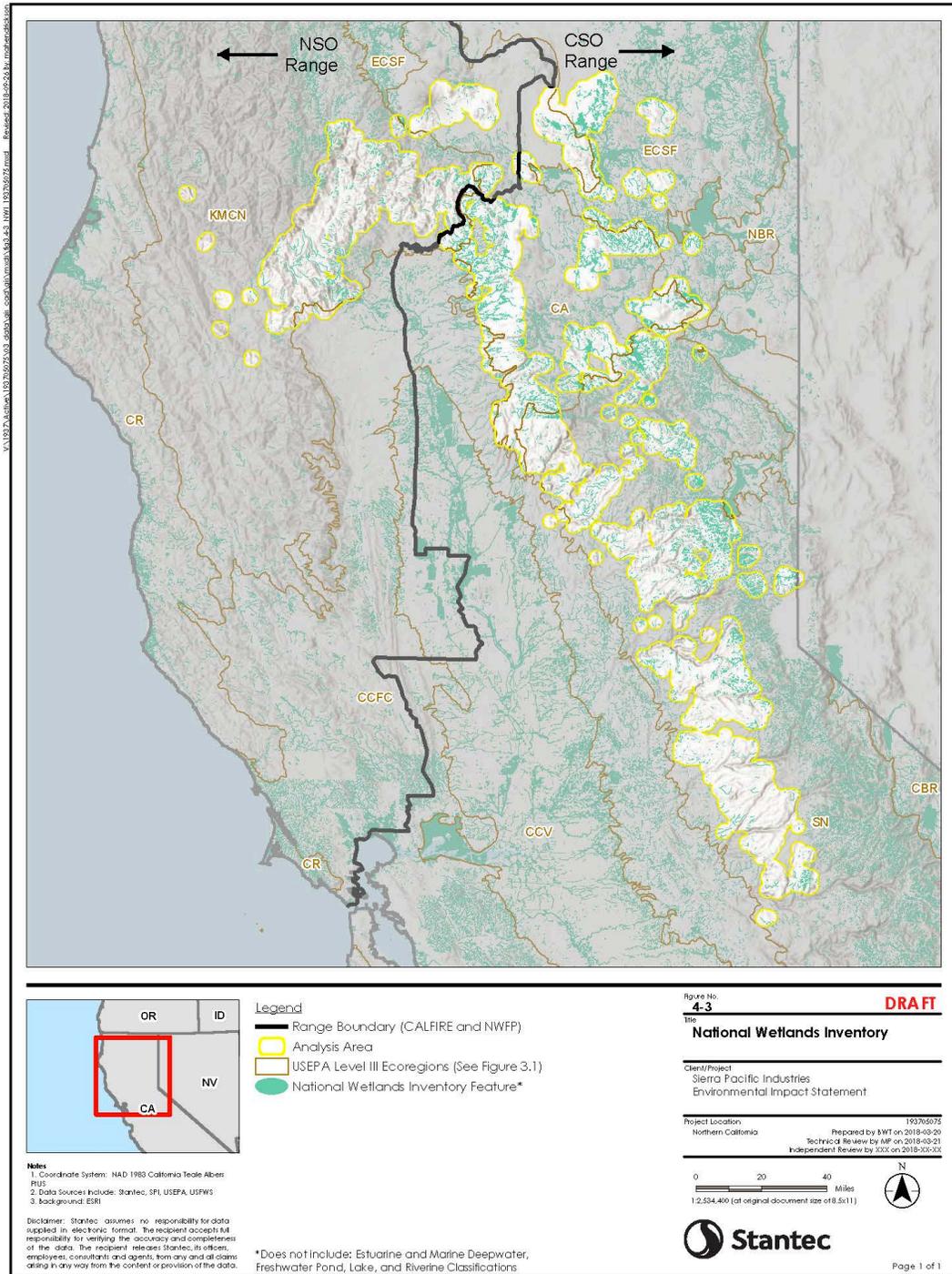


Figure 4-3. National Wetlands Inventory.

Groundwater is the subsurface water present beneath the surface of the Earth, where it is located within permeable materials such as pores between soil particles, fractures of rock formations, or other openings. The Central Valley and Modoc Plateau are the major groundwater basins of northern California that extend within the boundaries of the Analysis Area (Ferriz 2001). A brief description of each is provided below:

- The Central Valley is the largest groundwater basin in the state of California, which largely supports agricultural practices. This basin is recharged by direct precipitation and infiltration from large river systems (San Joaquin and Sacramento River systems). Withdrawals mostly result from subflow into the Sacramento delta, evaporation, and pumping (Ferriz 2001).
- The Modoc Plateau is a groundwater basin containing volcanic rock aquifers that hold water in fractures, volcanic pipes, rubble zones, tuff beds, and interbedded sand layers, primarily in basalts of Miocene age or younger. Recharge occurs primarily from infiltration from stream channels, precipitation, snow melt, and flow through volcanic features. The distribution of areas where permeable zones are large and interconnected enough to provide a reliable source of water are unpredictable (Planert and Williams 1995).

## 4.2 ENVIRONMENTAL CONSEQUENCES

### 4.2.1 Direct and Indirect Effects

Timber harvest and management activities (see Section 1.2.3) are expected to continue to occur under any of the three alternatives under consideration (see Section 3.2.1.1 for information on projected timber harvest rates). Under all alternatives, timber harvest and management activities are expected to occur throughout the Analysis Area, resulting in potential effects to water resources. Depending on the alternative, these effects may occur in different areas of the SPI Covered Lands, though all activities would follow applicable rules and regulations (i.e., CFPR). Under the NWFP/SNFPA Alternative, it is anticipated that timber harvest may be restricted to smaller areas, as more acreage of the SPI Covered Lands would be restricted from timber harvest than under the other alternatives. If SPI would harvest the same volume of timber as under the other alternatives, it is anticipated that this could result in more intense timber harvest in those non-restricted areas.

Water resources may be directly and indirectly affected by timber harvest and management activities within the Analysis Area. Direct effects may include alterations in hydrology, riparian conditions, water quality, and sediment input. Direct effects would occur during the period of timber harvest, while indirect effects such as increased sediment input and increased water temperature may continue after the activities have been completed and until forest regrowth occurs. The same types of effects would occur under each alternative; however, the location or level of impacts may vary. Under all alternatives, SPI would conduct timber harvest according to the CFPR and all applicable regulations, resulting in stable water resources conditions over time, as sediment and nutrient inputs are reduced and riparian areas are maintained by the use of BMPs.

Hydrologic processes within watersheds in the Analysis Area may be directly and indirectly affected by timber harvest and management activities under all three alternatives, as surface water annual water yields, low flows, and peak flows may be altered. Indirectly, timber harvest generally results in increases in annual water yield (Bosch and Hewlett 1982, Harr 1983, Stednick 1996) due to decreased vegetation, with these increases diminishing over time as forest regrowth occurs (Harr et al. 1979, Hibbert 1967, Keppler and Ziemer 1990). Timber harvest and its associated activities can directly lead to increases in sediment inputs from the actual timber harvesting activities and can also indirectly increase sedimentation due to decreased vegetation and increased erosion, and increased sediment can result in increased

turbidity levels. Generally, much of the observed erosion after timber harvest activities is associated with roads, landings, or skid trails, rather than surface erosion from harvested areas (Hagans and Weaver 1987, Rice and Datzman 1981). Mass soil movement (i.e., landslides), often associated with road networks, are also possible in areas with unstable slopes (as cited in House et al. 2012). Stream water temperature may increase as the result of riparian canopy removal (Chamberlin et al. 1991, as cited in House et al. 2012). This issue can be worsened by the additive effect of increased sediment inputs that result in wider, shallower stream channels. Decreased dissolved oxygen concentrations can result as a secondary negative effect, as many of these factors can lead to accelerated respiration and reduced oxygen solubility (House et al. 2012). Timber harvest can alter nutrient cycles, often leading to nutrient leaching and loss. Increased erosion also results in nutrient loss, as many nutrients are associated with soil particles (Swank et al. 1989). Clear-cutting results in the greatest changes to these resources, though streamflow and groundwater generally recover towards precutting levels about 10 years after timber harvest (Swank et al. 1989).

The primary mechanisms indirectly affecting hydrology and water quality parameters as the result of forestry operations under any of the alternatives include:

- Timber harvest in riparian zones – Removal of trees and other vegetation alongside streams, which provide shade, large woody and fine organic debris, and filter sediment.
- Site and soil disturbance – May increase soil erosion and runoff rates until vegetation regrowth occurs.
- Decreased transpiration – Harvest can increase the amount of soil water, as it is no longer utilized by trees.
- Snow accumulation – Recently clear-cut areas accumulate more snow due to the lack of forest canopy intercepting the snowfall.
- Herbicide runoff – Herbicides applied to control competing vegetation during reforestation may enter streams and other water bodies.
- Runoff from roads – Forest roads and stream crossings can increase runoff and sediment delivery to nearby water bodies.

Most forestry activities are locally intense and can result in moderate duration effects on water resources. The regenerating timber stand would progressively reduce these effects, as the planted trees mature in the years following timber harvest. This type of disturbance is continuously maintained throughout SPI's timber land, as subsequent timber harvests occur. Roads also result in moderate indirect effects to water resources, though well-maintained roads have significantly less runoff and erosion. Common BMPs used in THPs include but are not limited to: water breaks on roads; buffer establishment near streams, wetlands, and lakes; felling trees away from wet areas, watercourses, and lakes; limiting operation of equipment on steep slopes or saturated soils; and restricting the servicing of equipment to areas away from lakes or watercourses.

Overall, the effects of SPI forestry activities on water resources are of minor to moderate intensity and of moderate duration. The environmental consequences on aquatic resources focuses on the effects of the changes in management and additional measures that would be implemented under the alternatives when compared to the No Action Alternative. Continued implementation of the conservation measures in the SPI Fisher CCAA until 2026 would provide benefits to aquatic resources on SPI Covered Lands under all alternatives. Under the HCP Alternative (Proposed Action) and the NWFP/SNFPA Alternative, these benefits would be expanded and extended for the 50-year permit period consistent with the requested incidental take permit term.

#### 4.2.1.1 No Action Alternative

This DEIS analyses potential direct effects including alterations in hydrology and riparian conditions, and indirect effects such as increased sediment input and water temperature. Direct effects would occur during the period of timber harvest, while indirect effects may continue after the activities have been completed and until forest regrowth occurs. However, because of the reasons described below (e.g., state agency requirements) no significant impacts are expected to occur. Under the No Action Alternative, SPI would continue to conduct its timber operations and land management activities under all required state and federal regulations, as well as the SPI Fisher CCAA until 2026, with timber harvest not exceeding the demonstrated long-term sustained yield (see Section 3.2.1.1 for information on projected timber harvest rates). No change in the status quo is anticipated to occur. Under the CFPR, water quality must be addressed in THP development and agency review and approval, with beneficial uses of water and functions of riparian zones maintained, protected, or restored, depending on the circumstance. Specifically, the CFPR require these uses and functions be maintained where they are in good condition, protected where they are threatened, and restored where they are impaired. Additionally, impaired 303(d) listed water bodies must be protected under the CFPR.

THPs are reviewed by natural resource specialists of CAL FIRE, CDFW, the appropriate California Regional Water Quality Control Board (RWQCB), and the California Geological Survey to determine their adherence to applicable regulations and that applied mitigation measures meet the CEQA less-than-significant impact standard. These reviews include both document and in-field, site-specific reviews, and they commonly result in additional mitigation measures being identified by these agencies that must be incorporated into the final THP. Additionally, THPs are designed using the BOF anadromous salmonid protection rules package<sup>6</sup> in stream systems with federal- or state-listed salmonids. These rules do not apply to downstream sediment transport or temperature effects.

The THP process addresses water quality requirements on nonfederal timber lands by applying erosion control BMPs in a site-specific manner. Monitoring for implementation and effectiveness of the BMPs is required (e.g., Central Valley Regional Water Quality Control Board [RWQB] 2010). The Central Valley RWQCB also designates the BOF and CAL FIRE as joint management agencies for water quality management plan implementation. Additional forestry BMPs address both point (e.g., pipes) and non-point sources (i.e., diffuse landscape sources) of pollution and sedimentation. Many forest-related sediment sources are non-point sources and may include sediment contained in runoff from timber harvest units and road systems. The delivery of other water quality pollutants, such as sediment, organic debris, and chemical contaminants, are minimized or mitigated through the THP process.

The BOF anadromous salmonid protection rules recognize potential effects on anadromous salmonids through sedimentation and impacts to riparian zones that shade streams and contribute large woody debris. These rules provide a variety of additional protections for watercourses and lakes (e.g., increase WLPZ width and protection requirements). Site-specific investigation and application of the rule package is required for THPs where timber operations may affect anadromous salmonids.

The CFPR also require that new timber harvest units not be placed next to older units until those units are at least 5 years old. These adjacency requirements help reduce rain-on-snow effects (i.e., rainfall on existing snowpack resulting in increased runoff). The THP process further addresses sediment-related and peak flow effects through cumulative impacts assessments within each watershed affected by implementation of a specific THP.

Roads, many of which are permanent features, are maintained to minimize runoff and erosion, and their effects on water resources are of moderate duration. The potential for road degradation exists when roads

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<sup>6</sup> [http://www.fire.ca.gov/resource\\_mgt/downloads/Revised\\_Post-Workshop\\_ASP\\_Q&A\\_doc\\_4\\_2\\_2010\\_Final.pdf](http://www.fire.ca.gov/resource_mgt/downloads/Revised_Post-Workshop_ASP_Q&A_doc_4_2_2010_Final.pdf)

are used excessively, resulting in increased sediment transport rates and accelerated water runoff affecting water quality. The BOF enacted a revised CFPR pursuant to 14 CCR § 923 et seq. [943 et seq., 963 et seq.] in 2015, which describes and limits timber operations on logging roads, landings, and logging road watercourse crossings. These rules require an assessment of all pertinent roads, identification of associated potential erosion sites, and prescription of corrective measures prescribed in the THP. The BOF Technical Rule addendum No. 5 (TRA 5) was also enacted in 2015 to provide guidance on hydrologic disconnection, road drainage, minimization of diversion potential, and high-risk crossings. The CFPR require that road drainage practices and facilities (e.g., outsloping, rolling dips, stream crossings) are functioning while the THP is active and for 3 years following its completion date. Monitoring indicates that implementation of CFPR BMPs is high and that these practices are effective in preventing erosion, sedimentation, and sediment transport to stream channels (e.g., Brandow and Cafferata 2014). The purpose of these road maintenance activities is to ensure that roads are properly draining water and not discharging sediment to watercourses or contributing to excess erosion.

The primary timber harvest activities are performed under individual THPs that address water quality resources and apply avoidance and mitigation measures to minimize impacts to a CEQA determination of less-than-significant impact under CEQA. The consideration and application of regulatory requirements, use of the BOF's anadromous salmonid protections rules, impact consideration during the THP process, adherence to updated roads, landings, and logging road watercourse crossing rules, and the application of site-specific erosion control and mitigation measures ensure that the intensity of water quality impacts are minor to moderate. The water quality effects of timber harvest and management activities on individual units are considered of moderate duration because trees are replanted and regrow over a period of years, progressively reducing the potential for local effects on soil erosion, hydrology, and water quality.

