January 24, 2022

Stanislaus National Forest
Attn: SERAL
19777 Greenley Road
Sonora, CA 95370

Sent via: https://cara.ecosystem-management.org/Public/CommentInput?Project=56500

**Re: Comments on SERAL project Draft Environmental Impact Statement (#56500)**

Dear Interdisciplinary Team:

These comments are submitted on behalf of the undersigned organizations on the draft environmental impact statement ("DEIS") for the Social and Ecological Resilience Across the Landscape (SERAL) project.

This project proposes logging and other vegetation management on over 100,000 acres with portions located on the Calaveras, Mi-Wok, and Summit Ranger Districts. The project also proposes project specific forest plan amendments and the use of condition-based management for the salvage logging of trees killed by drought, insects/disease and wildfire. Road maintenance and temporary road construction is also proposed.

As noted in our scoping comments, our greatest concerns about this project are focused on impacts to California spotted owl (including the proposed amendments) and the use of condition-based management. Having now reviewed the DEIS, we are now also concerned that the hard look that NEPA requires to evaluate site-specific impacts has not been satisfied. We describe these concerns and others in the comments below.

## I. Impacts to California Spotted Owls (CSO) Including Forest Plan Amendments

The SERAL project proposes to amend direction in the current Stanislaus Land and Resource Management Plan for the SERAL project area to "incorporate" the strategy for CSO issued by the Forest Service in 2019 (USDA Forest Service 2019). The wording of the amendment is provided in Appendix B of the DEIS. The project specific plan amendment also relates to Appendix A and Map 1 since these items include estimates for the natural range of variation (NRV) and the locations of targeted forest types. Below we first discuss Appendix A and Map 1 as the foundation for the project specific plan amendment and then Appendix B to address the CSO specific issues. In this section, we also address concerns about negative impacts from the SERAL project on CSO and the failure to disclose these in the DEIS.

## A. Forest Plan Amendments Affecting CSO

### 1. Conservation of CSO Throughout the Bioregion

We raised this issue in our scoping comments and restate it here for emphasis.[1] The CSO strategy was developed to inform forest planning on national forests in the range of CSO in the Sierra Nevada. The Sierra and Sequoia National Forests are the first plans to attempt to incorporate the CSO strategy in their plan revision process. The revised plans are not yet settled or adopted and the process of their revision is still in development, including the development of plan components to conserve CSO. The plan revision process for these plans incudes an objection process which could result in additional substantive changes to the final forest plans and the plan components related to CSO.

We expect that the amended and revised forest plans throughout the bioregion to all have the same plan components to address CSO conservation. The importance of consistent management of this species throughout the bioregion was recognized in the development of the first forest plans, i.e., the "Rainbow Book" and the Spotted Owl Habitat Area (SOHA) strategy (USDA Forest Service 1984), and then in subsequent amendments to make changes related to managing for CSO in the bioregion (USDA Forest Service 1992, USDA Forest Service 2001, USDA Forest Service 2004). We note that guidance for conservation of northern spotted owl and Mexican spotted owl is uniform across their respective bioregions. In contrast, the forest plan amendment being proposed in the SERAL project is occurring prior to completing the forest plan revisions on the Sierra and Sequoia National Forests.

We ask that the plan amendment being proposed in the SERAL project be set aside until the forest planning process has been completed on the Sierra and Sequoia National Forests and the final plans adopted.

### 2. The Application of NRV in Response to the CSO Amendment

We raised this as a concern in our scoping comments, and it was not addressed in the DEIS. This proposal and the CSO amendments are driven by managing to achieve the "natural range of variation" (NRV). This is stated repeatedly throughout the DEIS. Because of this emphasis on NRV defining the actions to be taken, it is critical that any adopted NRV information be clearly presented with the supporting scientific information. This is what is required to ensure that the development and adoption of methods to set thresholds or desired conditions is not arbitrary and is based on the best available science.

As described below, the Forest Service used an atypical and not fully described method to assign and define forest types in the project area. This approach leads to the conclusion, presented in Tables A.2 and A.3, that management should convert a certain acreage of a specific seral stage to another seral stage. For instance, Table A.2 claims that 4,300 acres of CWHR 5M/5D (high quality nesting and roosting habitat for CSO) should be converted to CWHR 5S/5P (habitat that

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[1] We incorporate our scoping comments for the SERAL project by reference.

is not suitable for nesting or foraging). In turn, these NRV values and restoration targets drive the modeling and selection of areas for logging and other proposed actions.

### a) Geographic Assignment of Forest Type

The geographic location of forest types is foundational information needed to drive project planning and prioritization. LANDFIRE and EVEG are resource mapping products produced by the Forest Service in collaboration with other agencies. These data are used by the Forest Service for project and forest planning. The SERAL project, as described in Appendix E, developed a map layer called "Forest_Typ" that is substantially different from the typing use in LANDFIRE and EVEG. Refer to our scoping comments for a comparison of a LANDFIRE map and the forest type map created for the SERAL project. Most notably, the amount of moist mixed conifer is substantially reduced in the SERAL map compared to the LANDFIRE map. We raised this concern in scoping comments, but the DEIS provides no information explaining why the classifications in LANDFIRE or EVEG are not appropriate for the SERAL project. Furthermore, the explanation of modeling in Appendix E does not fully describe how this novel forest type layer was developed for the conifer types and the assumptions and processes used cannot be evaluated. Because the map information provided for the SERAL project is so vastly different from commonly used mapping data, e.g., LANDFIRE, full information on the criteria, assumptions, and analytical process used to create the SERAL forest type map must be provided to assess the scientific integrity of the information.[2]

We are also concerned that the forest type data was inconsistently used within different SERAL analyses. For instance, the forest type map created for SERAL also differs from the mapped information that was used to complete the wildfire risk assessment for the SERAL project. As described in Appendix E, the risk assessment for SERAL was based on the assessment completed for the southern Sierra in 2018. This assessment used the mapped information for biophysical settings from LANDFIRE to characterize forest type or the vegetation. Vegetation or forest type information also forms the basis of the modeling of four other fire conditions: 1) conditional flame length probabilities, expected fire type, annual burn probability, and predicted vegetation burn severity. Estimates of these conditions were included in the risk assessment for the southern Sierra and on which the SERAL risk assessment is based. However, we cannot determine from our review of Appendix E if the existing condition for these four attributes was derived from the risk assessment or independently developed.

### b) NRV Values Assigned to Forest Type

The NRV values described for each forest type in the SERAL project are summarized in Table A.1 of the DEIS. Elsewhere in the DEIS (DEIS, p. 90), it is stated that these values were developed from Safford and Stevens (2017). As summarized below and discussed in more detail in our scoping comments, the data from Stafford and Stevens (2017) was misinterpreted in the creation of Table A.1.

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[2] We submitted questions on the development of the "Forest_typ" to the science team, but did not receive a response prior to submitting these comments.

The NRV values from Safford and Stevens (2017) are based on seral stage definitions that are not equivalent to CHWR. For instance, open canopy cover in Safford and Stevens (2017) is based on LANDFIRE biophysical descriptions that set open canopy cover to < 50% cover, but the SERAL project sets closed canopy cover at 40-100%. This misinterpretation of the crosswalk likely results in an overestimate of the amount of "closed canopy" forests in the SERAL project because it is counting forest with 40-50% cover as closed canopy when they should be considered open canopy by the NRV definitions used by Safford and Stevens (2017). The values in Table A.1 should be revised to account for the different classification of canopy cover utilized by Safford and Stevens (2017).

We are also concerned that the metrics used to evaluate departure were not comparable across the analyses completed for SERAL. The resilience index and CSO departure index are metrics developed for the SERAL project that are not fully described in Appendix E. They both rely on the use of thresholds to establish departure, but those thresholds are not fully described or reported in Appendix E. We have slightly more information for the CSO departure index after talking to Pete Stine. He provided additional information supporting the basis of the thresholds selected for ridge, mid and lower slopes that was derived from Ng et al. (2020). The assumption in the CSO departure index is that an LMU or unit is departed or outside of NRV in a PAC when CHWR types 5M/5D/6 exceed a certain percentage of the LMU. These thresholds are set by LMU: valley bottom = 47%; mid-slope = 41%; ridge = 32%. These percentages were derived from reference conditions in contemporary forest with a relatively intact fire-regime (Ng et al. 2020) and reflect the NRV from these sites. These threshold values far exceed the NRV values for CWHR 5M/5D/6 in Table A.1.

We have no way to comprehensively assess what threshold values were used to characterize departure for all analyses used in the DEIS. Furthermore, we cannot determine if they are the same as the thresholds reported in Table A.1 or are comparable to the basal area thresholds set for the prescriptions described in Appendix E. We need to be able to review the complete details of modeling, including specific thresholds used in resiliency analyses, in order to evaluate the consistency and integrity of the analysis applied in the DEIS.

### c) Restoration Need is Based On An Incorrect Characterization of Forest Types Across the Project Area

We raised this as a concern in our scoping comments and it was not addressed in the DEIS. As noted above, the forest type map (Map 1) used in the SERAL project allocates the type "yellow pine/dry mixed conifer to most of the project area above about 4,000 feet elevation, yet a significant portion of this part of the SERAL project area is identified as "mesic mixed conifer" in the LANDFIRE classification. The maps included as Figures 1 and 2 in our scoping comments clearly show this.

The misclassification of forest type in the project areas leads to incorrect "restoration estimates" in Tables A.2 and A.3 (DEIS, Appendix A) and over estimates the amount of CWHR 5M/5D (large tree, moderate to dense canopy) that the agency states should be converted to CWHR 5S/5P (large tree, sparse to poor canopy). That the restoration estimates are incorrect is reinforced by the analysis provided in the wildlife biological evaluation (BE) regarding extremely low amounts of high-quality habitat, i.e., CWHR 5M/5D/, available across PACs and territories in the project area (Wildlife BE, Table CSO8, p. 42).

Management to achieve more open, large treed stands (CWHR 5S/5P), when less than desired, should focus on reducing density and promoting the growth of smaller sized stands (e.g., CWHR 4M/4D types with QMDs ranging from 12" to 18" DBH) in areas where this habitat type is not required to support species associated with mature forests. Management to enhance growth of the smallest trees (CWHR 2 and 3) is another area to focus management to increase the amount of open, large treed stands over time.

### 3. Abandoning Protected Activity Centers After Three Consecutive Years of Surveys and Limiting PAC Designation to Territorial Pairs

The amendment in Appendix B proposes a standard that states:

> Existing protected activity centers may not be retired unless loss of suitable habitat or long-term lack of occupancy criteria are met as defined in the 2019 Conservation Strategy for the California Spotted Owl in the Sierra Nevada, or more current guidance for the Pacific Southwest Region.

(DEIS, Appendix B, p. 3) One of the criteria stated in the referenced conservation strategy is:

> When a PAC has been surveyed repeatedly over time (at least two years of surveys within the last 12 years) with no observed breeding activity nor territorial behavior by an owl pair, monitor or survey the PAC for an additional three consecutive years. If no owl is detected, the PAC and associated territory may be retired. If an owl is detected but no breeding activity nor territorial behavior by an owl pair has been documented, the PAC and associated territory may be retired.

(CSO Strategy, p. 27) The CSO strategy does not provide a science-based rationale for limiting the final survey period to three consecutive years. The criteria above also allow the abandonment of a PAC if territorial singles or a non-territorial pair are detected. Both conditions are currently protected by PACs. Below we discuss these two issues in greater detail.

With respect to the three-year vacancy threshold, Wood et al. (2018) examined re-occupancy rates and found that CSO did reoccupy PACs after three years of absence. These rates of re-occupation were also noted to be important to conservation with a "liberal vacancy threshold of ≤3 years on spotted owl occupancy rates" having a negative impact on future occupancy (Wood et al. 2018, p. 254). Concern about the three-year threshold for vacancy being too low was also identified as a concern in the peer review for the CSO strategy document:

> In particular, I am concerned by the plan to remove PACs from protection if they have not been occupied for 3+ consecutive years. The idea that these sites will not be reoccupied, is not in fact well supported by the literature (i.e., unoccupied sites with suitable habitat can/will become occupied at non-zero rates – even when BO are at high densities).

(Peer Review 4, https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd934200.pdf) The basis for this criterion of three years is not clearly supported by a science-based rationale. It also reduces the conservation benefit to CSO relative to current practices or an alternative that would require, for example, 5 consecutive years of surveys.

The proposed plan amendment would also allow PACs to be abandoned if they are occupied by owl pairs that are not territorial and single birds that are territorial. Spotted owls are long lived and tend to stay in a central location. Pairs that are not territorial and birds that are single and territorial are more likely to become territorial pairs and successfully nest compared to the floater population because they are currently occupying habitat (Gutiérrez et al. 2017). For similar reasons, conservation measures for northern spotted owl include: 1) identifying activity centers for territorial singles and any detected pair; and 2) habitat guidelines in the territory around these activity centers (USDI Fish and Wildlife Service 2009 and 2012). Neither the CSO strategy document nor the proposed amendment provide any discussion or science information to indicate the basis for the change or if the recommended change in criteria will improve owl conservation.

We asked in our scoping comments that the science-basis for the 3-year vacancy threshold and abandonment of PACs with non-territorial pairs and territorial single birds be provided in the DEIS, yet this information has not been disclosed. Adoption of these amendments without presenting the science-basis would be arbitrary.

### 4. Protection for CWHR 5M/5D/6 Provided in CSO strategy Has Not Been Included in the Proposed Amendment

The proposed amendment now clearly states, in part, that the desired condition in a territory is:

> At least 40 to 60 percent (depending on the terrestrial vegetation type and site conditions) of each California spotted owl territory consists of the highest quality nesting and roosting habitat in large enough patches to provide interior stand conditions, generally 1-2 tree heights from an edge.

(DEIS, Appendix B, p. 132) Highest quality nesting and roosting habitat is also defined as CWHR 5M, 5D, and 6. However, the project-specific forest plan amendment now leaves out a critical recommendation from the CSO strategy intended to protect the highest quality habitat from degradation when desired conditions have not been met:

> When occupied territories do not meet the desired conditions described above, retain the existing large tree moderate/high canopy cover habitat (for example, CWHR 6, 5D, 5M) wherever it exists throughout the territory.

(USDA Forest Service 2019, p. 29) This means that if the desired condition has not been met with CWHR 5M, 5D, and 6, these types shall be conserved wherever they exist in the territory. There are many instances in the SERAL project area where territories do not currently meet desired conditions for CWHR 5M, 5D, and 6 habitat, yet logging that degrades and changes these habitat types is proposed in Alternative 1 (see following sections for additional discussion of this issue). Omitting this recommendation without explanation is arbitrary. And to be consistent with the CSO strategy and to protect high value habitat when in low amounts within a territory, this plan component should be included as a standard in any adopted forest plan amendment.

## B. Best Available Science Information (BASI)

### 1. Allowing Degradation of Habitat in PACs

Related to ISSUE 1.A. in the DEIS, the proposed SPEC-CS0-STD-04 amendment allows up to 100 acres of habitat in a PAC to be degraded by logging, and the entire PAC (up to 300 acres) can be mechanically treated if it is loosely considered habitat improvement:

> In California spotted owl protected activity centers, all management activities must maintain or improve habitat quality in the highest quality nesting and roosting habitat. Where necessary to increase long-term resilience, vegetation treatments that may reduce near-term habitat quality may be authorized in up to 100 acres outside of the highest quality nesting and roosting habitat. Throughout protected activity centers all vegetation treatments must:
>
> - Retain the largest/oldest trees, known nest trees, and other large trees and snags with cavities, deformities, broken tops, or other habitat features of value to old forest species; [CSO Strategy, p. 31; Approach 2, 3.A]
> - Retain connected areas of moderate (at least 40 percent) and high (at least 60 percent) canopy cover between the known nest site (if nest site is not known, use the most recent known roost site) and areas in the rest of the protected activity center;
> - Avoid mechanical treatments within a 10-acre area surrounding the most recent known nest;
> - Avoid creating new landings, new temporary roads, or canopy gaps larger than 0.25 acres comprising no more than 5% of a stand;
> - Increase the quadratic mean diameter of trees at the protected activity center scale; and
> - Maintain the average canopy cover of the protected activity center above 50 percent.

This provision for mechanical treatment that degrades habitat quality comes directly from the CSO strategy document (USDA Forest Service 2019, p. 28). The strategy document does not provide science information or a discussion of why this scale of habitat alteration and degradation is acceptable in a PAC, nor does it discuss the potential for abandonment given this level of habitat alteration and disturbance.

The DEIS should provide the science-based rationale and supporting research for this plan component. The potential effects on PAC abandonment by the proposed action should be compared to Alternative 3.

The scale of treatments proposed in the SERAL Alternative 1 is unprecedented and it is unknown from the literature how CSO will respond to up to 300 acres of habitat alteration in PACs. Only three studies have investigated experimental logging impacts to California spotted owls. They consistently show negative impacts to occupancy and other demographic parameters (Keane et al. 2017). These studies never treated in PACs, as proposed here, still mechanical treatments in CSO territories (outside of PACs) including thinning and small group selection pose long-term negative impacts to CSO (Seamans and Gutierrez 2007; Tempel et al. 2016;

Tempel et al. 2014; Stephens et al. 2014). These studies are dismissed in the CSO strategy for having a small sample size, however they represent the best available, peer-reviewed and published research to date. The SERAL project far exceeds the scale and intensity of any experimental treatments on this species. Thus, the project introduces significant uncertainty regarding the persistence of CSO across a large swath of habitat occupied by at least 49 owl pairs. The project threatens the sustainability of CSO on this landscape at a time when declines in CSO are documented across the Sierra Nevada (see Attachment A research summary). A more cautious approach to CSO management is needed to ensure old forest species resilience to climate extremes.

An additional concern with regard to treatments in PACs is that the scientific evidence presented in the BE does not support its own conclusions. The SERAL BE (p.51-56) relies on the CSO strategy as well as fire and climate research to assert that 5,987 acres of logging in 53 PACs (p.61), sometimes covering 100% of the PAC, poses an acceptable risk to CSO, despite evidence to the contrary published by US Forest Service spotted owl researchers discussed above. The project even breaks with the CSO strategy guidance to further treat in PACs. While we agree with the DEIS that recent megafires and research such as Jones et al. (2020) present convincing examples of unwanted consequences of severe fires for spotted owls, we disagree that this research is evidence for wide-scale habitat disturbance across 50+ PACs because that would also come with unwanted consequences for spotted owls (Jones et al. 2021b; Keane 2017).

The BE also presents anecdotal unpublished case studies to support its conclusion. In one exercise, biologists looked at CSO occupancy in a single PAC in the Stanislaus Tuolumne Experimental Forest (STEF). Here, it is not possible to determine if the same birds are occupying the area and what impacts are to demography parameters such as survival and occupancy; and, long-term impacts are unknown. Of further concern is that the BE equates the treatments in the STEF, where 21% of the PAC area was thinned (BE p.56), with the scope and intensity of proposed treatments in Alternative 1. No formal monitoring studies have examined treatment of up to 220 acres in CSO PACs and the BE must acknowledge that the project poses significant uncertainty to spotted owl.

The BE also maintains that the STEF treatments had no negative impact on the spotted owl PAC in the area, however, they may not have accounted for the lag in response time to disturbance that spotted owls are known to exhibit. Territorial owls can take 2-3 years to respond to even extreme disturbances (Stephens et al. 2014; Lee and Bond 2015a; Jones et al. 2020). In Stephens et al. (2014), spotted owl occupancy was maintained for several years following logging while owls used larger areas to forage. Eventually the study saw a 43% reduction in spotted owl occupancy from experimental logging after year three.

Further, the BE overlooked important research from the STEF study about logging impacts on spotted owl prey species. Sollman et al. (2016) showed that treatments in the STEF significantly reduced flying squirrel density in the study area. Owls in this study were presumed to rely on flying squirrels from outside of the treatment units where denser forests were not logged:

> Whereas thinning had negative effects on squirrel density on the scale of a thinning treatment unit, our results suggest that these effects were largely absorbed by the heterogeneous landscape, as squirrels shifted their distribution into un-thinned areas

without a decline in overall density. This highlights the need to incorporate the landscape context when evaluating the effects of forest management on wildlife.

(Sollman et al. 2016) Spotted owl PACs in SERAL represent 30% of PACs on the Stanislaus and 5% of owl sites in Sierra Nevada and most of these are lacking high quality nesting and roosting habitat (DEIS p.55; BE p.32). This is a significant portion of PACs in bioregion. The BE frames the bioregional importance of the area:

> California spotted owl sites in the SERAL project area location are of particular importance to the distribution of California spotted owl in the Sierra Nevada and potentially key to this subspecies' continued persistence, especially considering current projections for climate change.

(BE p. 27). Due to bioregional importance of the project area as well as the scale and intensity of PAC treatments, the project should avoid focus on reducing fuels and applying prescribed fire in PACs. Treatment intensity should be highest in PACs where habitat is ranked high on the departure index and where productivity and occupancy are low.

### 2. Habitat loss in Spotted Owl Territories

Related to DEIS Issue 1.A., the table below shows examples from SERAL Alternative 1 of high quality spotted owl habitat degradation in occupied territories. This is not a complete list, the GIS data was incomplete so it was not possible to look at all territories. We found 20 spotted owl territories with between 25 to over 300 acres of 5D and 5M targeted for degradation to 5P, despite the paucity of this forest type on the landscape. Alternative 1 would result in the total loss of 2,166 acres of 5D/5M from territories. Habitat loss as proposed in the SERAL project has been shown to lead to a loss of spotted owl occupancy in multiple studies as discussed below.

Table 1. Habitat changes for selected territories compared existing conditions.

| CSO Territory ID | Total 5/6[3] (acres) | Total CSO Habitat[1] (acres 4M, 4D, 5M, 5D, 6) | Proposed Removal in Alt. 1[4] | | |
|---|---|---|---|---|---|
| | | | 5D/5M (acres) | 4D (acres) | Total CSO Habitat (acres) |
| TUO0052 | 170 | 930 | 58 | 173 | 268 |
| TUO0017 | 210 | 920 | 60 | 164 | 467 |
| TUO0171 | 120 | 920 | 83 | 174 | 611 |
| TUO0117 | 150 | 640 | 76 | 0 | 304 |
| TUO0172 | 590 | 900 | 217 | 0 | 321 |
| TUO0209 | 320 | 980 | 162 | 241 | 541 |
| TUO0005 | 820 | 950 | 305 | 0 | 428 |
| TUO0018 | 510 | 880 | 167 | 6 | 469 |
| TUO0015 | 120 | 790 | 46 | 145 | 435 |
| TUO0154 | 240 | 780 | 78 | 45 | 324 |
| TUO0014 | 690 | 860 | 94 | 6 | 148 |
| TUO0220 | 300 | 750 | 109 | 13 | 313 |

[3] from BE Table CSO 5.