Overall, the effects of SPI's timber harvest and management activities on water resources under the No Action Alternative would be minor to moderate intensity and of moderate duration. However, because of adherence to the CFPR and implementation of the conservation measures outlined in the SPI Fisher CCAA until 2026, impacts to aquatic resources related to forest management activities are not expected to increase.

#### **4.2.1.2 HCP Alternative – Proposed Action**

This DEIS analyzes potential direct effects including alterations in hydrology and riparian conditions, and indirect effects such as increased sediment input and water temperature. Direct effects would occur during the period of timber harvest, while indirect effects may continue after the activities have been completed and until forest regrowth occurs. However, because of the reasons described below (e.g., state agency requirements) no significant impacts are expected to occur. Under the HCP Alternative (Proposed Action), SPI would continue to operate in accordance with all required state and federal regulations protecting water resources (described in Section 4.2.1.1 above for the No Action Alternative) and would continue to implement the conservation measures outlined in the SPI Fisher CCAA until 2026. A marginal beneficial effect due to the implementation of the HCP and its associated conservation measures would be expected, as these measures would extend and expand the current protections under the SPI Fisher CCAA. These enhanced benefits would be extended throughout the 50-year permit term. SPI is expected to harvest the same total timber volume from approximately the same acreage over the 50-year permit term when compared to the No Action Alternative. Implementation of the conservation measures in the HCP (see SPI HCP Section 5.2) may result in changes to the exact locations and timing of timber harvest on SPI Covered Lands. Therefore, with respect to the Covered Lands, the effects of the Covered Activities on soil erosion, hydrological response, and water quality are expected to be similar to those that would occur under the No Action and NWFP/SNFPA alternatives, with the enhanced benefit of extending many of the conservation measures currently implemented under the SPI Fisher CCAA (similar to NWFP/SNFPA Alternative).

#### 4.2.1.3 NWFP/SNFPA Alternative

This DEIS analyzes potential direct effects including alterations in hydrology and riparian conditions, and indirect effects such as increased sediment input and water temperature. Direct effects would occur during the period of timber harvest, while indirect effects may continue after the activities have been completed and until forest regrowth occurs. However, because of the reasons described below (e.g., state agency requirements) no significant impacts are expected to occur. Under the NWFP/SNFPA Alternative, SPI would continue to operate in accordance with all required state and federal regulations protecting water resources and the SPI Fisher CCAA until 2026. Similar to the HCP Alternative (Proposed Action), a marginal beneficial effect would be expected due to the implementation of a revised HCP and the establishment of additional no-harvest areas. However, any adverse effects to water resources may be more localized due to the reduced acreage available for harvest under the NWFP/SNFPA Alternative, if the alternative results in increased harvest pressure on the harvestable portions of the Covered Lands. The Covered Activities would still occur on SPI Covered Lands, though the location and timing of those activities may differ from the No Action Alternative and the HCP Alternative (Proposed Action). Overall, the effects to water resources under the NWFP/SNFPA Alternative are expected to be similar to those described for the No Action and HCP (Proposed Action) alternatives. However, if SPI would reduce its timber harvest volume in response to the reduction in harvestable acres on the Covered Lands, the effects on water resources may be slightly lessened due to the decrease in timber harvest activities. If SPI simply shifts timber harvest to other areas of the Covered Lands in response to the establishment of larger no-harvest areas, similar effects to water resources would be expected, though the location and timing of these effects may be different than under the No Action Alternative or the HCP Alternative (Proposed Action).

## CHAPTER 5. AIR QUALITY AND CLIMATE CHANGE

### 5.1 AFFECTED ENVIRONMENT

This section reviews air quality and climate resources as they relate to the Analysis Area. Resources used for analysis include publicly available data, including information from the USEPA, California Air Pollution Control Officers' Association (CAPCOA), National Oceanic and Atmospheric Administration (NOAA) and United States Energy Information Administration (USEIA).

#### 5.1.1 Air Quality

Air quality is generally influenced by the quantities of pollutants released within and upwind of an area and can be highly dependent upon the chemical and physical properties of the pollutants. Air quality standards and regulations limit the allowable quantities of pollutants that may be emitted. Additionally, the topography, weather, and land use in an area also affect how pollutants are transported and dispersed and the resulting ambient concentrations.

Air quality standards are important for protection of the public and environment from harmful pollutants. There are two sets of standards regarding air quality; primary standards involve public health protection, and secondary standards involve public welfare protection, including protection against decreased visibility and damage to animals, plants, and buildings.

Meteorological conditions across the Analysis Area vary, but in general, this region typically has warm to hot, dry summers and rainy to snowy winters. Increased air pollution and stagnant air conditions are common during the summer period, and winter periods are typically affected by storm systems that move into the region from the west, which in turn may disperse air pollutants. Regional wind patterns direct air from highly urbanized areas (where air pollutant concentrations are greater) into rural areas (CAPCOA 2015).

National Ambient Air Quality Standards (NAAQS, 40 CFR 50) and California Ambient Air Quality Standards (CAAQS, 17 CCR 70200) have been established by federal and state governments for six criteria air pollutants:

- Ozone (O<sub>3</sub>)
- Carbon monoxide (CO)
- Lead (Pb)
- Nitrogen dioxide (NO<sub>2</sub>)
- Sulfur dioxide (SO<sub>2</sub>)
- Particulate matter (PM), which is divided into PM with a diameter less than 10 microns (PM<sub>10</sub>) and PM with a diameter less than 2.5 microns (PM<sub>2.5</sub>)

Excluding lead pollutants, forestry equipment and operations may contribute emissions of all the above criteria air pollutants (USFWS 2016a). The California Air Resources Board has identified particulate matter from diesel-fueled engines (i.e., Diesel Particulate Matter [DPM]) as a toxic air contaminant. Forestry equipment and operations may also contribute to emissions of greenhouse gases (GHGs).

California is divided into Air Pollution Districts (APCD) or Air Quality Management Districts (AQMD). Districts are governed by county or regional authorities that have primary responsibility for controlling air pollution from stationary sources. The SPI Covered Lands are within air districts at the county level, except for three multi-county districts. The multi-county districts include Northern Sierra District (Nevada, Sierra, and Plumas counties), Feather River District (Sutter and Yuba counties), and North Coast District (Humboldt, Del Norte, and Trinity counties). Districts are then combined into air basins. The SPI Covered Lands are within five air basins that are managed for air quality on a regional basis including: Mountain Counties Air Basin, Northeast Plateau Air Basin, Sacramento Valley Air Basin, North Coast Air Basin, and Lake Tahoe Air Basin.

Each area is given a designation to determine its level of compliance with ambient air quality standards (AAQS). They are given one of three designations: attainment (the area meets AAQS), nonattainment (the area does not meet the AAQS), or unclassified (the area has insufficient data to draw a conclusion). The only criteria air pollutants designated as nonattainment in the five air basins that include SPI Covered Lands were ozone, PM<sub>2.5</sub>, and PM<sub>10</sub> (California Air Resources Board 2018). A summary of these nonattainment designations is shown below in Table 5-1. The full list of AAQS designations applicable to the Covered Lands is located in Table A-4 in Appendix C.

**Table 5-1. Summary of state and national ambient air quality for nonattainment pollutants in air basins and associated counties that include SPI Covered Lands.**

<b>Criteria Pollutant<sup>2</sup></b>	<b>Mountain Counties Air Basin<sup>1</sup> (Mariposa, Tuolumne, Calaveras, El Dorado Amador, Placer, Nevada, Sierra, and Plumas)</b>	<b>Northeast Plateau Air Basin<sup>1</sup> (Lassen, Modoc, and Siskiyou)</b>	<b>Sacramento Valley Air Basin<sup>1</sup> (Butte, Colusa, Glenn, Placer, Sacramento, Shasta, Solano, Sutter, Tehama, Yolo, and Yuba)</b>	<b>North Coast Air Basin<sup>1</sup> (Del Norte, Humboldt, Mendocino, Sonoma, and Trinity)</b>	<b>Lake Tahoe Air Basin<sup>1</sup> (El Dorado and Placer)</b>
<b>State-Ozone</b>	all counties nonattainment or unclassified	all counties in attainment	all counties nonattainment, except Glenn and Colusa in attainment	all counties in attainment	all counties nonattainment
<b>State-PM2.5</b>	all counties in attainment or unclassified, except Butte County in nonattainment	all counties in attainment	all counties unclassified, except Portola Valley in Plumas County nonattainment	all counties in attainment	all counties in attainment
<b>State-PM10</b>	all counties either nonattainment or unclassified	Siskiyou in attainment, Modoc and Lassen nonattainment	all counties nonattainment	Trinity, Del Norte, Sonoma in attainment. Mendocino, Humboldt nonattainment	all counties nonattainment

<b>Criteria Pollutant<sup>2</sup></b>	<b>Mountain Counties Air Basin<sup>1</sup></b>	<b>Northeast Plateau Air Basin<sup>1</sup></b>	<b>Sacramento Valley Air Basin<sup>1</sup></b>	<b>North Coast Air Basin<sup>1</sup></b>	<b>Lake Tahoe Air Basin<sup>1</sup></b>
<b>National - Ozone 8-hour</b>	Nevada, Placer, El Dorado, Calaveras, Mariposa counties nonattainment, all other counties unclassified	all counties unclassified	Butte, Yolo, Sacramento, Placer, Solano and southern portion of Sutter counties nonattainment, all other counties unclassified	all counties unclassified	all counties unclassified
<b>National - PM10</b>	all counties unclassified	all counties unclassified	Unclassified, except Sacramento County in attainment	all counties unclassified	all counties unclassified
<b>National - PM2.5</b>	Unclassified, except portions of Plumas and El Dorado counties in nonattainment	all counties unclassified	unclassified except Sacramento, Sutter, Solano, Placer, Yuba and portions of Yolo and Butte counties in nonattainment	all counties unclassified	all counties unclassified

<sup>1</sup> Air Basin designations from the California Air Resources Board (2018) website: <https://www.arb.ca.gov/desig/adm/adm.htm>.

<sup>2</sup> The AAQS (California Air Resources Board 2016) can be found at: <https://www.arb.ca.gov/research/aaqs/aaqs2.pdf>.

Each air quality district also has regulations for dust minimization from various activities, including forestry operations and use of unpaved forest roads. Air basins are typically in compliance with NAAQS and CAAQS standards; however, exceedances may occasionally occur (primarily for ozone and PM<sub>2.5</sub>). The most common reasons for exceedances are wildfires, air blown in from more populated areas to the south, and winter period residential wood burning; however, forestry operations can contribute to these exceedances (CAPCOA 2015).

### **5.1.2 Climate Change**

The climate in the Analysis Area is generally representative of northern California and varies depending on elevation, distance inland from the ocean, and slope direction. The climate pattern generally consists of hot, dry summers and cool, wet winters. Most precipitation falls in the form of rain, although snowfall occurs at higher elevations.

GHGs are gases that warm the Earth's atmosphere by absorbing solar radiation reflected from the Earth's surface. The most common GHGs are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>). According to USEPA (2016), scientists found that increasing GHG concentrations are warming the planet and rising temperatures may, in turn, produce changes in precipitation patterns, storm severity, and sea level – a phenomenon commonly referred to as “climate change.” Most of these gases are produced by the burning of fossil fuels for energy production. The California Air Resources Board (2007) found that California timberlands contribute to a net sequestration of carbon in the state (USFWS 2016a). Despite carbon sequestration and the use of renewable energy sources, average annual temperature increases are predicted throughout the state, with increases varying between ecoregions. Within the Sierra Nevada region, average annual temperatures are projected to increase 3.2 to 4.3°F by 2070 and 6.5 to 6.8°F by 2100 (PRBO Conservation Science 2011). The North Coast and Klamath regions are projected to have average temperature increases of 3.0 to 3.4°F by 2070 and 2.7 to 8.1°F by 2099 (PRBO Conservation Science 2011, Cayan et al. 2008). In the Southern Cascades region, annual average temperatures are predicted to increase by 3.2 to 4.0°F by 2070, with larger temperature increases expected for the more mountainous portions of the region (PRBO Conservation Science 2011, California Emergency Management Agency [Cal EMA] and California Natural Resources Agency [CNRA] 2012).

## **5.2 ENVIRONMENTAL CONSEQUENCES**

### **5.2.1 Direct and Indirect Effects**

#### **5.2.1.1 Air Quality**

Timber harvest activities and management activities (see Section 1.2.3) are expected to continue to occur under any of the three alternatives under consideration. Under all alternatives, timber harvest and management activities are expected to occur throughout the Analysis Area (see Section 3.2.1.1 for information on projected timber harvest rates), resulting in direct effects to air quality, including pollution from vehicles and machinery, and smoke from forest burning management activities. Indirect effects to air quality may include reduced smoke due to the reduction of catastrophic fire intensity and extent through land management activities. The sources of direct and indirect effects to air quality would be similar for all three alternatives; however, the input locations and levels may vary among the alternatives.

SPI's timber harvest and management activities that directly affect air quality include: operation of forest vehicles (e.g., cars, pickup trucks, diesel tractor trailer trucks, bulldozers, feller bunchers, and excavators); operation of water trucks for road dust suppression; operation of chain saws used for tree harvest and thinning; burning of wood slash piles; controlled burns for site preparation and fuel break construction; and fire suppression activities. All equipment is required to meet federal and California emission regulations and standards, but the activities do contribute to emissions of criteria pollutants, toxic air contaminants, and GHGs. Forest burning is always conducted under burn plans and smoke management plans, in accordance with local air quality management district permits and as allowed by the State Air Resources Board. Planned burning is conducted during periods that are identified for broad meteorological conditions that allow smoke and air pollutant dissipation. Additionally, a site-specific meteorological prescription (i.e., burn condition requirements) is identified that provides for smoke dispersion and fire control. All appropriate agencies are contacted prior to a burn project's commencement for coordination and to ensure that the burn versus no burn day condition is followed. Consequently, the burning activities also meet air quality regulations and standards and are expected to have minimal effects on sensitive human populations under all considered alternatives. Indirect effects to air quality under all alternatives may include the reduction of catastrophic fire intensity and extent, thereby reducing the total amount of air pollutant emissions from a given wildfire.

Depending on the alternative, these direct and indirect effects could occur in different areas of the SPI Covered Lands, though all activities would follow applicable rules and regulations (i.e., CFPR). Under the NWFP/SNFPA Alternative, it is anticipated that timber harvest may be restricted to smaller areas, as more acreage of the SPI Covered Lands would be restricted from timber harvest than under the other alternatives. If SPI would harvest the same volume of timber as under the other alternatives, this could result in more intense timber harvest in those non-restricted areas.