[4] We completed this analysis and others presented in these comments using SERAL GIS data provided at the project website. We refer to this as "SFL GIS analysis" in these comments.

| CSO Territory ID | Total 5/6[3] (acres) | Total CSO Habitat[1] (acres 4M, 4D, 5M, 5D, 6) | Proposed Removal in Alt. 1[4] | | |
|---|---|---|---|---|---|
| | | | **5D/5M** (acres) | **4D** (acres) | **Total CSO Habitat** (acres) |
| TUO0223 | 240 | 850 | 93 | 119 | 309 |
| TUO0152 | 320 | 880 | 58 | 44 | 467 |
| TUO0006 | 580 | 790 | 147 | 0 | 228 |
| TUO0170 | 220 | 710 | 44 | 21 | 436 |
| Missing PAC ID and data in GIS | - | - | - | - | - |
| **TOTAL** | **3,422** | **22,502** | **2,166** | **2,162** | **10,986** |

Recent spotted owl research shows that alteration of CWHR 5D represents a significant habitat alteration that reduces the probability of territory occupancy (Jones et al. 2019; Jones et al. 2021b). Authors reviewed data from 275 territories in four Sierra Nevada demography studies and found uniform benefits to mid-century occupancy when treatments were designed to avoid modifying CWHR 5D and 6 in occupied territories (Jones et al. 2019; Jones et al. 2021b). These results from Jones et al. 2021b were misunderstood in the BE:

> The effects of specific forest management activities on spotted owls have a level of uncertainty but overall would have a long term benefit with minimal or at least equivocal short term impacts (Gutierrez 2017; Jones et al. 2021; Jones et al. 2021 in press)".

(BE p.50) Jones et al. 2021 'in-press' aka Jones et al. 2021b does not support this statement. Instead, the authors showed that removal of 5D in spotted owl territories poses a strong risk of territory abandonment, making the proposed SERAL habitat treatments untenable. The DEIS does not consider viability of the spotted owl in the context of known impacts to territories from treatments proposed by the SERAL project.

Alternative 1 would convert 10,986 acres of high quality and best available habitat in territories to non-habitat categories. This would involve conversion of 5M to 5P, 5D to 5P, 4D to 4P or 5P, and 4M to 4P, 4M or 4S (see table above). Research shows that degradation of spotted owl habitat in breeding territories is not conducive to owl conservation even under extreme climate model scenarios. Tempel et al. (2014b and 2016) demonstrate that medium-intensity logging leads to a reduction in spotted owl occupancy, reproduction and survival. As mentioned earlier, Jones et al. (2021b) shows mechanical treatments that retain 5D in owl territories (called 'no habitat alteration' in this study[5]) offer the highest likelihood of maintaining spotted owl resilience over the next 40 years. This research also suggests that benefits from intensive forest treatments as proposed in Alternative 1 do not pay off even during severe fire scenarios because they lead to spotted owl territory abandonment before the benefits of fuels reduction catch-up (see Figure 1 below).

[5] Personal Communication between Dr. Gavin Jones and Dr. Sue Britting, January 2022.

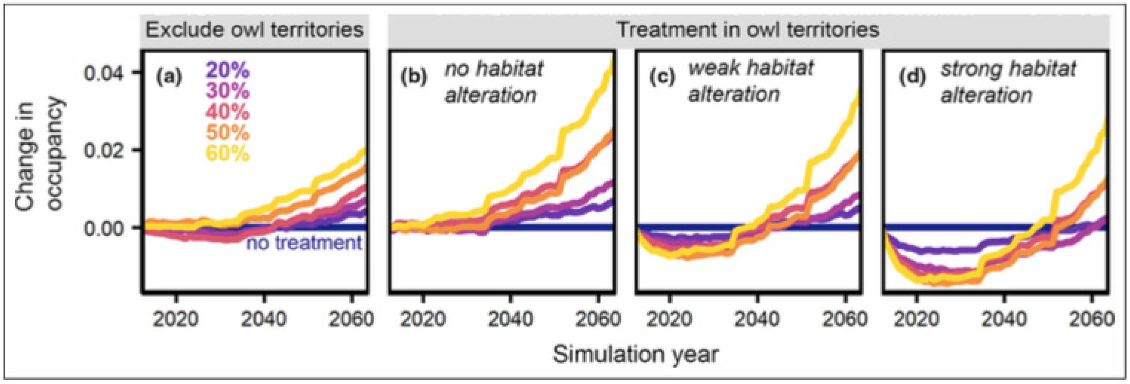


Figure 1 (From Jones et al. 2021b). "*Sierra Nevada-wide site occupancy trajectories for each treatment scenario relative to the baseline no-treatment scenario (dark blue line). (a) Occupancy when treatments are excluded from owl territories; (b–d) occupancy when treatment occurs within owl territories but assumptions about the extent to which treatments alter owl habitat vary (no habitat alteration, weak habitat alteration, strong habitat alteration). Trajectories represent means across 50,000 simulations. For full uncertainty across stochastic replicates.*"

We agree with the SERAL BE that Jones et al. (2021b) demonstrates fuel reduction and spotted owl conservation are not mutually exclusive. Notably, this research also shows that in order to truly achieve climate resilience and maintain species diversity, forest treatments must temper reductions in stand density for long-term benefit in order to achieve adequate old forest protection in the short-term. In the case of SERAL, the project must maintain CWHR 5M, 5D and 6 habitat where it exists in spotted owl territories and throughout the project.

### C. Designation of California Spotted Owl Territories

As mentioned in our scoping comments and DEIS issue 6.A., the spotted owl strategy approach to territory delineation based on circular territory results in reduced quantity and quality of habitat conserved and protected for owls. In some cases the PACs themselves are not even included in the new SERAL territories (see figure below). This concern is also illustrated by Table 32 of the DEIS, where proposed treatments in owl territories result in a loss of 186 acres of 6, 5D and 5M (p.78).

The Sierra Nevada Forest Plan Amendment (SNFPA) directs that suitable habitat be provided within 1.5 miles of the activity center in as compact arrangement as possible and identifies the target habitat in descending order of priority (USDA Forest Service 2004, p. 39). Habitat suitability in these areas, called Home Range Core Areas (HRCAs), is to be maintained following certain guidelines to protect large trees structures, snags, down wood, and higher cover preferred by spotted owls while increasing resilience to wildfire and other threats (USDA Forest Service 2004, p. 46). This is similar to the approach adopted to conserve northern spotted owl (USDI Fish and Wildlife Service 2009). Without establishing a science basis that relates to conservation biology, the SERAL plan amendment and the spotted owl strategy establish conservation on delineating a circular territory of a size based on the nearest neighbor distance that in the case of SERAL does not include as much high quality habitat as the HRCA and instead includes far greater foraging habitat; however this habitat overlaps significantly with private land. This is a less protective approach to managing for spotted owls and may not reflect how owls use habitat.

There is extensive evidence that spotted owls do not confine their habitat use to circular territories (see for example Jones et al. 2016 and Blakey et al. 2019). These simple 1,000a circles around activity centers often do not protect best foraging and nesting habitat when it occurs outside the circle.

The SERAL territories also include significant portions of non-habitat and overlap with clear cuts, plantations and lava cap, none of which will be spotted owl habitat for over 100 years if ever. This new approach to territory delineation adopted in SERAL results in 33% of HRCA acres dropped from protective status along with suitable habitat (Alternative 1, DEIS p.77-78). Indeed, there are 1,834 acres of 6, 5D, 5M in the SERAL project outside PACs and territories that are apparently protected in HRCAs because Alternative 3 only proposes 30 acres of this habitat to be removed (Table 24 p.52). The contrast between protections for best available spotted owl habitat in HRCAs under the current forest plan and its proposed removal under the SERAL project illustrates how implementation of the strategy without a regional planning process fails to protect important owl habitat and connectivity.

As shown below, the difference between territory and HRCA designations also makes clear that HRCAs are preferable in managing for old forest species because HRCAs include the entire spotted owl PAC, goshawk PACs, as well as north facing, riparian areas, hardwoods and lower-canyon bottoms where old forests are often found. The figure below compares territories and HRCAs in the SERAL project. Spotted owl territories are orange circles, HRCAs are outlined in blue and PACs are red (darker red is overlap with goshawk PACs). From upper right to lower left: TUO0102, TUO0220, TUO0038, TUO0160.

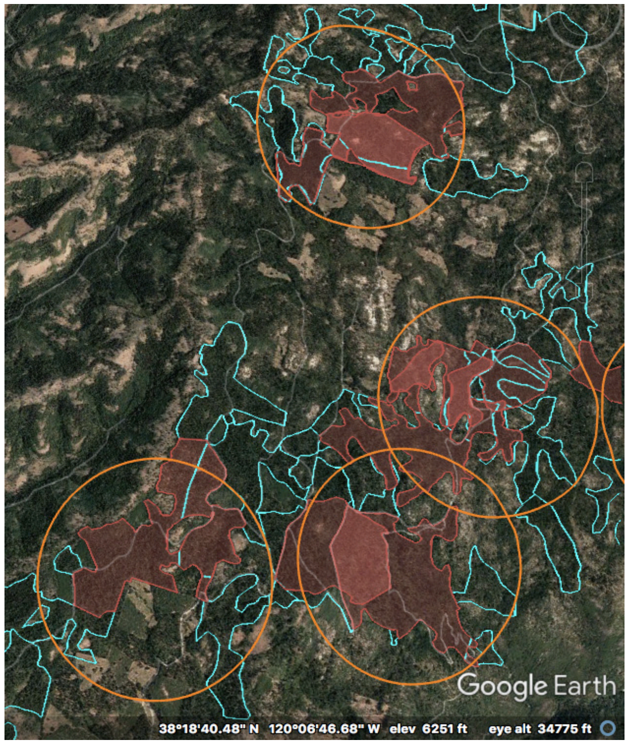


Figure 2. Sample of proposed 1,000-acre territories (orange) and existing Home range core areas (blue) and PACs (red) with an aerial image in the background. Data from SERAL project website and Google Earth.

The image above is an example of an issue that occurs throughout the project. The SERAL spotted owl territories overlap with private land instead of including the best available spotted owl habitat delineated in HRCAs under the current forest plan. These circles often don't include best habitat on federal land and overlap significantly with private land. The agency cannot guarantee a circular territory in private ownership will be managed for old forest species. Despite this, the spotted owl strategy recommends conservation based on a circular home range that was adopted by scientists as an analysis convention to evaluate habitat conditions around activity centers (see discussion in Seamans and Gutiérrez 2007). The forest has not adjusted the new territories to include this lost habitat as provided in LAND-SERAL-WILDLIFE-02. It is unclear if or when territories will be adjusted to include nearby highest quality habitat but this should be incorporated into the FEIS. Further, this loss of protection for the highest quality habitat included in HRCAs is not disclosed in the DEIS, contrary to NEPA.

### D. Adopting Desired Conditions for High-Quality California Spotted Owl Habitat in the 2019 California Spotted Owl Strategy.

#### 1. Alternative 1 Does Not Minimize Treatments in PACs with Highest Contribution to Reproductive Success.

The 2019 spotted owl strategy recommends treating PACs focusing on historically unoccupied PACs and avoiding intensive treatments in PACs occupied by productive pairs (emphasis added):

> B. In addition to prioritization by risk level, prioritize treatments in PACs based on the history of active nesting and pair territorial behavior where information is available. Treatments that may have negative near term effects should be **minimized or avoided** in PACs with the highest likely contribution to reproductive success.
>
> Prioritization for PAC treatment (listed from highest to lowest priority for treatment):
>
> - PACs presently unoccupied and historically occupied by territorial singles only
> - PACs presently unoccupied and historically occupied by pairs
> - PACs presently occupied by territorial singles
> - PACs presently occupied by pairs
> - PACs presently occupied by pairs and currently or historically reproductive
>
> C. When treating within PACs, **design treatments to minimize impacts to reproductive owls** and key owl habitat elements. Generally retain the highest quality habitat (CWHR 6, 5D, 5M), especially in areas with higher canopy cover (more than 55 percent) in large/tall trees.

(USDA Forest Service 2019, p. 28, Sections 1.4.B and 1.4.C). The SERAL DEIS developed a project-specific guideline to implement the recommendations above (emphasis added):

> To minimize potential impacts to CSO reproductive success, **vegetation treatments that may reduce habitat quality in the near term should be avoided in PACs with the highest likely contribution to reproductive success,** and otherwise prioritized as follows (from highest to lowest priority for treatment):
>
> 1. Currently unoccupied and historically occupied by territorial singles only.
> 2. Currently unoccupied and historically occupied by pairs.
> 3. Currently occupied by territorial singles.
> 4. Currently occupied by pairs.
> 5. Currently occupied by pairs and currently or recently reproductive.
>
> …When designing treatment unit intersections with PACs, limit treatment acres to those necessary to achieve strategic placement objectives and avoid treatments adjacent to nest stands whenever possible.
>
> If nesting or foraging habitat in PACs is mechanically treated, mitigate by adding acreage to the PAC equivalent to the treated acres using adjacent acres of comparable quality wherever possible.

(DEIS p.134, SPEC-CSO-GDL-02) There are 36 reproductive pairs, 13 non-reproductive pairs, and 4 territorial singles out of 53 PACs in the project area (BE p.29). Alternative 1 proposes intensive treatments in nearly all of these PACs (see figure below for example). Here, proposed tractor, skyline and helicopter logging will remove 1,762 acres of 4D and 318 acres of 5D in PACs (SFL GIS analysis). It is not clear that reproductive PACs had special consideration to reduce treatment impacts because all the PACs have same 20" upper diameter limit and they all have similar prescriptions based on stand density, fuel loading and habitat quality. According to the BE, treatments in PACs were prioritized based on a model developed for the SERAL project termed "owl departure" that rates spotted owl habitat for treatment. However, the DEIS does not demonstrate how proposed PAC treatments in Alternative 1 considered occupancy and reproductive history to reduce impacts to owl pairs consistent with SPEC-CSO-GDL-02.

We recognize lower elevation PACs contain dense stands and extreme fuel loading (near Deer Creek or Grant Ridge, for example), and we support treatments in these areas that rank high in the owl departure index and are at high fire risk. In such cases, SPEC-CSO-GDL-02 can be used to effectively reduce risk and protect existing important habitat, whereas areas occupied by productive pairs should retain best available habitat or be avoided in some cases at higher elevation.

### 2. Alternative 1 Proposed PAC Treatments Exceed 30% Area Treatment Threshold in Strategy.

Related to DEIS Issue 1.A., there are 5,987 acres of mechanical thinning proposed in 53 PACs in the SERAL project (BE p.61). In the case of these multi-PAC entries, the 100-acre treatment threshold in the spotted owl strategy is often exceeded. We are not sure why this appears so consistently in the GIS layers since the DEIS establishes a 100-acre limit: *"In Alternative 1, mechanical treatments may only occur in up to one third (100 acres) of California Spotted Owl PACs."* (DEIS p.45). There is a contradiction in the GIS data that needs to be corrected, or an explanation provided. We wonder if the Stanislaus is exceeding the 100-acres threshold under the strategy if treatments are passed off as habitat improvement.

We support habitat improvements in the project area such as prescribed fire, meadow and aspen restoration, and fuel reduction in old forest habitat discussed elsewhere in this document. However, the DEIS boldly claims spotted owl habitat improvement when converting CWHR 4D to 5M, yet it takes over 100 years to grow old forest conditions found in 4D (Jones et al. 2021). Habitat conversion that results in the loss of 4D would pose a negative impact to spotted owls for 100 years, even when 5M is gained, and even when it leads to increased fire resilience in the long-term. The DEIS does not acknowledge negative impacts to spotted owls from reductions in canopy cover (such as habitat loss and disturbance), contrary to NEPA and the spotted owl strategy.

Canopy cover is an important component of spotted owl habitat. It is well established that spotted owl occupancy and survival are strongly associated with high canopy cover (over 70%) and large trees (Verner et al. 1992; Blakesley et al. 2005; Seamans 2005; Seamans and Gutierrez 2007; North 2012; Tempel et al. 2014b; Tempel et al. 2016). Reducing canopy cover below 70% in dense stands can lead to long-term negative occupancy by spotted owls (Tempel et al. 2014b). If the long-term impacts of canopy cover reductions in spotted owl habitat "improvement" are misinterpreted, then the DEIS could erroneously apply component SPEC-CS0-STD-04 to mechanical treatments in PACs that exceed the 100-acre treatment threshold. We hope this is a modeling error and not the intention in Alternative 1. Nevertheless, the DEIS must more accurately represent the loss of canopy cover in 4D when it represents important prey or foraging habitat for each PAC. We would like to see more detail on the quality of 4D in each PAC to better understand habitat conditions because not all 4D is the same.

In the figure below, two spotted owl PACs are outlined in blue. Alternative 1 treatments are pink, red, purple and green. Areas without treatment show the aerial photograph. These two PACs are typical of the 53 PACs in the project area because they are 1) proposed for well over the 30% habitat treatment threshold, 2) proposed for treatments regardless of their productivity and occupancy status, and 3) often bisected by fuel breaks, contrary to SERAL plan components. Our concern again is that the proposed action strays well beyond what is allowable in the spotted owl strategy, and that forest thinning and removal of trees will eliminate quality spotted owl habitat. Alternative 1 must correct these discrepancies because PAC treatments exceed what is allowable under the spotted owl strategy in a number of ways, thus violating diversity requirements in 36 CFR 219.9 and viability requirements in NFMA.

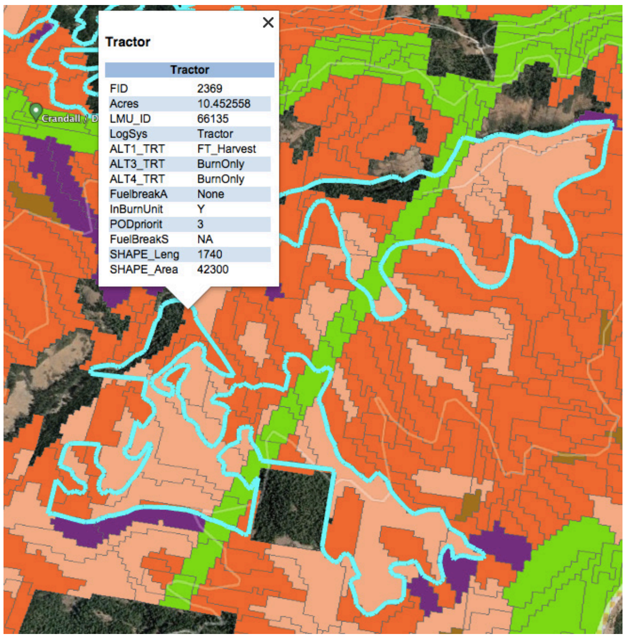

Figure 3. Alternative 1 treatment types for two PACs (outlined in blue) TUO0153 (pictured top) TUO0152 (pictured at bottom). Alternative 1 treatments are depicted in pink, red, purple and green shading. Areas without treatment show the aerial photograph. Data is from SERAL project website and Google Earth.

### 3. Alternative 1 Does Not Maintain High Quality Spotted Owl Habitat in Retired PACs as Provided in the Strategy.

Related to DEIS Issue 6.B., the 2019 California spotted owl strategy sets desired conditions for retired PACs. They include to *"...design treatments in retired PACs to retain available large, tall tree, high canopy cover habitat that is resilient to disturbance."* (1.3.D. p.27), yet treatments in retired PACs do not maintain available large tree high canopy cover habitat.

The intention of SERAL is to treat retired PACs *"to undergo restoration to make habitat more resilient and available for future owl use."* (BE p.29). Although it is not possible to determine if this goal is being met given the data provided, it appears that desired condition may not be met if high quality and best available nesting habitat in retired PACs are removed. For example, the Strawberry North PAC is proposed for retirement and also contains 21% of CWHR 5/6 habitat

(Table CSO3, BE p.34) We wonder what the site-specific impacts are to all PACs, and how much and what kind of habitat is being affected, so further explanation is needed.

We did not find any SERAL project-specific plan amendments to retain highest quality 6, 5D and 5M habitat in retired PACs to make the project compliant with desired conditions in the spotted owl strategy.

### 4. Alternative 1 Does Not Retain Highest Priority Breeding Habitat in Owl Territories as Provided in the Strategy.

The 2019 California spotted owl conservation strategy recommends conservation measures at several different spatial scales. At the territory scale,

> Desired conservation outcomes are for an occupied territory to maintain and promote 40 to 60 percent of a territory in mature tree size classes… in descending order of priority: 6, 5D, 5M, 4D and 4M…

(p. 29). As noted in our previous comments and related to Issue 6.A. in the DEIS, the SERAL project analysis combines all spotted owl habitat together including CWHR types 4M, 4D, 5M and 5D and 6 (again in Table CSO5, BE p. 37). The DEIS states:

> Currently only 8 territories meet the desired compositional range of 40-60% in mature trees size classes with moderate and high canopy cover. The remaining territories either contain low-quality habitat or contain greater than 60% of high quality or best available habitat combined.

(DEIS p.16) Since most owl territories in the project area preserve at least 40 percent of all CWHR types suitable for spotted owl combined, the implication is that removing highest priority habitat (6, 5D, 5M) meets desired conditions in the spotted owl strategy because lower quality habitat (4D, 4M) is left behind in at least 40% of the territory; however this is a misinterpretation of the desired conditions set forth in the strategy.