### **No Action Alternative**

Under the No Action Alternative, timber harvest and management activities are expected to continue throughout the SPI Covered Lands (see Section 3.2.1.1 for information on projected timber harvest rates). No change in the status quo related to air quality would occur. Under all alternatives, the continued reduction of catastrophic fire intensity and extent has the potential to positively indirectly benefit air quality by reducing the total amount of air pollutant emissions from a given wildfire. Air quality effects are considered to be of low to moderate intensity at the air basin scale based on the meeting of regulatory emission requirements. Although the activities would be conducted for the foreseeable future, the duration of effects is considered short because meteorological conditions change over short (daily, weekly) and seasonal time periods. Direct effects to air quality would include pollution from vehicles and machinery, and smoke from forest burning management activities. Indirect effects to air quality may include reduced smoke due to the reduction of catastrophic fire intensity and extent through land management activities.

### **HCP Alternative – Proposed Action**

Under the HCP Alternative (Proposed Action), it is anticipated that SPI operations that affect air quality would not change from those occurring under the No Action Alternative, and their effects would be similar to those expected under the No Action and NWFP/SNFPA alternatives. Under the HCP Alternative (Proposed Action), SPI is expected to harvest approximately the same timber volume from approximately the same acreage over the 50-year permit period as under the No Action and NWFP/SNFPA alternative. Therefore, with respect to air quality within the Analysis Area, these activities are not expected to change in amount, scale, duration, or intensity from those activities that would occur under the No Action or NWFP/SNFPA alternatives. There may be minor changes in the location and timing of timber harvest activities on SPI Covered Lands under the HCP Alternative (Proposed Action)

when compared to the other alternatives. The conservation measures to be implemented under the HCP Alternative (Proposed Action) are not expected to result in markedly different activities, and no quantifiable change in air quality is expected between the HCP Alternative (Proposed Action) and the other alternatives under consideration, with no additional air quality effects expected over the 50-year permit term. Although the activities would be conducted for a period of 50 years, the duration of effects at any given location is considered short because meteorological conditions change over short (daily, weekly) and season time periods. Air quality effects are considered to be of low to moderate intensity at the air basin scale based on the meeting of regulatory emission requirements. Direct effects to air quality would include pollution from vehicles and machinery, and smoke from forest burning management activities. Indirect effects to air quality may include reduced smoke due to the reduction of catastrophic fire intensity and extent through land management activities.

### **NWFP/SNFPA Alternative**

Under the NWFP/SNFPA Alternative, the effects to air quality are not expected to be different than those of the No Action Alternative or HCP Alternative (Proposed Action), if SPI maintains similar timber harvest rates as expected under the other two considered alternatives. If timber harvest rates would be reduced in response to the decrease in harvestable acres available on SPI Covered Lands under the NWFP/SNFPA Alternative, a slight positive effect on air resources could occur due to the reduction in direct forestry related activities that affect air quality (e.g., forest vehicle operations). Although the activities would be conducted for a period of 50 years, the duration of effects at any given location is considered short because meteorological conditions change over short (daily, weekly) and seasonal time periods. Air quality effects are considered to be of low to moderate intensity at the air basin scale based on the meeting of regulatory emission requirements. Direct effects to air quality would include pollution from vehicles and machinery, and smoke from forest burning management activities. Indirect effects to air quality may include reduced smoke due to the reduction of catastrophic fire intensity and extent through land management activities. Direct effects to air quality would include pollution from vehicles and machinery, and smoke from forest burning management activities. Indirect effects to air quality may include reduced smoke due to the reduction of catastrophic fire intensity and extent through land management activities. Overall, it is anticipated that the direct and indirect effects on air quality under the NWFP/SNFPA Alternative would be similar to the other alternatives under consideration.

### **5.2.1.2 Climate Change**

The management and transport of timber is assumed to be indirectly associated with climate through the emission of CO<sub>2</sub>, mostly from vehicles and other equipment with internal combustion engines, burning of forest slash, and prescribed burning. For all alternatives, SPI would continue to grow and harvest timber throughout the Analysis Area in compliance with all applicable forest regulations. Thus, the effect on climate change would be the similar for all considered alternatives, and carbon sequestration would continue to be promoted on SPI lands and other private and public timberlands in the region.

Climate change effects from SPI's timber harvest activities over the permit term are expected to be minimal. Methods used to evaluate the potential for adverse or beneficial effects of the alternatives on climate are based on the extent to which the alternatives may increase or reduce GHG emissions as compared to the existing environmental setting. SPI timberlands would provide an overall beneficial effect with respect to climate change, as SPI-owned forest would continue to sequester carbon over the 50-year permit term. Under all considered alternatives, SPI would continue to address GHG emissions as a part of the THP preparation and review process, with short-term and long-term GHG sequestration and emissions resulting from timber harvest activities being assessed.

**No Action Alternative**

Under the No Action Alternative, timber harvesting and associated activities would continue to generate CO<sub>2</sub> as the result of operation of vehicles and equipment using internal combustion engines. Burning of forest slash and prescribed burning activities would also continue to generate CO<sub>2</sub>. No change from the status quo with respect to CO<sub>2</sub> emissions is expected under the No Action Alternative. The forests on SPI Covered Lands would continue providing a net carbon sequestration for the foreseeable future. Harvested areas of SPI Covered Lands would be replanted, and the removal of timber from the Analysis Area would be offset by these reforestation activities. Therefore, the status quo with respect to climate change would be expected under the No Action Alternative as the forest landscape is maintained on SPI Covered Lands. GHG emissions and sequestration to occur under the No Action Alternative would be assessed during the THP preparation and review process.

**HCP Alternative – Proposed Action**

Under the HCP Alternative (Proposed Action), timber harvesting and associated activities would continue to emit CO<sub>2</sub> as the result of the operation of vehicles and other equipment using internal combustion engines. Burning of forest slash and prescribed burning activities would also continue to generate CO<sub>2</sub>. There may be minor changes in the location of timber harvest activities on SPI Covered Lands under the HCP Alternative (Proposed Action). Timber harvest under the HCP Alternative (Proposed Action) is not expected to result in markedly different activities, and no quantifiable change in CO<sub>2</sub> emissions is expected between the No Action Alternative and the HCP Alternative (Proposed Action), with no differing climate change effects expected over the 50-year permit term. Harvested areas of SPI Covered Lands would be replanted, and the removal of timber from the Analysis Area would be offset by these reforestation activities. The net carbon sequestration on SPI Covered Lands over the 50-year permit period would be similar to the No Action Alternative and would maintain the status quo with respect to climate change. GHG emissions and sequestration to occur under the HCP Alternative (Proposed Action) would be assessed during the THP preparation and review process.

**NWFP/SNFPA Alternative**

Under the NWFP/SNFPA Alternative, timber harvesting and associated activities would continue to emit CO<sub>2</sub> as the result of the operation of vehicles and other equipment using internal combustion engines. Burning of forest slash and prescribed burning activities would also continue to generate CO<sub>2</sub>. There may be minor changes in the location of timber harvest activities due to the establishment of no-harvest areas on SPI Covered Lands. These timber management changes under the NWFP/SNFPA Alternative are not expected to result in markedly different activities, though it is possible that timber harvest rates may decrease in response to the loss of harvestable acres on SPI Covered Lands. If timber harvest rates would be reduced in response to the decrease in harvestable acres available on SPI Covered Lands under the NWFP/SNFPA Alternative, a slight decrease in CO<sub>2</sub> emissions may occur due to the reduction in direct forestry related activities that emit CO<sub>2</sub> (e.g., forest vehicle operations), however, since harvested areas would be replanted under any alternative, this difference is expected to be minor or negligible. Overall, there would be no effect or a likely negligible positive effect on CO<sub>2</sub> emissions and climate change under the NWFP/SNFPA Alternative when compared to the No Action Alternative and the HCP Alternative (Proposed Action). Harvested areas of SPI Covered Lands would be replanted, and the removal of timber from the Analysis Area would be offset by these reforestation activities. The net carbon sequestration on SPI Covered Lands over the 50-year permit period would be similar to the No Action Alternative and would maintain the status quo with respect to climate change. GHG emissions and sequestration to occur under the NWFP/SNFPA Alternative would be assessed during the THP preparation and review process.

## **CHAPTER 6. SOCIOECONOMICS AND ENVIRONMENTAL JUSTICE**

### **6.1 AFFECTED ENVIRONMENT**

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, states that “each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies and activities on minority populations and low-income populations.”

This section describes socioeconomics and environmental justice, including population, housing, labor force, output and earnings, and minority and low-income populations. Information comes from publicly available sources, such as the United States Census Bureau (USCB), United States Bureau of Labor Statistics (USBLS), Bureau of Economic Analysis, Department of Energy, National Renewable Energy Laboratory, and the State of California.

The USCB California population estimate as of July 1, 2017 was 39,536,653, based on a population growth rate of 5.4% between April 1, 2010 and July 1, 2017 (USCB 2016a). The estimated individual median age in 2016 was 36 years (USCB 2016b), with 49.7% of the population male and 50.3% of the population female (USCB 2016b). The overall population density of California is approximately 239.1 people per square mile (USCB 2016a), though the population density varies throughout the state, with populations more dense in urban areas (near city centers, suburbs, and valleys). Lower population densities exist throughout rural and mountainous areas where the Analysis Area is located. Urban areas account for 95% of California’s population, compared to 5% within rural areas (USCB 2012). Eighteen California counties and one Nevada county intersect with the Analysis Area and are further described in Table 6-1 and spatially displayed in Figure 6-1.

**Table 6-1. Population demographics within counties that intersect the Analysis Area.**

<b>County Name</b>	<b>2016 Population Estimate</b>	<b>2016 Minority Population (percentage)</b>	<b>2016 Female Population (percentage)</b>	<b>2016 Poverty Rate (percentage)</b>	<b>2017 Unemployment Rate (percentage)</b>
Amador	37,383	9.7	46.8	11.3	4.4
Butte	226,864	13.6	50.5	19.5	5.1
Calaveras	45,171	18.4	50	13.1	4
El Dorado	185,625	10.7	50.1	8.7	3.6
Humboldt	136,646	16.5	50.1	20	3.6
Lassen	30,870	18.2	37.7	17.6	5.9
Mariposa	17,410	10.2	49	17.9	6.2
Modoc	8,795	11.6	49.4	18.4	8.1
Nevada	99,107	6.4	50.8	10.9	3.5
Placer	380,531	14.7	51.3	7.2	3.1
Plumas	18,627	9.5	49.9	12.6	8.8
Shasta	179,631	11.7	51	17.2	5.1
Sierra	3,240	6.3	49.1	14.4	6.2
Siskiyou	43,603	13.3	50.2	18.8	8.2
Tehama	63,276	9.6	50.3	20.9	5.3
Trinity	12,782	12.2	48.7	21.3	5.7
Tuolumne	53,804	9.4	48	15.4	4.7
Yuba	75,275	20.9	49.4	16.6	6.9
Washoe (Nevada)	453,616	15	49.7	12.5	3.7
<b>Average</b>	<b>109,066</b>	<b>13</b>	<b>49</b>	<b>15</b>	<b>5</b>

<sup>1</sup> Data provided by USCB (2016b) and USBLS (2018).

The 2010 census reported an estimated 13,680,081 housing units in California, of which 91.9% were occupied (USCB 2016b). Vacant homes make up 2.7% of homes that are for rent, 0.1% that are rented but unoccupied, 1.1% of homes for sale, 0.3% of homes that have sold but are not currently occupied, 2.2% of homes that are for seasonal, recreational, or occasional use, and 1.6% other vacant homes, for a total vacancy rate of 8.4% (USCB 2016b).

Within counties that intersect the Analysis Area (19), the estimated median home value is \$244,337, with a median monthly cost of \$1,561 with a mortgage or \$441 without a mortgage (USCB 2016a). The median rent is \$946 per month (USCB 2016a).

The average unemployment rate within the counties that intersect the Analysis Area in 2017 was 5.0% (Table 6-1), compared to California's unemployment rate of 4.4%, which is down from 5.2% in 2017 (USBLS 2018).

In 2012, McIver et al. (2015) reported approximately 52,200 workers, earning \$3.3 billion annually, were employed in the forest industry in California, including primary and secondary wood and paper products, private sector forestry and logging, and forestry support activities. SPI currently provides 5,150 family wage jobs, of which approximately 55% or 2,833 are located in California.

The 2016 per capita personal income (PCPI) in California was \$56,374. This PCPI ranked 6<sup>th</sup> in the United States and was 114% of the national average, \$49,246. The 2006-2016 compound annual growth rate of PCPI was 2.9%. The compound annual growth rate for the nation was 2.6% (USDC 2017).

In 2016, California current dollar GDP was \$2,622.7 billion and ranked 1st in the United States. In 2006, California GDP was \$1,879.5 billion and ranked 1st in the United States. In 2016, California real GDP grew 3.3%; the 2015-2016 national change was 1.5%. The 2006-2016 compound annual growth rate for California real GDP was 1.6%, and the compound annual growth rate for the nation was 1.2% (USDC 2017).

Total sales value for California's primary forest products was about \$1.4 billion in 2012, with lumber accounting for 64% of the total. The majority (77%) of all products were sold in California. Two sectors accounted for nearly 90% of industry sales value: sawmills and bioenergy plants (McIver et al. 2015).

A total of 77 primary forest products facilities operated in California during 2012. These included 30 sawmills, 26 bioenergy plants, 11 bark and mulch facilities, 2 veneer plants, and 8 manufacturers of other primary wood products (McIver et al. 2015). Over 55% (785 MMBF) of the 2012 timber harvest came from five California counties. For the first time since 1968, Shasta County provided the largest proportion at 16% (229 MMBF), followed by Humboldt County with a timber harvest of 215 MMBF (McIver et al. 2015). Eighty-three percent of California's 2012 timber harvest came from private lands. Nearly all (97%) of the timber harvested in California was processed within the state. Over half of the 360 million cubic feet (MMCF) of wood fiber (excluding bark) harvested in California in 2012 was used to generate energy, usually in the form of heat for steam or electricity (McIver et al. 2015).

California sawmills produced 1.9 billion board feet of lumber in 2012, just under 7% of production of softwood lumber and just over 5% of consumption in the United States. California's forest product industry's annual capacity to process sawtimber has decreased by more than 70%, from 6 billion board feet (Scribner Decimal C) in the late 1980s to 1.8 billion board feet in 2012. Of this total capacity, 72% was utilized in 2012 (McIver et al. 2015).