As our scoping comments point out, ongoing discussions with the Regional Office indicate that the desired condition is for 40 to 60% of the territory to be in CWHR types 5M, 5D, and 6. This is consistent with the overall desire to increase the amount and distribution of stands with large trees over the territory to better reflect NRV and support productive spotted owls. This was also the desired condition and management intent in the SNFPA.[6] The desired condition with a threshold attached to preference for CWHR 5M, 5D and 6 then makes meaningful the desired condition to conserve CWHR 5M, 5D, and 6:

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[6] The conservation measures in the SNFPA for high quality habitat in HRCAs: *"Arrange treatment patterns and design treatment prescriptions to avoid the highest quality habitat (CWHR types 5M, 5D, and 6) wherever possible"* and the desired conditions generally reflect CWHR 5M, 5D, and 6 habitat types (USDA Forest Service 2004, p. 46)

> When occupied territories do not meet the desired conditions described above, retain the existing large tree moderate/high canopy cover habitat (for example, CWHR 6, 5D, 5M) wherever it exists throughout the territory.

(USDA Forest Service, p. 29 and SERAL scoping package, p.27). The DEIS removed the above plan component from the scooping package and instead targets the last remaining highest quality spotted owl habitat in the project for removal. The proposed plan amendment LAND-SERAL-WILDLIFE-02 (DEIS p.130) weakens any direction from the scoping package that sought to retain the highest priority forest conditions in territories.

Very few owl territories in the SERAL project have appropriate amounts of 5D and 5M (Table CSO5, BE p.37). Only five out of 53 territories contain over 40 percent of CWHR 6, 5D and 5M. The remaining 90 percent of SERAL territories (48 of 53) do not meet desired conditions in CWHR 6, 5D and 5M (DEIS Table 4, p.15). Both the 2004 forest plan and the 2019 strategy strive to protect this high quality habitat because it is essential for spotted owl conservation. The SERAL project must save this essential habitat, as well.

Given the deficit of 6, 5D and 5M in the project, there is an urgent conservation need to retain all highest quality owl habitat especially in spotted owl territories. In response to this deficit, the DEIS states *"Active management is needed in those territories to maintain the existing and promote future high-quality habitat to meet the desired NRV-based conservation outcomes."* (id.). Yet instead of maintaining this important habitat, Alternative 1 proposes its removal.

A total of 1,027 acres of WHR 6, 5D, 5M would be removed from owl territories in Alternative 1 (Table 24 p.52). In no circumstance does it make conservation sense to remove what little exists of this highest quality habitat given the scarcity of it in the project area. Even the majority of PACs *"are lacking high quality nesting and roosting habitat"* (DEIS p. 55). Alternative 1 does not meet current forest plan nor the 2019 spotted owl strategy desired conditions for spotted owl territories (p.29 2.A.1.). It doesn't even meet its own management objectives (DEIS p.15) and puts regional spotted owl populations in jeopardy of accelerated decline (see Attachment A research summary).

The SERAL project illustrates how an ad-hoc implementation of the spotted owl strategy at the project-level rather than during the forest planning process leaves the most important habitat vulnerable at multiple scales, threatening the sustainability of wildlife species such as the spotted owl and the suite of old forest species it represents on the Stanislaus National Forest.

### 5. Maintaining Spotted Owl Habitat Connectivity at the Watershed Scale.

Verner et al. (1992) identified spotted owl habitat connectivity priorities on the Stanislaus National Forest that must be addressed in the SERAL project because the spotted owl strategy recommends managers *"promote habitat connectivity at the watershed scale by retaining connected areas of moderate and high canopy cover in large/tall trees within territories."* (p.29 USDA Forest Service 2019). The DEIS did not develop these important landscape-level design measures from the spotted owl strategy into DEIS plan components.

### F. DEIS Does Not Take Hard Look at Project Impacts to Spotted Owl, Contrary to NEPA.

The National Environmental Policy Act (NEPA), 42 U.S.C. § 4321 et seq., is designed to facilitate informed decision-making and public transparency by requiring federal agencies to take a "hard look" at the direct, indirect, and cumulative impacts of their proposed actions and reasonable alternatives. The analysis in this DEIS fails to adequately analyze certain impacts, including disclosing site-specific baseline information, impacts to wildlife and habitat connectivity corridors, impacts of altering and disturbing occupied and potential spotted owl habitat.

#### 1. DEIS and BE Lack Site-Specific Effects Analysis.

Thank you for sharing spatial data on CWHR types for PACs, HRCAs, and territories, however unit-level data and analysis are still missing for project activities in the DEIS. As raised in our previous comments, and as related to both Issues 1.A. and 6.A. in the DEIS, the Forest Service should disclose and analyze:

- detailed maps that identify timber harvest unit locations and the types of treatment in relation to ecologically important features including important to connectivity for spotted owl and other old forest associated species such as marten.
- where logging proposed for purposes other than fuels reduction (e.g. reducing stand density, salvage, insect and disease), including acreage and specific units in which such logging will occur and the rationale for any such treatments.

In the SERAL project analysis, the expected habitat changes are combined across the 118,000-acre landscape into a single table for activities like forest thinning and fuel breaks (Table 24 DEIS p.52). Here, PACs, HRCAs and territories are also analyzed together as a composite sum of all habitat conditions, however, the impacts to individual PACs and territories may be different depending on local habitat conditions and intensity of treatments.

As can be seen from our comments in preceding sections, more detailed examinations of project impacts at the individual PAC, HRCA, territory and unit scale are needed to truly understand what the project consequences would be for species like spotted owl, as required by NEPA. Otherwise, measurement or assessment of degree to which goals and objectives are met is almost impossible.

The following effects analysis from the Trestle Project on the Eldorado National Forest is an example of project impacts analysis at the HRCA/ territory scale for spotted owls:

Table 2. Example of habitat analysis taken from the Trestle Project, Tables V.2.5 and V.2.6. (From Eldorado National Forest 2017, p. 43-44).

Table V.2.5. Comparison of Mechanical Thinning Treatment within HRCAs: Number of Acres Thinned, Number and Percentage of Acres Not Thinned for Alternative 2, 4 & 5, CWHR Size 4+ and >50% Canopy Closure.

| PAC # | HRCA Spotted Owl Habitat<br>Total Acres<br>CWHR Size 4 and 5 with ≥50% canopy closure ALT 2 | | | | HRCA Spotted Owl Habitat<br>Total Acres<br>CWHR Size 4 and 5 with ≥ 50% canopy closure ALT 4 | | | HRCA Spotted Owl Habitat<br>Total Acres<br>CWHR Size 4 and 5 with ≥50% greater canopy closure ALT 5 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Current | Acres Thinned | Acres Not Thinned | % HRCA Not Thinned | Acres Thinned | Acres Not Thinned | % HRCA Not Thinned | Acres Thinned | Acres Not Thinned | % HRCA Not Thinned |
| ELD0007 | 976 | 541 | 435 | 45% | 135 | 841 | 86.2% | 347 | 629 | 64% |
| ELD0011 | 827 | 190 | 637 | 77% | 166 | 661 | 79.9% | 190 | 637 | 77% |
| ELD0017 | 952 | 35 | 917 | 96% | 34 | 918 | 96.4% | 0 | 952 | 100% |
| ELD0019 | 916 | 202 | 714 | 78% | 198 | 718 | 78.4% | 155 | 761 | 83% |
| ELD0035 | 982 | 330 | 652 | 66% | 229 | 753 | 76.7% | 236 | 746 | 76% |
| ELD0059 | 957 | 76 | 881 | 92% | 76 | 881 | 92.1% | 48 | 909 | 95% |
| ELD0063 | 876 | 170 | 706 | 81% | 84 | 792 | 90.4% | 84 | 792 | 90% |
| ELD0110 | 988 | 398 | 590 | 60% | 280 | 708 | 71.7% | 345 | 643 | 65% |
| ELD0111 | 1000 | 346 | 654 | 65% | 185 | 815 | 81.5% | 242 | 758 | 76% |
| ELD0112 | 961 | 261 | 700 | 73% | 106 | 855 | 89.0% | 241 | 720 | 75% |
| ELD0155 | 876 | 90 | 786 | 90% | 69 | 807 | 92.1% | 90 | 786 | 90% |
| ELD0208 | 940 | 22 | 918 | 98% | 0 | 940 | 100.0% | 0 | 940 | 100% |
| ELD0322 | 863 | 171 | 692 | 80% | 8 | 855 | 99.1% | 158 | 705 | 82% |
| ELD0323 | 902 | 125 | 777 | 86% | 74 | 828 | 91.8% | 74 | 828 | 92% |
| ELD0324 | 818 | 108 | 710 | 87% | 46 | 772 | 94.4% | 46 | 772 | 94% |
| ELD0325 | 996 | 90 | 906 | 91% | 9 | 987 | 99.1% | 51 | 945 | 95% |
| ELD0326 | 961 | 0 | 961 | 100% | 0 | 961 | 100.0% | 0 | 961 | 100% |
| ELD0328 | 979 | 539 | 440 | 45% | 93 | 886 | 90.5% | 445 | 534 | 55% |
| ELD0329 | 955 | 177 | 778 | 81% | 179 | 776 | 81.3% | 181 | 774 | 81% |
| **Total** | **17,725** | **3,871** | **13,854** | **78%*** | **1,971** | **15,754** | **89%*** | **2,933** | **14,792** | **84%*** |

*Average percentage of untreated acres across HRCAs within treatment units

Table V.2.6. Comparison of Mechanical Thinning Treatments Proposed Within High-Quality Habitat within HRCAs. High Quality Habitat is defined as CWHR Size Class 4+ and > or =70% Canopy Closure. The number of acres of high-quality habitat currently available, proposed for treatment, and not commercial mechanically thinned was estimated for each California spotted owl HRCA within the Trestle project area.

| PAC # | Current Acres of High-Quality HRCA Habitat | Alternative 2 | | | Alternative 4 | | | Alternative 5 | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | High-Quality Habitat in HRCA | | | High-Quality Habitat in HRCA | | | High-Quality Habitat in HRCA | | |
| | | Acres Thinned | Acres Not Thinned | % HRCA Not Thinned | Acres Thinned | Acres Not Thinned | % HRCA Not Thinned | Acres Thinned | Acres Not Thinned | % HRCA Not Thinned |
| ELD0007 | 653 | 280 | 373 | 57% | 67 | 586 | 90% | 209 | 444 | 68% |
| ELD0011 | 565 | 111 | 454 | 80% | 87 | 478 | 85% | 111 | 454 | 80% |
| ELD0017 | 787 | 32 | 755 | 96% | 74 | 713 | 91% | 0 | 787 | 100% |
| ELD0019 | 694 | 137 | 557 | 80% | 172 | 522 | 75% | 99 | 595 | 86% |
| ELD0035 | 916 | 311 | 605 | 66% | 39 | 877 | 96% | 223 | 693 | 76% |
| ELD0059 | 800 | 41 | 759 | 95% | 19 | 781 | 98% | 39 | 761 | 95% |
| ELD0063 | 589 | 59 | 530 | 90% | 1 | 588 | 100% | 19 | 570 | 97% |
| ELD0110 | 862 | 311 | 551 | 64% | 205 | 657 | 76% | 260 | 602 | 70% |
| ELD0111 | 863 | 309 | 554 | 64% | 161 | 702 | 81% | 212 | 651 | 75% |
| ELD0112 | 515 | 118 | 397 | 77% | 70 | 445 | 86% | 114 | 401 | 78% |
| ELD0155 | 490 | 61 | 429 | 88% | 47 | 443 | 90% | 61 | 429 | 88% |
| ELD0208 | 721 | 20 | 701 | 97% | 29 | 692 | 96% | 0 | 721 | 100% |
| ELD0322 | 677 | 102 | 575 | 85% | 2 | 675 | 100% | 100 | 577 | 85% |
| ELD0323 | 517 | 120 | 397 | 77% | 53 | 464 | 90% | 71 | 446 | 86% |
| ELD0324 | 422 | 72 | 350 | 83% | 50 | 373 | 88% | 31 | 391 | 93% |
| ELD0325 | 851 | 82 | 769 | 90% | 8 | 843 | 99% | 48 | 803 | 94% |
| ELD0326 | 556 | 0 | 556 | 100% | 0 | 556 | 100% | 0 | 556 | 100% |
| ELD0328 | 729 | 357 | 372 | 51% | 71 | 658 | 90% | 266 | 463 | 64% |
| ELD0329 | 799 | 65 | 734 | 92% | 64 | 735 | 92% | 65 | 734 | 92% |
| **Total** | **13,006** | **2,588** | **10,418** | **80%*** | **1,286** | **11,788** | **91%*** | **1,928** | **11,078** | **85%*** |

*Average percentage of untreated acres across HRCAs within treatment units

We ask that you include an analysis of habitat changes similar to those shown above for territories, HRCAs and PACs in the FEIS for each alternative. We also ask that you discuss the impacts to these owl sites for each alternative in terms of short and long term impacts and risks.

### 2. PAC Retirement Not Analyzed in DEIS.

In another issue related to the 'hard look' standard and DEIS issue 6.B, the DEIS does not identify negative impacts from retiring four spotted owl PACs that contain of 1,167 acres of suitable habitat. Although data were not available for all these PACs in the GIS layers provided, there are 3,609 acres of spotted owl habitat proposed for mechanical thinning across all PACs combined (SFL GIS analysis). Furthermore, high quality habitat is already lacking in these four PACs (DEIS p.79). The SERAL project analysis must identify consequences of the proposed action for retiring and mechanically thinning PACs including displacement of owls from territories and a disruption in habitat connectivity that both diminish spotted owl conservation efforts (Peer Review Summary https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd934194.pdf; attached research summary)

### 3. Mechanical Treatments in Spotted Owl PACs Not Adequately Analyzed in DEIS.

In a third issue related to the 'hard look' standard and DEIS issue 1.A., are statements in the DEIS that *"proposed forest thinning treatments do not eliminate or even reduce high-quality CSO habitat in CSO PACs."* (DEIS p.54). The effects analysis is made without considering how much foraging and nesting habitat is available to each owl pair, especially the productive ones. There are 5,987 acres of mechanical thinning proposed in the PACs (BE p.61) including the proposed alteration of 2,718 acres of 4D and 4M in PACs (SFL GIS analysis). The configuration of these acres as well as how much breeding habitat is being treated or how much is left after treatments on individual territory basis must be disclosed in the FEIS.

Fuel breaks often intersect PACs and are not analyzed in the effects section. It is not possible to tell how the fuel breaks were considered in the effects analysis, or how they were reconciled with the 100-acre PAC treatment threshold or the standard to avoid fuel breaks in PACs. The effects section should reflect and analyze the proposed action according to NEPA.

We offer the following example to illustrate why an analysis of effects by PAC (and territory) is necessary. In the figure below, PAC TOU0221 is outlined in blue, proposed treatments are pink, red, purple and green; areas without treatment show the aerial photograph. Contrary to the DEIS which states: *"In Alternative 1, mechanical treatments may only occur in up to one-third (100 acres) of California spotted owl PACs."* (p.45) this PAC is proposed for well over 160 acres of proposed treatments including forest thinning and fuel breaks. This PAC is also located at the bottom of a moist north-facing slope and we wonder why it is intersected by three different fuel breaks. This PAC specific information leads us to conclude that the guideline to limit mechanical treatment in PACs to 100-acre or less is not being followed. We also question why topographic position (i.e., low on the slope) was not taken into consideration in selecting this area for treatment.

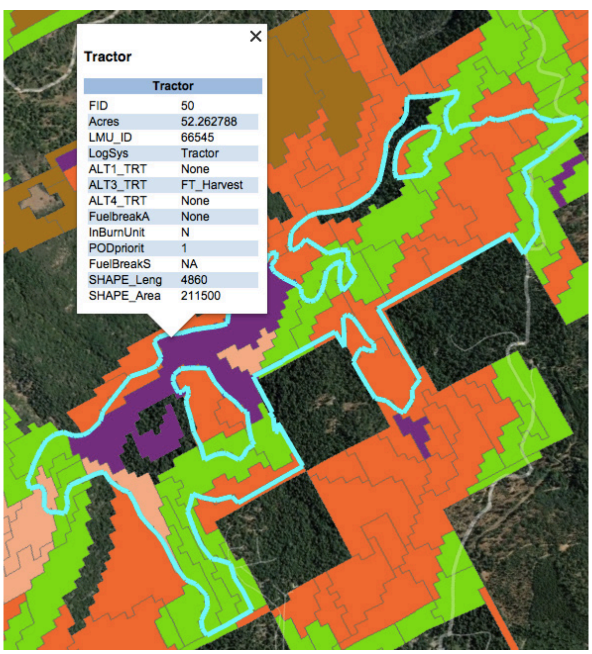

Figure 4. Treatment locations and type within spotted owl PAC TOU0221. Treatments are pink, red, purple and green; areas without treatment show the aerial photograph. Data from SERAL project website and Google Earth.

Another concern we have regarding the treatment and removal of habitat in owl PACs is that the DEIS claims removing medium sized trees from CWHR 4D converting it to 5M creates new high-quality habitat within owl PACs (DEIS p.52). This is an artifact of mechanical thinning treatments and the removal of canopy cover, and not the full picture of project impacts on spotted owls. The assumption that removal of all vegetation under 20” diameter in PACs in Alternative 1 is positive impact to spotted owls isn’t correct. Substantial removal of surface and ladder fuels in occupied owl habitat as proposed in SERAL would almost certainly amount to negative short-term impacts for spotted owls (see Attachment A research summary). Spotted owls are associated with multi-storied, closed-canopy forests (Verner et al. 1992) and reductions in these forest characteristics would reasonably be expected to have a negative effect on habitat quality in the short-term as concluded by the Eldorado National Forest (2017).

While SFL supports some fuel reduction in spotted owl habitat including PACs, especially when it leads to the reintroduction of fire back to the landscape, we also expect to see an effects analysis of these actions that is accurate, considers both short and longer-term as well as cumulative impacts, and are consistent with best available science. We support the 20” dbh limit in PACs and 24” dbh limit for pines outside PACs as an important step toward old forest conservation, but these measures do not conclude the agency’s responsibility regarding spotted owl management. In considering alterations of mature forest structure, the agency must weigh short and long-term impacts to spotted owls for each PAC and territory. This starts with examining site-specific habitat conditions as they contribute to connectivity to adjacent habitat, support for owl survival (ex. foraging and breeding habitat), as well as each PAC’s occupancy and productivity history.

There are 1,762 acres of 4D proposed for removal from thinning in PACs in Alternative 1 (SFL GIS analysis; does not include fuel breaks). Contrary to the DEIS analysis we know that the removal of canopy cover from CWHR 4D forests is not without consequences and must be balanced with other considerations such as the intensity of treatments at multiple spatial scales as well as PAC productivity. An important consideration in the conversion of 4D to 5M is that flying squirrels are associated with multi-story forest structure and spotted owl might lose access to prey with reductions in canopy cover (Sollman et al. 2016). The DEIS must quantify and analyze potential for negative impacts from the conversion of 4D to 5M in each PAC. Only then will the public and decision makers have an accurate assessment of the true costs and benefits of the proposed actions.

### 4. Proposed Plan Components Not Implemented or Analyzed in DEIS.

Related to concerns about the delineation of circular territories in DEIS issue 6.A, the DEIS does not clearly state if or when some proposed plan components will be implemented. For example, it is difficult to determine from the DEIS if the spotted owl territories will remain an unmodified circle of 1,000 acres or if or even when they will have a ‘modified shift’ of boundaries that would include more suitable spotted owl habitat in the HRCAs (DEIS p.77 and 78):

> We speculate with the ability to adjust the territory boundaries to include the most sustainable areas of high quality habitat as encouraged by LAND_SERAL-WILDLIFE-

02, that the discrepancy between the quantity of high-quality habitat within HRCAs and territories would be easily overcome.

(DEIS p.78) It appears this project component was never analyzed because the biological evaluation shows the unmodified circles for spotted owl territories (Figure CSO4, BE p.30). If the *LAND_SERAL-WILDLIFE-02* is to be implemented, baseline conditions must be characterized and project impacts then analyzed and described. As it stands, uncertainty clouds the analysis because it's unclear when or if the territory adjustment will happen. The project must make a choice clear so that the decision maker and public can review it.

Also related to the 'hard look' standard and DEIS Issue 1.A, the DEIS does not provide adequate information on an individual territory level to determine if requirements from SPEC-CSO-STD-04 are being met, such as *"…maintain average canopy cover in PAC above 50%",* and *"…retain areas of moderate and high canopy cover between the known nest site and areas in the rest of the PAC."* (DEIS p.133). This is another example of the data that is missing for each PAC in the DEIS. This information is needed to adequately review a proposed action for forest plan amendments in spotted owl habitat.

### 5. New Circular Territories Overlap Significantly with Private Land; DEIS Cannot Assume Private Landowners Will Manage for Spotted Owls.

Related to Issue 6.A. in the DEIS, the Figure CSO4 (below) is from the SERAL BE shows where proposed circular spotted owl territories in black overlap significantly with private lands in gray (p.30).

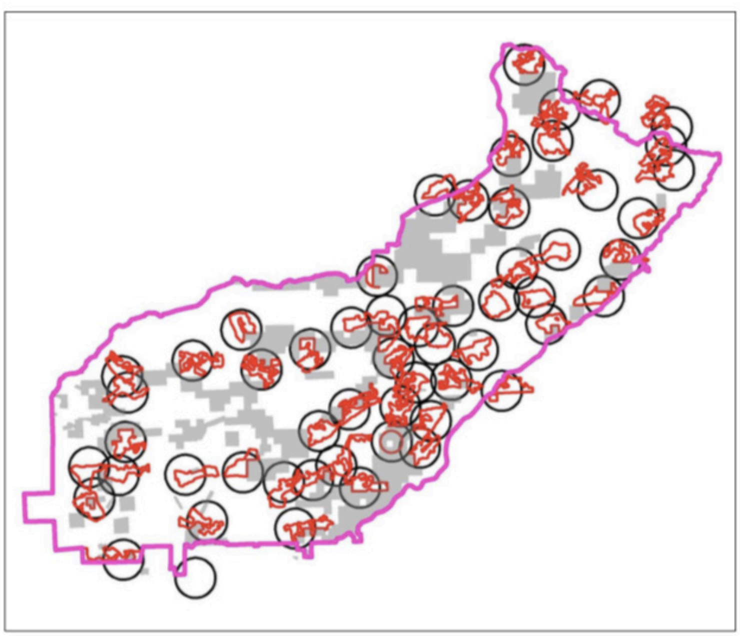

Figure 5. Distribution of CSO PACs (red) and territories (black circles) in the SERAL project areas in relation to private land (gray). Taken from SERAL BE, Figure CSO 4.