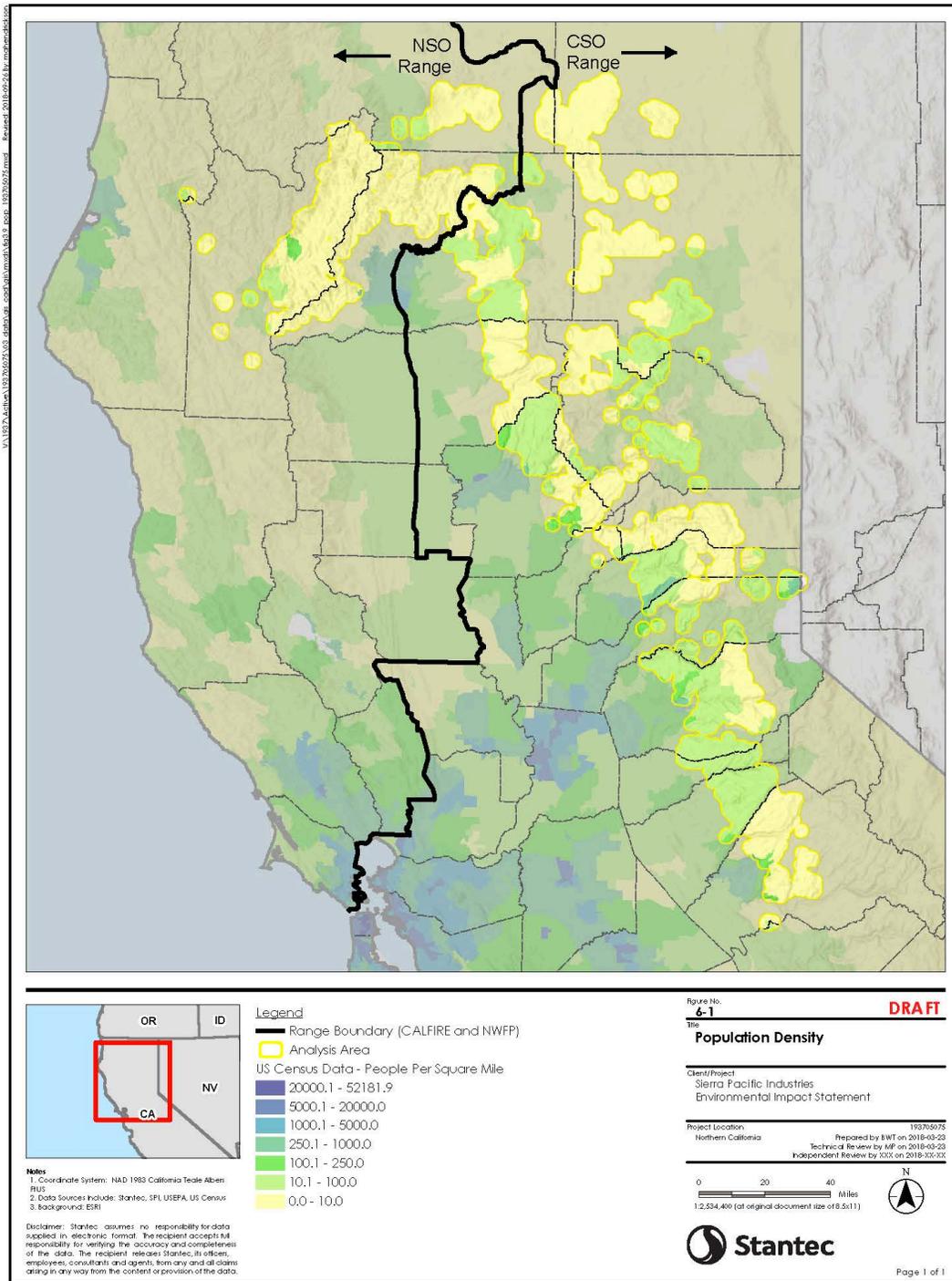


Figure 6-1. Population Density.

## 6.2 ENVIRONMENTAL CONSEQUENCES

### 6.2.1 Direct and Indirect Effects

Timber harvest and management activities (see Section 1.2.3) are expected to continue to occur under any of the three alternatives under consideration. Under all alternatives, timber harvest and management activities are expected to occur throughout the Analysis Area (see Section 3.2.1.1 for information on projected timber harvest rates). Direct effects of timber harvest would include the direct employment for timber harvesting activities and direct taxes paid to local governments. Indirectly, timber harvest activities could increase other employment in the area (e.g., local hotels, restaurants) and could lead to population growth and housing development in the area due to increased jobs. These effects could occur in different areas of the SPI Covered Lands, though all activities would follow applicable rules and regulations (i.e., CFPR). Under the NWFP/SNFPA Alternative, timber harvest may be restricted to smaller areas, as more acreage of the SPI Covered Lands would be restricted from timber harvest than under the other alternatives. If SPI would harvest the same volume of timber as under the other alternatives, this could result in more intense timber harvest in those non-restricted areas.

Internal and external influences, such as adoption of the SPI HCP and lumber/wood markets, are likely to affect socioeconomic indicators, such as SPI employment rates, within the Analysis Area. Socioeconomic indicators are difficult to predict, as future policies and market trends are unknown.

Under all alternatives, timber harvest and management activities would continue on SPI-owned lands, and SPI predicts that employment would remain similar for the No Action Alternative and HCP Alternative (Proposed Action). When compared to the other considered alternatives, the NWFP/SNFPA Alternative would have less forestland available for timber harvest on the Covered Lands. SPI employment rates and yield taxes could be altered if the NWFP/SNFPA Alternative is chosen. None of the considered alternatives are expected to cause changes in population growth, housing construction, or other socioeconomic indicators.

The proposed action and the alternatives considered have also been evaluated in the context of potential effects to environmental justice, and neither the Covered Activities nor the alternatives affect any particular segment of society in ways that are different from any other segment of society. Local tribes were contacted during the scoping period (see Section 1.7); no responses were received. In general, multiple other regulatory frameworks are in place that would avoid or reduce to insignificance any potential impacts of otherwise lawful activities conducted under any of the analyzed alternatives with respect to socioeconomic or environmental justice issues.

#### 6.2.1.1 No Action Alternative

Under the No Action Alternative, SPI is expected to continue its timber harvest and forest management operations. No direct or indirect effects to socioeconomics or environmental justice would be expected, and SPI would continue to employ approximately 2,833 people in California. Local tax revenues and yield taxes would be expected to remain similar to present conditions.

#### 6.2.1.2 HCP Alternative – Proposed Action

SPI's timber harvest and management activities would proceed as planned under the HCP Alternative (Proposed Action). The Covered Lands would be managed to promote the growth of PHAs and harvestable timber. Timber harvest rates are expected to remain comparable to the rates expected under the No Action Alternative, and implementation of the Conservation Measures would not change the

existing conditions related to the number and types of jobs. No measurable direct or indirect effects to socioeconomics or environmental justice are expected, as timber harvest would remain comparable to the No Action Alternative. SPI would be expected to continue to employ approximately 2,833 people in California. Local tax revenues and yield taxes would be expected to remain similar to present conditions. The HCP Alternative (Proposed Action) may have a marginally greater benefit than the NWFP/SNFPA Alternative (see Section 6.2.1.3)

### **6.2.1.3 NWFP/SNFPA Alternative**

Under the NWFP/SNFPA Alternative, less of SPI Covered Lands would be available for timber harvest, as more land would be designated as no-harvest areas. A possible outcome to this reduction in harvestable acres would be a reduction in the rate of SPI's timber harvest. If that were to occur, a direct effect would be that fewer employees may be required to complete these timber harvest activities, and SPI would have less revenue. Local tax revenues could be reduced relative to the No Action and HCP (Proposed Action) alternatives, and yield taxes paid to the 17 counties<sup>7</sup> within SPI Covered Lands (Figure 6-1) may decrease if timber harvest rates decreased under the NWFP/SNFPA Alternative. This could then lead to indirect negative effects on the local economy, although the extent of which is unquantifiable at this time. If SPI were to shift all originally planned timber harvest activities to other locations on the Covered Lands, fewer effects on socioeconomics would be expected.

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<sup>7</sup> Counties include: Siskiyou, Humboldt, Trinity, Shasta, Modoc, Lassen, Tehama, Calaveras, Butte, Yuba, Sierra, Nevada, Plumas, Placer, El Dorado, Amador, and Tuolumne (see Table 1.2 in the SPI HCP).

## CHAPTER 7. CULTURAL AND HISTORIC RESOURCES

### 7.1 AFFECTED ENVIRONMENT

This section describes known cultural and historic resources (i.e., archaeological, historic, prehistoric, and Native American resources) within the Analysis Area. Information comes from publicly available sources, such as the National Register of Historic Places (NRHP) and National Historic Landmarks (NHL).

Under the NHPA, “historic property” and “historic resource” is defined as any prehistoric or historic district, site, building, structure, or object included in or eligible for inclusion on the NRHP, including artifacts, records, and material remains related to such a property or resource. Properties are listed in the NRHP if they possess integrity and meet one of the following four criteria (36 CFR 60):

1. That are associated with events that have made a significant contribution to the broad patterns of our history.
2. That are associated with the lives of significant persons in the present or past.
3. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction.
4. That have yielded or may be likely to yield information important in history or prehistory.

The NHL list was also reviewed. These are places designated by the Secretary of the Interior because they possess exceptional value or quality in illustrating or interpreting the heritage of the United States. Places may be considered for designation as a NHL if they are of national significance and meet one of the additional criteria set forth in 36 CFR 65.4:

1. Associated with events that have made a significant contribution to, and are identified with, or that outstandingly represent, the broad national patterns of United States history and from which an understanding and appreciation of those patterns may be gained.
2. Associated importantly with the lives of persons nationally significant in the history of the United States.
3. Represent some great idea or ideal of the American people.
4. Embody the distinguishing characteristics of an architectural type specimen exceptionally valuable for a study of a period, style, or method of construction, or that represent a significant, distinctive, and exceptional entity whose components may lack individual distinction.
5. Composed of integral parts of the environment not sufficiently significant due to historical association or artistic merit to warrant individual recognition, but collectively compose an entity of exceptional historic or artistic significance, or outstandingly commemorate or illustrate a way of life or culture.

6. Have yielded or may be likely to yield information of major scientific importance by revealing new cultures, or by shedding light upon periods of occupation over large areas of the United States. Such sites are those which have yielded, or which may reasonably be expected to yield, data affected theories, concepts, and ideas to a major degree.

Generally, cemeteries, birthplaces, graves of historical figures, properties owned by religious institutions or used for religious purposes, structures that have been moved from their original locations, reconstructed historic buildings and properties that have achieved significance within the past 50 years are not eligible for designation, unless they fall within one of the following categories:

1. A religious property deriving its primary national significance from architectural or artistic distinction or historical importance.
2. A building or structure removed from its original location, but which is nationally significant primarily for its architectural merit, or for association with persons or events of transcendent importance in the nation's history and the association consequential.
3. A site or a building or structure no longer standing but the person or event associated with it is of transcendent importance in the nation's history and the association consequential.
4. A birthplace, grave, or burial if it is of a historical figure of transcendent national significance and no other appropriate site, building, or structure directly associated with the productive life of that person exists.
5. A cemetery that derives its primary national significance from graves of persons or transcendent importance, or from an exceptionally distinctive design or from an exceptionally significant event.
6. A reconstructed building or ensemble of buildings of extraordinary national significance when accurately executed in a suitable environment and presented in a dignified manner as part of a restoration master plan, and when no other buildings or structures with the same association have survived.
7. A property primarily commemorative in intent if design, age, tradition, or symbolic value has invested it with its own national historic significance.
8. A property achieving significance within the past 50 years if it is of extraordinary national importance.

There are currently just over 146 places with the NHL distinction in the State of California. Only one NHL (Donner Camp Sites) falls within the boundaries of the Analysis Area (NPS 2016). There are 12 sites on the NRHP within the Analysis Area (Table 7-1, Figure 7-1). Two state historic parks are found within the Analysis Area (Malakoff Diggins State Historic Park and Weaverville Joss House State Historic Park).

**Table 7-1. Number of properties on the National Register of Historic Places and list of Historic Landmarks by Level III Ecoregion within the Analysis Area.**

<b>Level III Ecoregion</b>	<b>Buildings</b>	<b>Districts</b>	<b>Objects</b>	<b>Sites</b>	<b>Structures</b>	<b>National Historic Landmarks</b>
Cascades	2	2	0	0	0	0
Central Basin and Range	3	0	0	0	0	0
Central California Foothills and Coastal Mountains	0	0	0	0	0	0
Eastern Cascades Slopes and Foothills	0	0	0	0	0	0
Klamath Mountains/California North High Coast Range	1	0	0	0	0	0
Northern Basin and Range	0	0	0	0	0	0
Sierra Nevada	1	2	0	0	1	1
<b>Total</b>	<b>7</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>1</b>

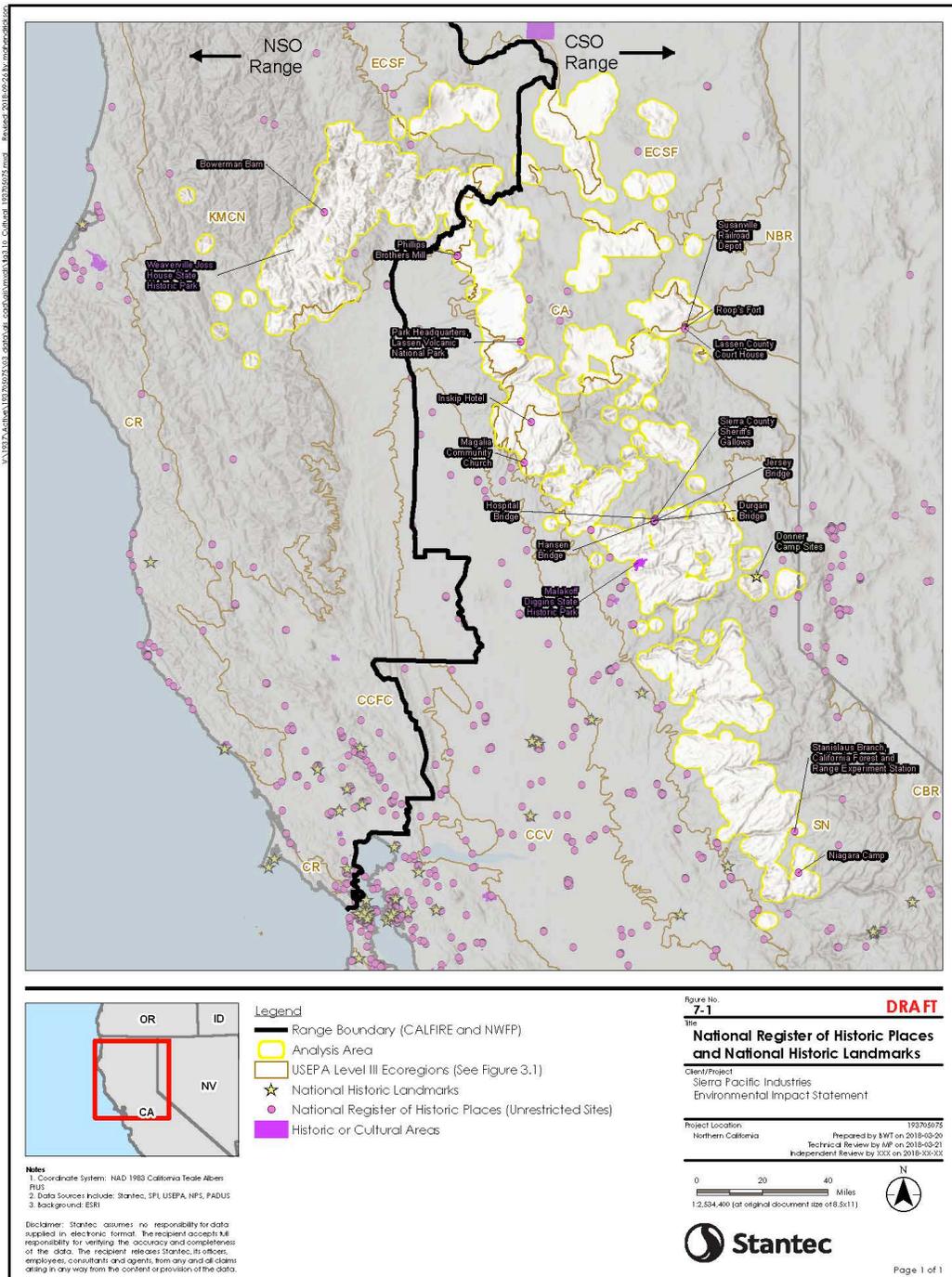


Figure 7-1. National Register of Historic Places and National Historic Landmarks.