The DEIS analysis claims that these circular territories would result in a gain of 4,911 acres of 4M and 4D habitat compared to the HRCAs, yet HRCAs explicitly exclude private land to ensure habitat is managed for spotted owl desired conditions (Table 32 DEIS p.78). It is unclear if the overlap with private land has been accounted for in this calculation. The USFS cannot guarantee that habitat in the circular territories on private lands are managed for old forest species, and private land should be excluded from any assessment of available habitat. This issue needs to be clarified to improve the accuracy of the project analysis.

### G. Purpose and Need

We find it difficult to understand why the project wouldn't identify spotted owl conservation as a purpose and need of the project. The DEIS developed 25 project-specific plan amendments from the 2019 spotted owl conservation strategy, and five out of twelve issues are spotted owl related (DEIS p.9). Further, the DEIS states the purpose and need was developed for the spotted owl:

> The primary purpose and need of the project is to retain large old and structurally diverse trees and snags across the project area. The SERAL project was developed to specifically maintain and promote these important habitat characteristics for the spotted owl.

(DEIS, p. 120) This concern is related to Issue 1.A. of the DEIS.

### H. Alternative 1 Does Not Provide for Viable Spotted Owl Populations in Project Area

The 2012 planning rule requires forest plans to maintain viable populations of each species of conservation concern (CFR 219.9). This is of utmost importance given that spotted owl populations have declined 30% to 50% in the Sierra Nevada over the last 30 years within all demography study areas on national forest lands (Connor et al. 2013; Tempel and Gutiérrez 2013; Tempel et al. 2014b).

As mentioned in our previous comment letter and DEIS issue 1.A., proposed changes in management direction that are more risky or less certain for spotted owl must be evaluated in terms of viability to the species. We remain concerned that the BE hardly mentions providing for viable spotted owl populations, nor does it offer consistent definitions for important concepts such as 'essential habitat for survival and reproduction' and 'reduction in habitat quality.' This makes viability difficult to determine and leaves questions unanswered such as: How much high quality habitat is needed to maintain viability? The SERAL project proposes to retain less spotted owl habitat than that which is recommended by the 2019 strategy and strays significantly from the document's core intent. The 2019 spotted owl strategy strives for:

> …maintaining well-distributed territories across the CSO range …[in order to] increase population resilience to the effects of climate change and other environmental stressors….Conservation measures aimed at maintaining the CSO and their suitable habitat where they exist today provide some immediate stability for individual owls while we work to align the landscape with NRV.

(USDA Forest Service 2019, p.2) Contrary to this goal, Alternative 1 proposes intensive forest management treatments across spotted owl habitat in the project area including nearly every owl PAC and territory, thereby increasing risk and uncertainty for viability of this declining species. In addition to the risk introduced by implementing the 2019 owl strategy, the project does not comply with the desired conditions in the strategy for maintaining high quality spotted owl habitat, as discussed earlier in this document. The proposed mechanical treatments exceed the risk and uncertainty posed by the regional strategy, threatening viability of the California spotted owl.

**1. The Project Proposes to Degrade Spotted Owl Habitat Across the Project Area, Threatening the Viability of the California Spotted Owl.**

Related to Issue 1.A in the DEIS, the intensity of treatments proposed in Alternative 1 would substantially reduce habitat availability for almost all spotted owl territories in the project. The mechanical thinning proposed in SERAL removes and degrades high quality that only occurs intermittently in the project area. According to the DEIS, *"currently approximately 9% of SERAL project area contain high-quality CSO habitat while 58% contain best-available CSO habitat (Table 23)."* (p.51) Despite so little high quality habitat on the landscape, Alternative 1 would convert 10,986 acres of it to non-habitat categories in occupied spotted owl territories. This would involve conversion of 5M to 5P, 5D to 5P, 4D to 4P or 5P, and 4M to 4P, 4M or 4S (SFL GIS analysis). Alternative 1 would also remove 1,834 acres of 6, 5D, 5M outside territories, reduce canopy cover on 2,718 acres of 4D/4M in PACs (SFL GIS analysis). These treatments are proposed at an unprecedented scale, introducing uncertainty and risk to spotted owl persistence on the landscape. Research shows that this intensity of habitat degradation in the 5D/M and 6 categories in breeding territories leads to a reduction in owl survival, reproduction and occupancy over time (see Attachment A research summary and BASI discussion above).

**2. California Spotted Owl Surveys Must Be Required With All Treatments in Owl Habitat.**

Related to Issue 1.A. in the DIES, there are number instances where Alternative 1 would degrade spotted owl habitat and then characterizes this as an improvement in habitat conditions. For instance, when Alternative 1 converts 4D to 5M, then component SPEC-CSO-STD-01 is triggered lifting the survey requirement when owl habitat is 'improved' (DEIS p.132). Our concern with the CSO-STD-01 is that without surveys, undetected spotted owls could be overlooked, thereby risking harm to those owls, as well as loss of undetected spotted owl territories, and the elimination of important breeding structures in nest stands such as dense canopy cover, nests and roosts essential to spotted owl sustainability.

The potential lack of surveys in spotted owl habitat is especially fraught given that there is so much disturbance to PACs proposed in the project area that could displace owls to suitable habitat outside of existing PACs that could then be degraded as part of 'habitat improvement'. For example, mechanical thinning in 53 PACs and territories (BE p.61) may cause some birds to relocate as a result of disturbance from intensive treatments. Another possibility is that a future fire in the project area could force owls to relocate. In these scenarios, owls that colonize habitat outside existing PACs that is also proposed for 'habitat improvement' would not be detected without surveys. Surveys prior to treatment in spotted owl habitat should always be required, even if the treatment is considered 'improvement' because as we have established this could still involve degradation of 4D or 5D spotted owl habitat and could otherwise impact undetected resident owls. The DEIS has not considered this in the evaluation of project impacts to spotted owl viability.

There are also large areas of the project area where no surveys have ever been conducted because of accessibility issues such as the South Fork Stanislaus River canyon West of Cedar Ridge (and more than 1.5 miles from nearest neighbors TUO0139 and TUO0221). We would like more information about what surveys are planned for those areas. They are proposed for helicopter and skyline logging, indicating both the removal of large merchantable trees and inaccessibility of the area.

## II. Concerns About Other At-Risk Species

### A. Northern Goshawk

Territory D52T04 appears bisected by fuel break –Territory D51T28 (Fraser Flat), D53T14, (Strawberry) and D52T15 (Smoothwire) all have significant mechanical treatments, although the BE assumes no treatment in NOGO outside Defense Zone:

> Goshawk PACs within WUI may be mechanically thinned as per forest plan direction (USDA Forest Service 2017); goshawk PACs outside of WUI are avoided and not mechanically thinned. Prescribed burning is allowed in goshawk PACs and hand treatments, including handline construction, tree pruning, and cutting of small trees (less than 6 inches DBH) may be conducted prior to burning as needed to protect important elements of habitat." (p.78)

We are not sure what the intention of the proposed action for goshawk PAC treatments is and clarification is needed.

### B. Great Gray Owl

The Regional Learning Center GGO PAC at the Sierra Outdoor School is proposed for mechanical thinning and fuel breaks across the entire 50-acre PAC, according to the GIS layer:

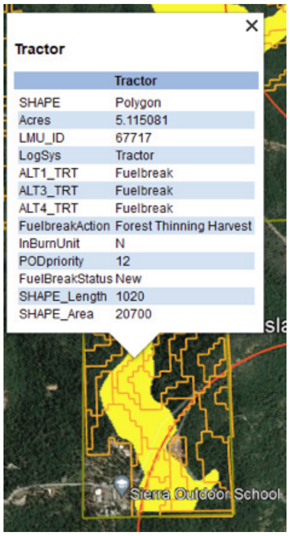


Figure 6. Treatment units (orange line) for Alternative 1 overlayed on Regional Learning Center great gray owl protected activity center (yellow fill). Data from SERAL project website and Google Earth.

However, the BE (p.22) assumes no mechanical treatments in great gray owl PACs.

> While GGO nest stand habitat is avoided and not mechanically thinned (i.e., generally the 50 acres of forested habitat near the nest along meadow margins), alternatives may vary with regards to hand treatments, including hand line construction, tree pruning, and cutting of small trees (less than 6 inches DBH) prior to burning as needed to protect important elements of owl habitat. This may apply to GGO PACs in the Wildland Urban Interface and/or GGO PACs where fire is prescribed. Additionally, under the action alternatives, encroaching conifers may be removed in meadow foraging habitat within PACs to maintain the meadows and enhance habitat needs of prey species.

This inconsistency between the information in the GIS data and the BE should be corrected in the FEIS.

## III. Use of FORSYS Model to Select Treatment Locations and Assign Prescriptions

A resilience departure index was developed as part of the FORSYS modeling system. Appendix E described the departure index and states this about its use:

> A departure value of > 1 (i.e., > 1 standard deviation from the mean) represent locations where forest structure is more dense than the reference conditions; the greater the departure the greater the density of the forest.

We examined the GIS data and found that significant areas within the treatment footprint for Alternative 1 were not considered departed, i.e., areas with departure values less than or equal to 1. Table 3. Shows that in dry mixed conifer, for example, that 7,222 acres outside of territories is considered resilient, yet this area is proposed for logging. Similarly, 4,373 acres within territories is considered resilient, yet this area is also proposed for logging.

Table 3. Distribution of Alternative 1 treatments in areas judged to be resilient versus not resilient according to Appendix E. Derived from SFL GIS analysis.

| Alternative 1 prescription | Resilient | Not Resilient |
|---|---|---|
| Alt134_biomass_thin_25tpa.kcp | 4,081 | 2,876 |
| Alt1_MC_GF_200.kcp | 772 | 542 |
| Alt1_PP_GF_100.kcp | 778 | 168 |
| Alt134_mastication.kcp | 3,873 | 5,353 |
| Alt1_MC_GF_150.kcp | 7,222 | 4,437 |
| Alt134_biomass_thin_100tpa.kcp | 1,365 | 315 |
| Alt1_MC_Territory_200.kcp | 485 | 148 |
| Alt1_PP_Territory_100.kcp | 520 | 114 |
| Alt1_MC_Territory_150.kcp | 4,373 | 3,560 |
| Alt1_MC_PAC_20.kcp | 2,898 | 711 |
| Alt1_FMF_THIN30PCC.kcp | 2,876 | 3,898 |
| **Total** | **22,243** | **22,122** |

In many of these areas logging proposed under Alternative 1 would change suitable habitat to unsuitable for CSO. For example, suitable habitat would be reduced to unsuitable on over 2,900 acres within territories and over 6,200 acres outside of territories (SFL GIS analysis). Among these areas affected that were considered not to be departed from NRV, there were about 574 acres of highest quality nesting and roosting habitat (CWHR 5M or 5D) within territories and 473 acres outside of territories that would be reduced to unsuitable habitat, i.e., CWHR 5P. These areas are not considered departed by the analysis developed by the SERAL science team. The FEIS should explain how the treatments in these areas are consistent with the stated purpose and need to manage within NRV to benefit landscape scale restoration.

We also do not understand how the silvicultural prescriptions described in Appendix E (Table 1) meet the stated purpose and need to manage toward NRV. For mixed conifer types, there are only two criteria to distinguish between treatments: 1) forest type: dry mixed conifer or mesic mixed conifer: 2) diameter limit: territory versus general forest. The topographic position within these forest types is variable, yet we see no distinction made in prescriptions applied to lower, mid- and upper slopes. We do note that the CSO departure index (Appendix E and limited to use within PACs) distinguished between these topographical positions and based on NRV values set different canopy cover criteria for valley, mid and upper slopes.