## 7.2 ENVIRONMENTAL CONSEQUENCES

### 7.2.1 Direct and Indirect Effects

Timber harvest and management activities (see Section 1.2.3) are expected to occur under any of the three alternatives under consideration. Under all alternatives, timber harvest and management activities are expected to occur throughout the Analysis Area (see Section 3.2.1.1 for information on projected timber harvest rates). Depending on the alternative, these activities may occur in different areas of the SPI Covered Lands, though all activities would follow applicable rules and regulations (i.e., CFPR). Direct and indirect effects to cultural and historic resources would be expected to be similar under all alternatives. Under the NWFP/SNFPA Alternative, timber harvest may be restricted to smaller areas, as more acreage of the SPI Covered Lands would be restricted from timber harvest than under the other alternatives. If SPI would harvest the same volume of timber as under the other alternatives, this could result in more intense timber harvest in those non-restricted areas.

Under all alternatives, no change in the status quo with respect to cultural resources would be expected. A summary of the CFPR applicable to considering cultural resources during the development of THPs is provided below (Appendix D):

- Shall conduct an archaeological records search at the appropriate Information Center.
- Shall provide written notification to Native Americans of the preparation of a plan.
- Shall provide a professional archaeologist to conduct a field survey for archeological and historical sites within the site survey area.
- Shall ensure that research is conducted prior to the field survey, including review of appropriate literature and contacting knowledgeable individuals and Native American tribes, concerning potential cultural, archaeological, or historical sites occurring on the property.
- Provide notification to Native Americans if a Native American Archeological or Cultural Site is located within the plan area.
- Provide written notice to Native Americans informing them of the presence of Native American cultural resources within the site survey area.
- Shall submit a Confidential Archaeological Addendum for a plan providing methods and results, descriptions of all identified historical and archaeological sites, and a description of protection methods.
- Upon submission of the plan also submit completed site records for each site proposed to be a significant archaeological or historical site per the State Office of Historic Preservation Instruction for Recording Historical Resources.
- A determination of significance shall be made for an identified archaeological or historical site within the site survey area of a THP if damaging effects from timber operations cannot be avoided. If agreement on protection measures cannot be reached between the RPF responsible for the THP and CAL FIRE, then a professional archaeologist shall conduct a survey and prepare a report on the site and potential impacts. The report shall contain recommendations for mitigation, the elimination of impacts, or for the reduction of impacts to avoid or prevent substantial adverse change to significant archaeological or historical resources.
- A variety of protective measures may be utilized to prevent significant impacts, ranging from complete site avoidance with 100-foot buffers for a Special Treatment Zone to limited timber operations with measures such as directional falling of timber away from the site to extensive archeological surveys, subsurface testing, and data recovery.

- If a potentially significant archaeological or historical site is discovered and a plan is accepted, the following procedures apply:
  - CAL FIRE, the licensed timber operator, the RPF, or timberland owner of record shall be notified immediately.
  - The notified party shall notify the other parties that no timber operations shall occur within 100 feet of the site's identified boundaries until the plan submitter proposes and the CAL FIRE director agrees to protection measures.
- If human remains are discovered, no disturbance of the site or adjacent area shall occur, and the local county coroner shall be notified. The coroner shall contact the Native American Heritage Commission if the remains are found to be of Native American origin.

The primary timber harvest activities under any alternative would be performed under individual THPs. THPs evaluate potential impacts (including cumulative impacts) to a variety of resources, including cultural and historic resources, and apply avoidance and mitigation to minimize impacts to a CEQA determination of less-than-significant impact.

The current use of SPI timberlands by Native American tribal groups is minimal, and records of such use are reviewed during THP development. The implementation of required measures during THP development results in less than significant direct and indirect effects to cultural resources during timber harvesting and associated activities. Under all alternatives, it is anticipated that SPI would continue to implement ownership-wide mitigation, management, and monitoring measures for protection of cultural resources. No effects to the 1 NHL or the 12 NRHP sites located within the Analysis Area are expected. Implementation of any alternatives would not result in direct or indirect effects to cultural resources due to timber harvest or management activities that differ from those that would occur under the No Action Alternative.

## CHAPTER 8. CUMULATIVE EFFECTS

NEPA requires agencies to consider the effects of both cumulative actions and cumulative impacts (40 CFR 1508.25, 1508.7). A cumulative impact is defined as “The impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time” (40 CFR 1508.7). A cumulative action is one “which when viewed with other proposed actions have cumulatively significant impacts and should therefore be discussed in the same impact statement” (40 CFR 1508.25(a)(2)). Cumulative effects can be beneficial, detrimental, or both.

The discussion of cumulative effects includes analysis of both the direct effects attributable to the proposed action, as well as the effects that are not directly attributable to the underlying action but that are facilitated by issuance of the ITP. This includes all activities proposed under each of the alternatives, as described in Chapter 2. The cumulative effects analysis attempts to delineate the cause-effect relationships between the underlying Federal action and the subsequent decisions of other Federal, state, regional, and local entities that have direct jurisdiction over the specifics of the proposed action. It is not practical nor feasible to analyze all indirect effects related to SPI’s operations in the Analysis Area. This cumulative analysis therefore considers a reasonable range of the attenuated, project-specific effects that would be subject to review by other agencies at a level of detail sufficient to meet the goals of determining the reasonably foreseeable environmental consequences of each of the alternatives.

The cumulative effects analysis also attempts to address the uncertainty surrounding actions that have not yet been fully developed. Regulations promulgated by the Council on Environmental Quality (CEQ) provide for the inclusion of uncertainties in the DEIS analysis, and state that “[w]hen an agency is evaluating reasonably foreseeable significant adverse effects on the human environment in an environmental impact statement and there is incomplete or unavailable information, the agency shall always make clear that such information is lacking” (40 CFR 1502.22). Consequently, the analysis contained in this DEIS includes what could be reasonably anticipated to occur related to timber harvest and related activities on the Covered Lands, as described below.

In 1997, the CEQ published Considering Cumulative Effects under the NEPA as a comprehensive guidance document for cumulative analyses. The CEQ guidelines (1997) acknowledge that while “in a broad sense all the impacts on affected resources are probably cumulative,” it is important to “count what counts” and narrow the focus of the analysis to important national, regional, and local issues. While the CEQ recommends this be done through scoping, they also caution that “not all potential cumulative effects issues identified during scoping need to be included” in an EIS, but only those effects with direct influence on the project and project decision-making. The CEQ guidelines (1997) recommend analyzing cumulative effects according to a tiered approach, which allows for a quantitative, resource-specific analysis of regional actions.

Following the tiered approach recommended by the CEQ guidelines for analyzing cumulative effects, we have determined that the incremental effects on Biological Resources from our proposed action would contribute to a cumulative effect on NSO and CSO. Also, we analyze the cumulative effects of barred owl research on the barred owls. Therefore, we focus our cumulative effects analysis on the NSO and CSO. No significant change in the status quo as compared to the No Action Alternative is expected for

the other resource areas analyzed; thus, those resources are not included in the cumulative effects analysis.

## **8.1 PAST, PRESENT, AND REASONABLY FORSEEABLE THREATS AND ACTIONS AFFECTING NSO AND CSO**

To determine the range of threats to be considered in the analysis, we used the primary threats identified in recent literature. The revised recovery plan for the NSO (USFWS 2011) determined that the most important range-wide threats to the species include:

- Competition with barred owls
- Ongoing loss of habitat due to timber harvest
- Habitat loss or degradation from stand replacing wildfire and other disturbances
- Loss of amount and distribution of habitat as a result of past activities and disturbances

The primary threats to the CSO, as described in “The California Spotted Owl: Current State of Knowledge” (Gutiérrez et al. 2017), include:

- Loss of habitat on public and private lands
- Increased threat of stand-replacing wildfire
- Competition with barred owls
- Effects of climate change on owl populations, vegetation types, and fire activity
- Human population growth and development

Stressors to the CSO are also described in the conservation objectives report for the CSO (USFWS 2017), which include:

- High-severity fires
- Forest management practices
- Tree mortality
- Barred owls
- Contaminants
- Climate change

Based on this information, the Service has analyzed past, current, and reasonably foreseeable threats and activities affecting the NSO and CSO:

- Competition with barred owls
  - Barred owl research
- Ongoing loss of habitat due to timber harvest
  - Private lands
  - Public lands
  - Tribal lands
- Habitat loss, degradation, and fragmentation
  - Critical habitat designation
  - Fire
  - Commercial and residential development due to human population growth and development
  - Marijuana cultivation
  - Sudden oak death
- Climate change

This chapter analyzes the cumulative effects of the alternatives and other past, present, and reasonably foreseeable threats and actions affecting the NSO and CSO. The spatial scope of analysis for the NSO is the species' range within California, Washington, and Oregon, and the spatial scope for analysis for the CSO is the species' range within the Sierra Nevada mountains in California<sup>8</sup>. The 50-year permit term is the temporal scope for both species.

### 8.1.1 Competition with Barred Owls

Barred owls have expanded their range over the past century, from eastern North America to forests throughout central and western North America (Livezey 2009). Therefore, the range of the barred owl now overlaps the ranges of the NSO and the CSO. Two similar-sized, congeneric species in newly established areas of overlap would be expected to compete, and stable coexistence is unlikely, which has been shown by recent studies showing competition for food and habitat, as well as interference competition, with the more dominant species being the barred owl (Gutiérrez et al. 2017). Recent research has focused on the impacts of barred owls on the NSO, and for this analysis it is assumed that the impacts on the CSO would be comparable.

Competition with barred owls can have detrimental effects on spotted owl occupancy, reproduction, and survival (USFWS 2011). Barred owls seemingly compete with spotted owls for nesting and roosting sites and food, and barred owls may also predate/harass spotted owls. Barred owl populations are increasing in California (Forsman et al. 2011), and the probability of detecting spotted owls is significantly lower in areas occupied by barred owls (Olson et al. 2005, Crozier et al. 2006). The more significant decrease in NSO populations in the northern portion of its range may be explained by competition with barred owls in areas where they have been present the longest, specifically in Washington, Oregon, and along the northern coast of California (USFWS 2011, Gutiérrez et al. 2004, Olson et al. 2005). The effect of barred owl presence on spotted owl populations may lead to extirpation (local extinction) or near extirpation of the NSO, even if other threats, such as habitat loss and fragmentation, decrease (USFWS 2013). Interference competition between barred owls and NSOs is evident by the spatial segregation and altered habitat use that is observed when both species are present (Wiens et al. 2014).

As of 2014, a total of 3,116 known NSO ACs had been reported in California (CDFW 2016). The annual rate of NSO population decline has been estimated at 3.8% per year from 1985-2013 (CDFW 2016). Population declines in California, which were previously small or stable, are now accelerating, possibly due to increased presence of the barred owl in recent years (Dugger et al. 2016). Competition between spotted owls and barred owls results in an increased probability of extinction for spotted owls, as well as reduced occupancy and population sizes, but modeling has found that it is unlikely to lead to full competitive exclusion (Yackulic et al. 2014).

As stated previously, it is assumed that these impacts (e.g., extirpation, spatial segregation) are also applicable to the CSO. Barred owls are an increasing threat to the CSO, as barred owls expand their range and become more prevalent in the Sierra Nevada (Gutiérrez et al. 2017). It is expected that barred owls may eventually expand their range into the entire Sierra Nevada. Expansion of the barred owl range throughout the CSO range, similar to the current threat to the NSO, would likely result in extirpation of the CSO in the future (Gutiérrez et al. 2017). Barred owls have only recently expanded their range into the northern Sierra Nevada, in the range of the CSO. The first record of a barred owl in the Sierra Nevada occurred in 1989 (as cited in Gutiérrez et al. 2017). Like most invasive species, the momentum of their

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<sup>8</sup> Gutiérrez et al. (2017) concludes that the Sierra Nevada population of CSO is distinct from the populations found in the mountains of southern California due to geography, and that movement of owls between these areas is likely rare.

range expansion, and the associated population abundance, is expected to increase exponentially once some critical density (as yet unknown) has been reached (Gutiérrez et al. 2017).

#### **8.1.1.1 Barred Owl Research Programs**

The Revised Recovery Plan for the Northern Spotted Owl recommends that barred owl removal experiments be initiated immediately to increase our understanding of competition between the two species and the potential effectiveness of barred owl removal in the recovery of spotted owl populations (USFWS 2011). However, the evidence suggesting the detrimental impact of barred owl presence on spotted owl populations does not yet warrant the widespread removal of barred owls throughout the spotted owl range (USFWS 2013). Experiments by the Service that include the lethal and non-lethal removal of barred owls in Washington, Oregon, and a portion of northern California (study areas include a total of 958,300 acres) began in 2013 and are ongoing (1,633 barred owls removed to date), which will provide crucial information on the applicability of widespread barred owl removal as a management strategy for future use (USFWS 2013, 2018d). A total of 3,603 owls are expected to be removed by the Service during its experiments. The Service has not yet made any conclusions regarding the effect of barred owl removal on spotted owl populations (USFWS 2018d).

A study by Diller et al. (2012) in northern California showed the removal of barred owls from nine historical NSO nest sites resulted in the reoccupation of those sites by spotted owls within one year of barred owl removal. Within four years of initial removal, barred owls replaced the NSOs once again at three of the sites. Thus, removal programs may help increase the nesting density of spotted owls but would need to be in place long-term. For the CSO, barred owl removal programs may be more successful in the near future, while barred owl populations are still low (Dugger et al. 2016, Gutiérrez et al. 2017).

As stated in the draft EIS analyzing the Green Diamond Forest HCP (USFWS 2018e), Green Diamond is expected to achieve 100% removal of barred owls from its ownership (357,412 acres) for the life of its ITP, which is estimated to be between 100 to 150 barred owl removals per year for the duration of the 50-year permit term (total of 5,000 to 7,500 barred owls over 50 years).

Under the No Action Alternative, SPI would not conduct barred owl research on the Covered Lands; thus, no beneficial effects to the NSO or CSO would occur. However, negative effects would occur as the barred owl population in the Analysis Area is expected to continue to increase, and barred owl range expansion would likely continue. Barred owls would continue to compete with the NSO and CSO for resources, and adverse effects to spotted owls from barred owl interactions would continue to occur in the Analysis Area. Barred owl research on SPI Covered Lands (1,566,153 acres) under the HCP Alternative (Proposed Action) and NWFP/SNFP Alternative throughout the permit term would likely result in reduced barred owl populations, as up to 150 barred owls per year may be collected for research purposes over the course of the 50-year permit term (up to 7,500 barred owls over 50 years). Barred owl research by SPI would be expected to cumulatively add to research and removal efforts by federal and private entities throughout the range of the NSO and CSO. Reduced barred owl populations would likely allow spotted owls to respond favorably to conservation efforts throughout their range. However, it is not known whether a decline in the barred owl population due to the effects of barred owl removal would be offset by population increases that may be attributable to timber harvest and other activities making habitat more suitable for barred owls and other generalist species.

#### **Cumulative Effects of Barred Owl Research on Barred Owls**

As proposed in the Green Diamond HCP, barred owl removal is expected to occur on 357,412 acres of its property in California (Green Diamond Resource Company [GDRC] 2018). Barred owl removal research is currently being conducted by the Service on 958,300 acres in Washington, Oregon, and California

(USFWS 2013). A total of 2,881,865 acres would be subject to barred owl removal research, which includes the research on the SPI Covered Lands proposed in both the HCP Alternative (Proposed Action) and the NWFP/SNFPA Alternative. This accounts for less than 0.1% of the range of the barred owl in North America. Thus, these combined removals on private and public lands represent an insignificant portion of the barred owl range

### **8.1.2 Ongoing Loss of Habitat Due to Timber Harvest**

Spotted owl habitat availability has decreased by 60% to 88% from the early 1800s to 1990, mostly due to timber harvest and land-conversion activities (USFWS 2008b). In California, the rate of spotted owl habitat loss was estimated as 1% per year until 1990 (USFWS 2008b). Historical management of forested lands in California has resulted in significant effects to spotted owl habitat. Four main changes to forested areas in California, summarized by McKelvey and Johnston (1992), occurred from 1850 to 1992, including:

1. Loss of large trees and associated downed logs;
2. Shift towards shade-tolerant, fire-sensitive species;
3. Fuel load increases due to mortality of small trees; and
4. Occurrence of fuel ladders that promote crown fires.

Since 1990, forest management on publicly owned lands has changed dramatically, with timber harvest decreasing on USFS lands in California (Gutiérrez et al. 2017). In 2012, the timber harvest in California was approximately 1,425 MMBF, representing an 18% decline from 2006 (McIver et al. 2015). Overall, management practices on public and private lands have significantly improved with the development of logging regulations and new technology; however, legacy impacts from previous forest management practices continue to affect wildlife, including the NSO and CSO. Replacement forest stands are often composed of even-aged stands of trees, rather than the mosaic of habitats and uneven-aged stands characteristic of historical forested areas in California (CDFW 2015). The fragmentation of habitat that has resulted from timber harvest may still allow for foraging by most species, but many wildlife species, such as spotted owls, prefer nesting or resting sites that include unfragmented forested areas (CDFW 2015).

Harvest that reduces the number of large trees or decreases the amount of large-tree habitat with moderate to high canopy cover, likely negatively affects CSO occupancy, survival, and productivity (as reviewed in USFS 2018b). However, recent studies have failed to detect any negative impact of logging to CSO occupancy, survival, or productivity (Tempel et al. 2016, Irwin et al. 2015). However, this may be because timber harvest since the early 1990s has not reduced the amount of high-quality habitat on public lands, and the number and amount of territories on public lands that have been affected by logging are so small (USFS 2018b).

Historically, timber harvest activities within the NSO's range, such as clear-cuts and heavy commercial thinning, have been shown to be detrimental to the species (USFWS 2011). Some silviculture methods, such as variable retention and uneven-aged management, have less obvious effects on NSO habitat use (CDFW 2016). Some methods of timber harvest, when applied at appropriate scales, may in fact enhance owl habitat by increasing foraging opportunities, for example (CDFW 2016). Of the 32.8 million acres of forested land in California, national forest lands account for 48%, and private land owners hold 39%. The remaining 13% of forested land is classified as other public land.

Within the Analysis Area, there are 4,497,772 acres of forested land, with 3,022,807 acres of the Analysis Area classified as federal ownership, 577,876 acres as special designation lands, 47,596 as state ownership, and 2,348 acres as Native American lands (see Section 3.1.1).

### 8.1.2.1 Private Lands

Privately managed forests are the main producers (85%) of wood products in California (Morgan et al. 2012).

Timber harvest on private lands are governed by the CFPR<sup>9</sup>, which were revised in 1990 to require surveys for spotted owls in nesting, roosting, and foraging habitat, and to provide habitat protection measures around ACs. Under these rules, a THP cannot be approved if it is likely to result in incidental take of federally-listed species unless that take is authorized by a federal ITP (Appendix D). No ITPs have been issued for the CSO, which is not currently listed under the ESA, but should the species be listed in the future, timber harvest within the range of the CSO would likely require all timber harvest plans within the species' range to also avoid take or seek an ITP.

Therefore, the effects of timber harvest and management activities on private lands contributing to the cumulative effects on NSO and CSO populations are discussed separately below.

#### Northern Spotted Owl

Range-wide, an estimated 535,400 acres of NSO roosting and foraging habitat were harvested on non-federal lands in Washington and Oregon between 1996 and 2006, with an additional 90,200 acres harvested in California between 1994 and 2007 (USFWS 2011). This is an average loss of 53,540 acres per year in Oregon and Washington, and an additional 6,939 acres in California, for a total harvest of 60,479 acres per year on non-federal lands. It should be noted that while timber harvest is occurring, other areas are being replanted, and other areas are growing, so these numbers do not represent a total loss. The Service (2011) estimated that in 1994/1996, non-federal lands contained approximately 4,198,000 acres of habitat for the NSO. Of these approximately 4.2 million acres, it is estimated that approximately 1,344,409 acres<sup>10</sup> have been harvested as of 2018, which represents approximately 32% of the NSO habitat.

Assuming similar harvest trends over the next 50 years, loss of NSO habitat due to timber harvest on private lands is projected to be approximately 3,023,950 acres range-wide. This would essentially result in over 100% loss of NSO habitat on non-federal lands. However, this would not be a total loss of habitat, as reforestation of harvested areas and advances in timber harvest practices would provide or maintain forested habitat on private lands.

However, timber harvest on private lands in California are governed by the CFPR, which were revised in 1990 to require surveys for spotted owls in nesting, roosting, and foraging habitat, and to provide habitat protection measures around ACs. Under these rules, a THP cannot be approved if it is likely to result in incidental take of federally-listed species unless that take is authorized by a federal ITP (USFWS 2011).

In addition, habitat suitability is not static, and areas that have been harvested in the past may now be suitable habitat or become suitable habitat in the future. Harvested areas are also required to be replanted within five years of harvest completion (per Cal. Pub. Res. Code § 4561-4563.5). Additionally, advances in timber harvest practices result in some harvested areas remaining suitable for the NSO (e.g., selective harvest, leaving behind large trees, leaving enough canopy cover for the species).

Table 8-1 summarizes the HCPs issued to-date addressing NSO throughout its range.

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<sup>9</sup> [https://calfire.ca.gov/resource\\_mgt/downloads/2017%20Forest%20Practice%20Rules%20and%20Act.pdf](https://calfire.ca.gov/resource_mgt/downloads/2017%20Forest%20Practice%20Rules%20and%20Act.pdf)

<sup>10</sup> Sum of the following: 535,400 non-federal acres in Washington/Oregon between 1996 and 2006, plus 12 additional years at 53,540 acres/year; 90,200 non-federal acres in California between 1994 and 2007, plus 11 additional years at 6,939 acres/year.

**Table 8-1. Habitat conservation plans prepared for NSO incidental take permits issued or being considered for issuance throughout the NSO range on non-federal lands.**

<b>Name</b>	<b>State</b>	<b>Area covered (acres)</b>	<b>Permit duration</b>	<b>Land use activities</b>	<b>Listed species covered</b>
<b>Weyerhaeuser (Millicoma Tree Farm)</b>	OR	209,000	50 years (1995-2045)	Forest management	NSO
<b>West Fork Timber (formerly Murray Pacific)</b>	WA	53,527	100 years (1993-2093)	Forest management	NSO, gray wolf, marbled murrelet
<b>WDNR Forest Lands</b>	WA	1,600,000	70 years (1997-2067)	Forest management, gas/oil production, recreational activities	NSO, gray wolf, marbled murrelet, Oregon spotted frog, Columbian white-tailed deer, Oregon silverspot butterfly
<b>Terra Springs LLC Low Effect</b>	CA	76	30 years (2004-2034)	Agricultural, forest management	NSO
<b>Scofield Corporation</b>	WA	40	1 year (1996-1997)	Forest management	NSO
<b>Regli Estates</b>	CA	500	20 years (1995-2015)	Forest management	NSO, marbled murrelet
<b>Port Blakely RB Eddy Tree Farm</b>	WA	10,628	50 years (1996-2046)	Forest management	NSO, marbled murrelet
<b>Plum Creek Timber I-90 Land Exchange</b>	WA	148,300	50 years (1999-2049)	Forest management	NSO, gray wolf, marbled murrelet, grizzly bear
<b>Plum Creek Timber Central Cascades</b>	WA	169,177	100 years (1996-2096)	Forest management	NSO, gray wolf, marbled murrelet, grizzly bear

<b>Name</b>	<b>State</b>	<b>Area covered (acres)</b>	<b>Permit duration</b>	<b>Land use activities</b>	<b>Listed species covered</b>
<b>Mendocino Redwood Company</b>	CA	213,244	80 years (in development)	Forest management	NSO, marbled murrelet, California red-legged frog, mountain beaver, coho salmon, steelhead
<b>Humboldt Redwood Company (formerly Pacific Lumber, Headwaters)</b>	CA	211,700	50 years (1999-2049)	Forest management, mining or other extraction	NSO, marbled murrelet, western snowy plover
<b>Fruit Growers Supply Company</b>	CA	155,000	50 years (issued in 2012, revoked in 2015, working on new HCP)	Forest management	NSO, coho salmon, yreka phlox
<b>Elliott State Forest</b>	OR	93,000	50 years (terminated in 2011)	Forest management	NSO, marbled murrelet
<b>Coast Range Conifers</b>	OR	110	5 years (1995-2000)	Forest management	NSO, marbled murrelet
<b>City of Dalles Municipal Watershed</b>	OR	1,400	30 years (1999-2029)	Forest management	NSO
<b>City of Tacoma, Tacoma Water</b>	WA	14,888	50 years (2001-2051)	Forest management, water activities	NSO, marbled murrelet, gray wolf, grizzly bear, Oregon spotted frog, Canada lynx, chinook salmon, chum salmon, sockeye salmon, steelhead, bull trout

Name	State	Area covered (acres)	Permit duration	Land use activities	Listed species covered
<b>Cedar River Watershed</b>	WA	90,546	50 years (2000-2050)	Forest management, recreational activities, utility/infrastructure, water activities	NSO, gray wolf, grizzly bear, southwestern willow flycatcher, Oregon spotted frog, marbled murrelet, chinook salmon, bull trout
<b>Boise Cascade Low-Effect (transferred to Western Pacific Timberlands, LLC)</b>	WA	620	5 years (2001-2006)	Forest management	NSO
<b>Green Diamond Resource Company (formerly Simpson Timber Company)</b>	CA	383,100	30 years (1992-2022) 50 years (in development)	Forest management	NSO, fisher

### California Spotted Owl

Between 1994 and 2013, 83.4% of timber harvest in California occurred on privately owned lands, while 73-80% of important CSO habitat types occur on national forest lands in the Sierra Nevada (Gutiérrez et al. 2017). Therefore, the majority of the private timber harvest is not occurring within prime CSO habitat and is likely to have a smaller effect than harvest occurring on public lands (see Section 8.1.2.2 below). However, a recent study has suggested that CSO may occur on private timberlands at greater densities than expected (USFS 2018b). The USFS (2018b) believes that additional work is required to determine the habitat quality on private lands, their importance to population viability of the CSO, and the long-term effects of harvest systems.

Around 2.9 million acres of silvicultural treatments were approved or completed between 1990 and 2013 in the Sierra Nevada, of which at least 998,000 acres were within the range of the CSO (Gutiérrez et al. 2017). Over 23 years, this averages 43,392 acres within the CSO range per year. Conservatively assuming that this same level of harvest continues (though as stated previously, timber harvest has declined in recent years), approximately 2,169,600 acres of timber within the range of the CSO could be harvested over the 50-year permit term on private lands, though not all of this habitat may be suitable or occupied. It should be noted that while timber harvest is occurring, other areas are being replanted, and other areas are growing, so these numbers do not represent a total loss. Harvested areas are also required to be replanted within five years of harvest completion (per Cal. Pub. Res. Code § 4561-4563.5). Additionally, advances in timber harvest practices result in some harvested areas remaining suitable for the CSO (e.g., selective harvest, leaving behind large trees, leaving enough canopy cover for the species).

### 8.1.2.2 Public Lands

Presently, approximately 73% to 80% of California wildlife habitat relations (CWHR) habitat classes utilized by owls are located on land managed by the USFS (Gutiérrez et al. 2017).

#### Northern Spotted Owl

The NWFP was adopted to create a coordinated forest management plan for lands managed by the USFS and the BLM within the range of the NSO. It is recognized that these managed public lands need to provide forest habitat, as well as forest products. The NWFP covers lands throughout Oregon, Washington, and northern California that are managed by Federal agencies. The NWFP is intended to maintain late-successional forest ecosystems and to protect them from disturbance, including wildfires, insects, diseases, and human impacts. The NWFP covers over 24 million acres of federally owned habitat within the NSO's range, which includes approximately 3.5 million acres of reserved lands in California (CDFW 2016).

For known spotted owl ACs, 100 acres of the best northern spotted owl habitat is retained as close to the nest site or owl AC as possible. Timber management within the 100-acre area should comply with management guidelines for LSRs. The area should be maintained as such, even if the AC is no longer occupied by the spotted owl. The NWFP applies to all BLM properties, unless existing resource management plans are more restrictive or provide additional benefits to late-successional related species (CDFW 2016).

Range-wide, an estimated 42,600 acres of NSO roosting and foraging habitat were harvested on non-federal lands in Washington and Oregon between 1996 and 2006, with an additional 11,200 acres harvested in California between 1994 and 2007 (USFWS 2011). This is an average loss of 4,260 acres per year in Oregon and Washington, and an additional 862 acres in California, for a total harvest of 5,122 acres per year on non-federal lands. USFWS (2011) estimated that in 1994/1996, federal lands contained approximately 8,853,000 acres of habitat for the NSO. Of these 8.8 million acres, it is estimated that approximately 114,402 acres<sup>11</sup> have been harvested as of 2018, which represents approximately 1.3% of the NSO habitat.

Assuming similar harvest trends over the next 50 years, loss of NSO habitat due to timber harvest on federal lands is projected to be approximately 256,100 acres range-wide. This would increase the loss from timber harvest from 1.3% to 4.2%, an additional loss of 2.9%. However, habitat suitability is not static, and additional suitable habitat may be available today or in the future that was not available in 1994/1996, and likewise, habitat that was suitable in 1994/1996 may no longer be suitable today or in the future. Additionally, areas that have been harvested in the past may now be suitable habitat or become suitable habitat in the future, and advances in timber harvest practices result in some harvested areas remaining suitable for the NSO (e.g., selective harvest, leaving behind large trees, leaving enough canopy cover for the species). Overall, timber harvest on public lands within the range of the NSO would cumulatively add to the expected timber harvest occurring on privately-owned lands, with timber harvest on public lands estimated to account for approximately 7.8% of the combined harvest expected on public and private lands range-wide over the next 50 years.

#### California Spotted Owl

Following the publication of the "California Spotted Owl: A Technical Assessment of its Current Status" (Verner et al. 1992), the CSO guidelines were adopted, which changed the management of national

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<sup>11</sup> Sum of the following: 42,600 acres in Washington/Oregon between 1996 and 2006, plus 12 additional years at 4,600 acres/year; 11,200 acres in California between 1994 and 2007, plus 11 additional years at 862 acres/year.

forests within the range of the CSO. Timber harvest on National Forest System (NFS) lands decreased dramatically starting in the mid-1990s, with only 665,000 acres logged on national forests in the Sierra Nevada between 1990 and 2013, compared to 1 million acres on private lands.

These guidelines recommended by Verner et al. (1992) were followed by the national forests in the Sierra Nevada until the Sierra Nevada Forest Plan Amendment record of decision (ROD) was released in 2001, and then amended in 2004<sup>12</sup>. The ROD provided some specific standards and guidelines for CSO habitat.

The adoption of the guidelines in 1993 led to an increase in commercial thinning on national forest lands, maintaining all trees greater than 30 inches in diameter at breast height, maintaining overstory canopy cover at greater than 40%, and removing small trees (Gutiérrez et al. 2017). Currently, USFS practices tend to focus on two metrics when implementing management treatments: the maximum tree diameter removed, and the residual canopy cover. While trees up to 30 inches can be removed, the maximum diameter limit is set lower in many forests that have been previously thinned, as removing larger trees would drop the residual canopy cover below the target of 40% (Gutiérrez et al. 2017). Based on these changes in the management practices, some aspects of CSO habitat have likely improved since 1992, with the average tree diameter increasing in many forests (Gutiérrez et al. 2017). The number of acres subject to timber harvest activities on NFS lands in the Sierra Nevada and within the range of the CSO has declined dramatically since 1990, with a decline from 57,091 acres in 1990 to 7,915 acres affected in 2014 (includes all silviculture treatment types; USFWS 2017). Assuming similar harvest rates as reported in 2014 for the next 50 years, loss of CSO habitat due to timber harvest on federal lands is projected to be approximately 395,750 acres over the next 50 years. Overall, timber harvest on public lands within the range of the CSO would cumulatively add to the expected timber harvest occurring on privately-owned lands, with timber harvest on public lands estimated to account for approximately 15.4% of the combined harvest expected on public and private lands in the Sierra Nevada range of the CSO over the next 50 years.

### **8.1.2.3 Tribal Lands**

#### **Hoopa Valley Indian Reservation**

The Hoopa Valley Indian Reservation encompasses 90,767 acres in the northeastern portion of Humboldt County, making it the largest reservation in California. A revised Forest Management Plan (FMP) has recently been adopted, which covers the period of 2011-2026. An estimated 8,980 acres of habitat will be lost due to timber harvest activities during the covered period, making it temporarily unsuitable for the NSO. By 2026, a 4.4 percent decline in total suitable habitat is expected with the implementation of the FMP and the completion of its associated projects. The reservation plans to retain habitat for up to 50 potential NSO territories and 20-40 owl pairs throughout the entire planning period. However, it is stated that competition with barred owls may make this goal difficult to reach.

#### **Yurok Indian Reservation**

The Yurok Indian Reservation includes 59,000 acres in Del Norte and Humboldt counties, which includes a total of 36,637 acres of forested tribal land. The Yurok Tribe's FMP outlines NSO management objectives, including maintaining all ACs as no harvest reserves within 60 acres and seasonal restrictions on disturbance activities within 0.25 mile of NSO nesting sites.

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<sup>12</sup> [https://www.fs.usda.gov/Internet/FSE\\_DOCUMENTS/stelprd3840932.pdf](https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprd3840932.pdf)

## Round Valley Indian Reservation

The Round Valley Indian Reservation encompasses 23,200 acres in Mendocino County, with 8 known nesting NSO pairs on the reservation as of 2006. Approximately 22,150 acres of suitable habitat is found on the reservation, with about 13 percent of it being impacted by Round Valley's FMP. The preferred silviculture method on the reservation is uneven-aged forest management, although limited even-aged management is allowed in some instances.

### 8.1.3 Habitat Loss, Degradation, and Fragmentation

#### 8.1.3.1 Fire (including stand-replacing wildfire)

While forest fires have always occurred within the range of the NSO and CSO, in the past, these fires generally occurred more frequently, but at a lower severity (USFS 2018b). This kept the forest density lower and kept the composition of the forests in such a way that stand-replacing wildfires were less common (USFS 2018b). Fire suppression over the last century has reduced species diversity, increased the number of fire-sensitive, shade-tolerant trees, created denser forests with multiple canopy layers, and resulted in more densely forested landscapes with high fuel levels, which results in an increase in the number of stands and landscapes that are highly susceptible to stand-replacing wildfire (USFS 2018b).

Fires in the western United States have increased in size and frequency due to climate change and land management throughout the region (Westerling et al. 2006, Heyerdahl et al. 2008, Reinhardt et al. 2008, Wiedinmyer and Hurteau 2010, Spies et al. 2010a). In the next century, it is expected that areas affected by wildfires in the Pacific Northwest will increase significantly (Hessburg et al. 2005, 2007, Kennedy and Wimberly 2009, Littell et al. 2009, 2010, Shafer et al. 2010), as fires have been suppressed for years, resulting in the current state of high susceptibility to large wildfires (Hessburg et al. 2005, Moritz et al. 2011, USFWS 2011). Predictions of future fire risk, when also considering climate change, predict a near doubling of fire likelihoods (Gutiérrez et al. 2017). Both state and national policies have promoted the suppression of wildfires over the last century (van Wageningen 1995), resulting in an accumulation of dense tree stands with high fire potential (Husari and McKelvey 1996). Urban development has increased the wildland-urban interface, resulting in an increased chance of human-caused wildfires. Additionally, some expanses of tree plantations are more susceptible to severe wildfires when compared to multi-aged forests (CDFW 2015, Odion et al. 2004). The results of climate change and wildfire occurrences will likely result in the conversion of mid-elevation coniferous forests to other habitat types, such as montane chaparral, mixed-hardwood forests, or grasslands (Lenihan et al. 2008).

Natural wildfire supports and is critical to the maintenance of ecosystem health, structure, and function in the state of California (State Board of Forestry and Fire Protection [SBFFP] 2016). Conversions between ecosystem types will be expedited due to stand-replacing wildfire events and other disturbances (Joyce et al. 2008, Blate et al. 2009, Littell et al. 2010). Many areas of older forest stands are being lost due to wildfires throughout the range of the spotted owl (Spies et al. 2006, 2010b, Ager et al. 2007, Clark 2007, Healey et al. 2008, Kennedy and Wimberly 2009). Specifically, in the Sierra Nevada, the areas of altered landscape lack the characteristics of old-growth or seral stage forests (Franklin and Fites-Kaufman 1996, USFS 2001). Land cover change assessments have revealed that fire, rather than timber harvesting or development activities, now represents the greatest proportion of live tree mortality or "loss" in California (Sleeter et al. 2011). When considering the recent improvements to owl habitat due to management practices, the progress may be short-lived, as the inevitable threat of large wildfires becomes more likely (Weatherspoon et al. 1992).

The use of post fire habitat by spotted owls depends on the previous function of the habitat (i.e., nesting, roosting, or foraging) and the severity of the fire. The Revised Recovery Plan for the Northern Spotted

Owl concludes that spotted owls can continue to utilize fire-impacted habitats, though fire reduces the function of some habitat types, especially in severe fire conditions. Research on the CSO has shown that occupancy is not affected when fires occur under their natural regime (every 2-14 years; Gutiérrez et al. 2017).

In 2017, the USFS, CAL FIRE, the National Fish and Wildlife Foundation, and SPI signed a Memorandum of Understanding (MOU) to coordinate their respective fire management strategies and share technical information regarding the location of sensitive wildlife habitats. The coordination provided for in the MOU will increase the effectiveness of fire management strategies on over 2 million acres of federal, state, and private land in California (USFS 2017). The collective cooperation of the MOU parties to manage fire across ownership and jurisdictions is expected to directly and indirectly benefit NSO and CSO populations and the forest communities that support them by directly protecting habitat from destruction due to fires, and indirectly by protecting foraging areas and habitat for prey species.

### **Northern Spotted Owl**

On non-federal lands, approximately 7,500 acres of NSO nesting and roosting habitat were lost in Oregon and Washington due to fire between 1996 and 2006, with another 5,600 acres lost within the range in California between 1994 and 2007 (USFWS 2011). This is an average loss of 750 acres per year in Oregon and Washington, and an additional 431 acres per year in California, for a total loss of 1,180 acres of habitat per year on non-federal lands. On federally-owned lands, where large wildfires continue to be the leading cause NSO habitat loss (Davis et al. 2016), an additional 161,200 acres of NSO roosting and foraging habitat were lost in Oregon and Washington due to fire between 1996 and 2006, with another 75,500 acres lost within the range in California between 1994 and 2007 (USFWS 2011). This is an average loss of 16,120 acres per year in Oregon and Washington, and an additional 5,808 acres per year in California, for a total loss of 21,928 acres of habitat per year on Federal lands. Davis et al. 2016 state rangewide losses of nesting/roosting habitat on Federal lands were estimated at 474,300 acres during the first two decades of the NWFP (1994-2013; approximately 23,715 acres per year). When considering non-federal and Federal lands together utilizing information from USFWS 2011, wildfires have removed an average of 23,108 acres of NSO habitat per year within the range of the NSO. It should be noted that the occurrence and severity of wildfires within the range of NSO may continue to increase over time due to factors such as climate change and land management throughout the region. However, increased fuel reduction efforts on both private and public lands may reduce the potential for increase in wildfire occurrence and severity.

USFWS (2011) estimated that in 1994/1996, non-federal lands contained approximately 4,198,000 acres of habitat for the NSO, and Federal lands contained an additional 8,853,000 acres, for a total of 13,051,000 acres of NSO habitat. Of these 13 million acres, it is estimated that approximately 520,868 acres<sup>13</sup> have been lost as of 2018, which represents approximately 4% of the NSO habitat.

Assuming similar fire trends over the next 50 years, loss of NSO habitat due to wildfire is projected to be approximately 1,155,400 acres range-wide. This would increase the loss from wildfire from 4% to 12.8%, an additional loss of 8.8%. Actual losses may be greater, as fire risk has been increasing in recent years, and is projected to continue to increase due to climate change as described above. However, habitat suitability is not static, and additional suitable habitat may be available today or in the future that was not available in 1994/1996, and likewise, habitat that was suitable in 1994/1996 may no longer be suitable

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<sup>13</sup> Sum of the following: 7,500 non-federal acres in Washington/Oregon between 1996 and 2006, plus 12 additional years at 750 acres/year; 5,600 non-federal acres in California between 1994 and 2007, plus 11 additional years at 431 acres/year; 161,200 federal acres in Washington/Oregon between 1996 and 2006, plus 12 additional years at 16,120 acres/year; 75,500 federal acres in California between 1994 and 2007, plus 11 additional years at 5,808 acres/year.

today or in the future. Though the NSO evolved on a landscape in which wildfires are a natural ecological process, the landscape was altered greatly during the 20th century. The NSO habitat that remains within its range is relatively fragmented and located primarily on federal lands, with large wildfires being a threat to current and future habitat loss.

### **California Spotted Owl**

The CSO may continue to persist in areas that experience low-moderate or mixed-severity wildfires, so this loss may not be complete, though no research has been conducted on long-term survival, reproduction or fitness of owls within these areas (Gutiérrez et al. 2017). For the CSO, about 1.1 million acres of conifer, hardwood, and mixed-conifer vegetation types across the range of the species in the Sierra Nevada have been burned from 1993-2013, with the number of acres burned increasing in recent years (Gutiérrez et al. 2017). Over the 20 years, this is an average of 55,000 acres per year, though as stated, fires have been increasing in recent years. Projected over the 50-year permit term, this is the loss of 2.75 million acres, and the actual loss may be higher due to increasing fire risk, as described above. However, increased fuels reduction efforts on both private and public lands may reduce the potential for increase in wildfire occurrence and severity.

#### **8.1.3.2 Commercial and Residential Development**

Urban and suburban development, and the resulting loss of habitat, is ongoing throughout the range of the NSO and CSO and can act as a barrier to dispersal among owl populations (Gutiérrez et al. 2017). Land development may result in habitat loss, habitat degradation, and disturbance. Additionally, fuels treatments and forest thinning near wildland-urban interface zones may be conducted to protect urban areas. To date, there is no information pertaining to the effects of these land development and forest management practices on spotted owls and their habitat (Gutiérrez et al. 2017).

Forests have historically been lost to golf courses, single family homes, commercial properties, ski resorts, industrial sites, and new roadways, and this loss is anticipated to continue in the future. The threat of future development varies throughout the Analysis Area, with areas in the northwest being more sparsely populated compared to more rapidly growing areas in the Sierra Nevada (CDFW 2015). The Sierra Nevada underwent a 130% population increase between 1970 and 1990 (CDFW 2015), and low-to-mid elevation zones on the western slope of the Sierra Nevada continue to experience growing populations, expansion of communities, and an increase in dispersed, low-density housing (Gutiérrez et al. 2017). In the northeastern parts of the Analysis Area, within the Cascades, development has primarily occurred within lower elevations with subdivisions of 1-20 acres near existing cities and towns, particularly in the foothills near metropolitan centers such as Redding and along major highways (CDFW 2015). Due to this variation in development pressure throughout the Analysis Area, commercial and residential development may have a greater effect on the CSO based on the species range.

As shown in Figure 3.9 of the EIS, the majority of Covered Lands and areas being analyzed for effects in the EIS are located in areas with lower population densities. Of the 19 counties that include part of the Analysis Area, 4 are projected to lose population between 2010 and 2060, and the remaining 14 are projected to grow between 0% and 70% (Table 8-2).

**Table 8-2. Population demographics within counties that intersect the Analysis Area.**

<b>County Name</b>	<b>Projected Population Growth (2010-2060)</b>	<b>2010 Population Density (people per square mile of land)</b>	<b>2010 Housing Density (housing units per square mile of land)</b>
Amador	16%	64.1	30.3
Butte	33%	134.4	58.6
Calaveras	10%	44.7	27.4
El Dorado	39%	106.0	51.6
Humboldt	4%	37.7	17.3
Lassen	-22%	7.7	2.8
Mariposa	7%	12.6	7.0
Modoc	-11%	2.5	1.3
Nevada	25%	103.1	54.9
Placer	70%	247.6	108.5
Plumas	-12%	7.8	6.1
Shasta	19%	46.9	20.5
Sierra	-10%	3.4	2.4
Siskiyou	0%	7.2	3.8
Tehama	27%	21.5	9.1
Trinity	3%	4.3	2.7
Tuolumne	2%	24.9	14.1
Yuba	41%	114.2	43.7
Washoe (Nevada)	n/a	66.9	29.3
<b>Average</b>	<b>13%</b>	<b>55.7</b>	<b>25.9</b>
<b>California (state-wide)</b>	<b>37%</b>	<b>239.1</b>	<b>87.8</b>

Source: California Department of Finance (2018), United States Census Bureau (2010).

In addition to the growth of populations in these areas, and the associated housing development that may accompany them, are associated with linear structures such as roads, canals, and power lines that can contribute to additional habitat loss, as well as degradation and fragmentation of existing habitat (CDFW 2015). The following sections summarize existing developments known to affect the NSO (i.e., developments with an associated HCP).

### **Regali Estates**

The Regali Estates HCP, which expired in 2015, covered 480 acres in Humboldt County in the California Coast Province. The HCP covered two NSO ACs, and the associated activities resulted in the immediate loss of nesting habitat for one NSO pair.

### **Terra Springs LLC**

The Terra Springs HCP, a “Low Effect HCP,” covers 76 acres in Napa County within the California Coast Province for the conversion of 22 acres of mature forest to vineyard. One NSO AC is located 1.1 miles from the covered lands (Butler and Wooster 2003).

### **8.1.3.3 Marijuana Cultivation**

Some regions of the Analysis Area are ideal for legal and illegal marijuana cultivation due to their remoteness and forested landscape. This is particularly true in the northwestern portions of the Analysis Area, which is characterized by a lower population density and a remote and forested landscape (CDFW 2015). Cultivation has increased in recent years since the passing of Proposition 215, the Compassionate Use Act (1996), which, according to state law, allows medical marijuana users to legally cultivate marijuana plants. Recently, environmental impacts as the result of this cultivation have been observed, including degradation, loss, and fragmentation of habitat. Illegal marijuana cultivation has resulted in the removal and damage of forested areas, with the resulting landscape prone to landslides (CDFW 2015). Additional effects include reduced water quality and stream flow, as well as mortality of various fish and wildlife species (CDFW 2015). Species may also be affected by the use of chemicals, such as rodenticides, fertilizers, and herbicides, during illegal marijuana cultivation (CDFW 2015).

The prime areas of cultivation are within Humboldt, Trinity, and Mendocino counties (CDFW 2015). The Analysis Area includes portions of Humboldt and Trinity counties. California is actively trying to reduce the environmental damage caused by legal and illegal marijuana cultivation on both public and private lands (CDFW 2015).

Recent research has shown the NSO is exposed to anticoagulant rodenticides as the result of marijuana cultivation (Gabriel et al. 2018). It is expected that the CSO is also be affected by rodenticides, as the CSO and NSO share similar habitat and prey (Gutiérrez et al. 2017). Though the effects of rodenticide exposure are not well understood in raptor species, the available information indicates that exposure may decrease fitness, increase mortality, and affect reproductive success (Gabriel et al. 2018).

### **8.1.3.4 Sudden Oak Death**

Sudden oak death, caused by the plant pathogen *Phytophthora ramorum*, is a disease of oak trees that occurs in coastal California (Monterey County to Humboldt County) and in southwest Oregon. In the last decade, it is estimated that the disease has killed over 1 million oak and tanoak (*Lithocarpus densiflorus*) trees. The movement of infested soil and plant materials spreads the disease, and the California Department of Food and Agriculture (CDFA) and the United States Department of Agriculture Animal and Plant Health Inspection Service (USDA-APHIS) now regulate the movement of known host plant species (Alexander and Swain 2010). The loss of tree species affected by sudden oak death will result in

short- and long-term effects, including a decrease in acorn production and the species that feed upon acorns (such as the dusky-footed woodrat and northern flying squirrel, the primary prey species of the NSO and CSO). Ultimately, these effects may cascade up the food chain and affect other species, such as the NSO and CSO (Courtney et al. 2004). The loss of habitat due to declines in tanoak and coast live oak (*Quercus agrifolia*) could also be significant and lead to additional effects, such as the invasion of exotic plant species, shifts in native vegetation, and increased erosion (Moritz et al. 2008). Tree mortality due to sudden oak death may also increase fuel loads and the potential for severe fires (Press et al. 2011)

#### 8.1.4 Climate Change

GHGs are gases that warm the Earth's atmosphere by absorbing solar radiation reflected from the Earth's surface. The most common GHGs are carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF<sub>6</sub>). According to USEPA (2016), scientists find that increasing GHG concentrations are warming the planet, and rising temperatures may, in turn, produce changes in precipitation patterns, storm severity, and sea level, a phenomenon commonly referred to as "climate change." Most of these gases are produced by the burning of fossil fuels for energy production.

In 2016, about 225 billion kilowatt-hours (kWh) of electricity were consumed by California; however, the state ranked third in the nation in conventional hydroelectric generation, second in net electricity generation from all other renewable energy resources combined, and first as a producer of electricity from solar, geothermal, and biomass resources (USEIA 2017). California leads the nation in solar thermal electricity capacity and generation (USEIA 2017). Additionally, the California Air Resources Board (2007) concluded that California timberlands contribute to a net sequestration of carbon in the state (USFWS 2016a).

Despite the use of renewable energy sources, average annual temperature increases are predicted throughout the state, with increases varying between ecoregions. Within the Sierra Nevada region, average annual temperatures are projected to increase 3.2 to 4.3°F by 2070 and 6.5 to 6.8°F by 2100 (PRBO Conservation Science 2011). The North Coast and Klamath regions are projected to have average temperature increases of 3.0 to 3.4°F by 2070 and 2.7 to 8.1°F by 2099 (PRBO Conservation Science 2011, Cayan et al. 2008). In the Southern Cascades region, annual average temperatures are predicted to increase by 3.2 to 4.0°F by 2070, with larger temperature increases expected for the more mountainous portions of the region (PRBO Conservation Science 2011, Cal EMA and CNRA 2012).

Forest ecosystem changes are being intensified and made more unpredictable due to climate change, including the pattern of wildfires, insect outbreaks, drought, and disease. Specifically, for the Pacific Northwest, climate change models predict warmer, drier summers and warmer, wetter autumns and winters (USFWS 2011). These alterations are expected to cause some ecosystems to become more water-limited, temperature sensitive, and prone to disturbance (McKenzie et al. 2009). A shift in tree line elevation and other alterations of the forest ecosystem may result in habitat loss at existing low-elevation forests and changes in species composition (Case and Peterson 2007, Graumlich et al. 1989 as cited in USFWS 2011).

Climate change projections for low- and mid-elevation forests in the Sierra Nevada that provide habitat for the CSO suggest that these areas are vulnerable to conversion to woodlands, shrublands, and grasslands (USFS 2018b). Extensive droughts in recent years (2012-2015) have led to extensive tree mortality, which may be further affected by decreased snow melt due to climate change. There is the potential that some of these threats may be mitigated by habitat moving upslope, creating habitat for the spotted owl where none currently exists (Peery et al. 2012); however, this may not be able to keep pace with habitat loss at lower elevations (Stephens et al. 2016).

Spotted owl populations in northern California have been shown to be affected by weather and climate (Franklin et al. 2000). Spotted owl reproduction and survival are negatively affected by wet, cold weather that occurs during the nesting season. Additionally, extremely warm temperatures during the summer months have also been shown to decrease spotted owl recruitment and survival rates (Franklin et al. 2000), largely due to reduced prey availability (Glenn 2009). However, the effects of weather and climate are reduced when high-quality habitat is available (USFWS 2011). It is likely that climate change will result in indirect effects on owl populations through alterations in habitat distribution, abundance, and quality, as well as changes in prey availability, disease dynamics, and wildfire occurrences (Gutiérrez et al. 2017). Spotted owls rely on specific forest structure and landscape compositions, as well as the prey species that inhabit those ecosystems. It is not known how climate change will affect these factors in the future (CDFW 2016).

Climate change may also result in changes to spotted owl population distributions. Local and regional owl populations may respond differently to future climate scenarios, as responses may range from neutral to significantly negative (Glenn 2010, 2011, Peery et al. 2012). Specifically, for the CSO, climate change is predicted to have significant effects on the forests of the Sierra Nevada (as cited in Gutiérrez et al. 2017). Shifts in the distribution of CSO populations may occur as the Sierra Nevada's vegetation distribution is altered, with low- and mid-elevation forests likely being converted to woodlands, shrublands, and grasslands, especially with increased fire risk (Gutiérrez et al. 2017).

## 8.2 CUMULATIVE EFFECTS OF THE PROPOSED ACTION

As discussed above, a variety of threats affect NSO and CSO populations throughout their respective ranges, including loss or degradation of habitat through commercial timber harvest and residential or commercial development; wildfire; barred owl competition; marijuana cultivation; and climate change. Collectively, these threats have been ongoing for decades, and the extent of their impact on NSO and CSO populations is expected to remain generally the same or increase during the 50-year permit period.

Under either the HCP Alternative (Proposed Action) or NWFP/SNFPA Alternative, take of NSO through harm resulting from habitat modification would incrementally add to the effects of the other threats to NSO; however, the conservation measures proposed in the SPI HCP (see SPI HCP Section 5.2) would be expected to offset these effects through enhanced protection of the most productive NSO ACs on the Covered Lands. Additionally, possible reduction in barred owl competition resulting from the proposed barred owl research program, along with habitat modeling information that would be provided to the Service and CDFW and other conservation measures would also be expected to reduce the overall impact of the take under either the HCP Alternative (Proposed Action) or the NWFP/SNFPA Alternative. Under the No Action Alternative, take of NSO is prohibited; therefore, take of NSO through harm resulting from habitat modification would not occur, thus no incrementally additive effects on NSO populations over the current conditions are anticipated. However, since no HCP would be prepared, the NSO would not have the conservation benefits (e.g., protection of the most productive NSO ACs) afforded to it through development and implementation of an HCP.

Under the HCP Alternative (Proposed Action) and NWFP/SNFPA Alternative, take of CSO through harm resulting from habitat modification would likely have fewer negative effects on CSO populations and would incrementally add to the effects of the other threats to CSO less than when compared to the No Action Alternative. Although take would still occur under the HCP or NWFP/SNFPA alternatives, the conservation measures proposed in the SPI HCP (see SPI HCP Section 5.2) would be expected to reduce the overall impact of the take under either the HCP Alternative (Proposed Action) or the NWFP/SNFPA Alternative. Under the No Action Alternative, take of CSO would not be prohibited; therefore, the No Action Alternative would incrementally add to the effects of the other threats to CSO, although at the

same levels as the current conditions. Since no HCP would be prepared under the No Action Alternative, the CSO would not have the conservation benefits (e.g., reduced take) afforded to it through development and implementation of an HCP.

## **CHAPTER 9. ADDITIONAL EIS ANALYSIS AND REQUIREMENTS**

### **9.1 SHORT-TERM USES AND LONG-TERM PRODUCTIVITY**

NEPA requires consideration of “the relationship between short-term uses of man’s environment and the maintenance and enhancement of long-term productivity” (40 CFR 1502.16). As declared by Congress, this includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans (NEPA Section 101).

Timber harvest on SPI Covered Lands would continue to require an investment in materials and the consumption of fossil fuels. However, these requirements would remain comparable to current levels. As indicated in Section 1.3, Purpose and Need for Action, the purpose of the Service’s action is to provide long-term comprehensive conservation and protection of the NSO and CSO and their habitats at ecologically appropriate scales on SPI lands in California. The Proposed Action would provide direct and indirect benefits to various resources, including the NSO and CSO, due to the implementation of the conservation measures described in the SPI HCP. The long-term productivity of timberland under SPI ownership would not be significantly affected by the Proposed Action, as timber harvest would continue in accordance with all applicable regulations and timber harvest rates are anticipated to remain comparable under all considered alternatives.

### **9.2 SUBSTANTIAL UNAVOIDABLE ADVERSE EFFECTS**

The direct and indirect effects associated with the considered alternatives and the Proposed Action are described in the Environmental Consequences sections in Chapters 3 through 7. Timber management activities are regulated by numerous state regulations (e.g., CFPR) in order to avoid, reduce, or mitigate for potentially significant adverse impacts. Any adverse impacts resulting from timber harvest on SPI Covered Lands would be similar to the No Action Alternative, as timber harvest is anticipated to remain comparable to the present day, regardless of which alternative is chosen.

### **9.3 IRREVERSIBLE AND IRRETRIEVEABLE COMMITMENTS OF RESOURCES**

As stated in 40 CFR 1502.16, the Service must identify, as part of the environmental consequences section of an EIS, any irreversible or irretrievable commitments of resources which would be involved in the proposed action or alternative. Irreversible commitment of resources refers to the loss, as a result of the project, of future options for resource development or management, especially of nonrenewable resources such as minerals and cultural resources. Irretrievable commitment of resources refers to the lost production or use value of renewable natural resources as a result of the project. The Proposed Action (i.e., issuance of the ITP) would not result in any additional commitments of material resources or energy.

## CHAPTER 10. LIST OF PREPARERS

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Terry VanDeWalle	Stantec	EIS Manager; EIS Preparation M.A. Biology 30 years' experience with ESA section 7 and section 10 consultation, threatened and endangered species surveys, and NEPA documentation
Kendra Markland	Stantec	EIS Preparation M.S. Environmental Science 2 years' experience with environmental studies
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Kari Soltau	Stantec	EIS Preparation B.S. Biology, Environmental Concentration 6 years' experience with wildlife studies, including threatened and endangered species surveys
Bryan Thiermann	Stantec	GIS Analyst and Graphics Preparation B.S. Natural Resource Management/Soil Science 9 years' experience with geospatial environmental analysis and GIS/GPS technologies

# **Appendix A - Scoping Report**

## **Appendix B - Regulatory Framework**

## **Appendix C - Supplementary Tables and Figures**

# **Appendix D - 2018 California Forest Practice Rules**

## **Appendix E - Acronyms and Glossary**

## **Appendix F - References**