When we examined the distribution of prescriptions within Alternative 1, we found that just over 9,000 acres was proposed for commercial logging in territories and about 86% of the areas would be treated with a single prescription – "Alt1_MC_TERRITORY_150.KCP" – that would manage the stands for "a target stand density index (SDI) of 150" (Appendix E)[7]. Similarly, the

[7] We note that although Appendix E refers to the "150" value for this prescription as SDI, we suspect that it actually refers to a target for basal area per acre since that is the value reflected in Table 13 of the DEIS.

description of Alternative 1 mentions that prescriptions will create a variable stand structure with individual trees, clumps and openings (ICO) (DEIS, p. 25), but the prescriptions used in the modeling do not mention this variability or that it is likely to vary with topographic position. The FEIS should explain how the treatment prescriptions described in Appendix E will achieve the stand variability described in Alternative 1.

## IV. Condition-Based Management for Salvage Logging of Drought, Insect/Disease and Wildfire Related Tree Mortality

We identified the use of condition-based management (CBM) as a concern in our scoping comments. We note here that the term "condition-based management" has been eliminated from the DEIS. Instead, the DEIS refers to the proposed salvage logging as "NRV-based restoration." We think it important to be clear that what is being proposed as "NRV-based restoration" is condition-based management, a practice that is highly controversial and has been the subject of recent litigation in which the Forest Service did not prevail. We also note that MOTORM2K, the proposal that preceded SERAL, included condition-based management that was opposed by many organizations. We think the effort to refer to this as "NRV-based restoration" is disingenuous. That is because the entire SERAL project is based on using NRV to assess the need for restoration and to set targets for restoration. This is called NRV-based restoration and is promoted by the CSO strategy across the landscape and not limited to the salvage of dead and dying trees.

The idea of CBM has been circulating in the Forest Service for several years. In 2019 a definition was proposed for inclusion in Forest Service regulations on implementing the National Environmental Policy Act (NEPA; 36 CFR Part 220), but was abandoned in the final rulemaking. The American Bar Association recently reviewed the status of CBM and offered the following as a description of CBM:

> CBM projects use an overarching set of "goal variables"—predetermined management criteria that guide implementation—that Forest Service staff apply to on-the-ground natural resource "conditions" encountered during the course of project implementation, a period that can span years or even decades: essentially, when the Forest Service finds X resource condition on the ground, it applies Y timber harvest prescription. However, basic information regarding the project's details—such as unit location, timing, road building, harvesting methods, and site-specific environmental effects—is not provided at the time the Forest Service conducts its NEPA environmental review (when the public can weigh in), nor when it gives its final approval to a project (when the public can seek administrative review). Instead, site-level disclosures are made after NEPA environmental and administrative review is complete, depriving the public of opportunities to comment and influence the decision based on localized conditions.

(Cliburn et al. 2021) Management frameworks that establish goals and approaches to achieving them can make project planning more efficient. This is what a well-designed forest plan can provide. This type of guidance also can be provided by "left-side analysis" that has formed the basis of landscape planning completed by the Forest Service for the past 25 years. The problem, however, comes with the Forest Service's attempt to marry CBM with the requirements of NEPA. NEPA requires federal agencies to disclose to the public and in advance of environmental decision making the likely site-specific impacts of project related activities. In a recent legal case, the courts held that the Forest Service's Prince of Wales Landscape Level Analysis Project—a 15-year logging project on Prince of Wales Island in the Tongass National Forest using CBM—violated NEPA because it failed to provide the site-specific analysis that was needed to satisfy NEPA's "hard-look" standard.

These are the same issues that confront us for the salvage logging proposed in the SERAL project. What are the specific locations where the salvage logging is proposed and what are the site-specific environmental impacts of those actions? These details are not provided in the DEIS or specialists reports. In the case of post-wildfire salvage, up to 3,000 acres across the project area could be salvaged. For insect-, disease-, or drought-killed trees, up to about 37,000 acres could be salvaged logged with this decision.

We specifically asked in our scoping comments that the DEIS disclose the site-specific impacts of any actions proposed, including salvage logging. In response to our concern, the DEIS simply added a few criteria to narrow the footprint of impact, but includes little to no evaluation of impacts of the proposed salvage logging on up to 37,000 acres. Impacts are not discussed or only generically discussed for aquatic resources, soils, and wildlife, yet significant impacts to such resources from salvage logging are widely documented (see for example Blakey et al. 2019; Burnett et al. 2010, Burnett et al. 2012; Georgiev et al. 2020; Leverkus et al. 2020; Loffland et al. 2017; Roberts et al. 2021; Seavey et al. 2012; Siegel et al. 2013; Thorn et al. 2018;). In the absence of the disclosure of site-specific impacts, the analysis in the DEIS does not meet the hard look standards required by NEPA.

Setting aside the failure to disclose and evaluate impacts of the proposed salvage logging, the proposal itself still lacks sufficient detail about the salvage logging to be completed. The proposal identifies some NRV conditions of severity and amount of tree mortality, but fails to establish what is to be created by clearing away all other dead trees. Clearing away areas of dead trees does not achieve NRV conditions in itself and must be coupled with a more complete description of the post-treatment landscape and include measures to conserve additional resources. The additional detail needed to more completely described the proposed action would include the site-specific locations for treatments as well as:

- Additional clarity on the scale at which the NRV conditions would be applied
- Measures to address habitat requirements for black-backed woodpeckers and other species dependent on burned forests.
- Desired conditions for post-treatment tree structure, including what tree structures will be retained.
- Desired conditions for post-salvage fuels to ensure that fuel conditions following salvage are improved over pre-salvage conditions. This is important given that post-disturbance salvage logging can increase hazardous fuels following treatment (Donato et al. 2006).

We also note that there are many other environmental decision-making processes that can be used to expeditiously address the desire to salvage dead or dying trees including categorical exclusions and environmental assessments combined with shortened decision-making time lines that can be requested of CEQ.

Unless the DEIS provides a site-specific analysis of the impacts from salvage logging the resources noted above and others that would be affected by the proposal,[8] we ask that you drop this activity from the final decision.

## V. Creation of Fuel Breaks

We support the creation of fuel breaks to assist in the implementation of prescribed and managed fire, as well as for defense of communities and infrastructure. We also expect that the fuel breaks that are created are permitted with environmental analysis that complies with NEPA's requirement to disclose the site-specific impacts of the project a take a hard look at potential impacts. We are concerned that the proposed fuel break and environmental analysis do not meet the requirements for NEPA because the proposed action is insufficiently described and the impacts of the fuel break on some resources have not been disclosed.

The DEIS describes the activities to create the fuel breaks in the DEIS (p. 26-28). Table 16 describes the treatment specifications and is a helpful table, but it is not complete. There are several references to taking action to achieve "fuels objectives" or "to achieve effective fuels treatments", but how these activities will alter the resource is not described. For instance, would all the shrubs be cleared in chaparral habitats or some shrubs left? Table 16 also does not describe what to expect in chaparral types where shrubs are the overstory or if a different approach will be taken in riparian areas. This information is important to visualizing how the fuels break will alter these habitat types. We have seen photos used very effectively to depict the desired conditions in fuels breaks and suggest that they be used in the DEIS.[9]

The DEIS and specialist reports also don't evaluate the impact that the fuel breaks may have on the affected resources. We looked at the MIS report to see how it addressed the effect of fuel break creation on shrub habitats. The MIS report indicates that shrub cover and size class are factors in the analysis that will be used to assess habitat condition, however the analysis of effects does not report any results for this factor.

We have a similar concern about the disclosure of impacts form fuel breaks on oak woodlands. The project area includes sensitive blue oak woodland (Botany BE p.6), but the proposed oak retention guidelines for fuel breaks do not protect blue or valley oaks: *"Retain all [oak and other hardwood trees] 12 in. DBH or greater"* (DEIS p.28). This proposed action does not comply with current forest plan direction and there are no project-specific plan amendments for hardwoods proposed in the DEIS.

We recommend that you improve the evaluation of fuel breaks in the DEIS by:

- Clarifying what the fuel objectives are for fuel breaks
- Define what an "effective fuel treatment" is and how that affects understory vegetation

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[8] We note here that we remain open to reviewing an analysis that adequately addresses site specific impacts in compliance with NEPA, but we are not convinced that it is possible to achieve.

[9] See for example the images of post-treatment desired condition for this project on the Los Padres National Forest: https://www.fs.usda.gov/nfs/11558/www/nepa/113939_FSPLT3_5616166.pdf

- Providing photos of samples of fuel breaks in different habitat types, especially chaparral and oak woodland
- Evaluate potential changes to habitat condition for shrub and oak woodland types using the habitat condition metrics referenced in the MIS report, e.g., shrub canopy and size class.
- Follow the nine standards and guidelines for hardwood management in the 2004 Forest Plan including: retain all blue oak and valley oak (#21), encourage hardwoods in plantations (#26), manage hardwood ecosystems for a diversity of hardwood tree size classes with in a stand (#19), as well as minimize impacts to hardwood ecosystem structure and biodiversity (#22).

We note that the DEIS proposed the use of staged decision making to allow a partial decision on project activities to move forward quickly in the five priority PODs. This approach includes limiting activities to those that do not involve timber removal. We support this approach, but ask that you address our concerns about the adequacy of the treatment descriptions and effects analysis before proceeding with a decision.

## VI. Improving the Approach to Fire Management

The action-alternatives include roughly 70,000 acres of prescribed fire either as the first treatment or a follow up treatment. We strongly support these actions. We think the completion of prescribed or managed fire is critical to meet the purpose and need of the project to improve resilience for people and nature. Prescribed fire is essential and not incidental to achieving the purpose and need. And, the stated goal for the SERAL project (DEIS, p. 8 "designed to restore forest resilience and the landscape's ability to persist with fire as a natural process on the Stanislaus National Forest") cannot be achieved without it.

We are concerned that the framing in the DEIS about implementation of prescribed fire is passive or soft with less commitment to implementation than conveyed about logging. We are also concerned about the discussion in the DEIS that appears to "give up" on accomplishing prescribed fire:

> However, due to unsafe existing conditions, weather, personnel availability, and uncertain funding — opportunities to burn or manage fire are very limited.

(DEIS, p. 49) These limitations can be reduced and overcome, but it requires volition and dedication to do so. The DEIS and alternatives is one place to establish the need and importance in priority for action for prescribed fire. We ask that you make that case more prominently in the DEIS.

We have been working in recent years to reduce barriers to prescribed fire. With support from a variety of stakeholders and agencies, we have been making headway. This is an area that we are particularly interested in working in partnership with your staff to successfully implement the proposed prescribed fire treatments.

## VII. Use of Designation by Prescription (DxP) and Designation by Description (DxD) to Implement Logging Treatments

We raised this concern in our scoping comments, but it is not mentioned in the description of the proposed action or elsewhere in the DEIS. We are concerned about the use of Designation by Prescription (DxP) and Designation by Description (DxD) applied to the marking of trees to be logged. This approach relies on a written description to be used by the logger to judge for themselves which trees in a stand should be removed. The Forest Service monitors the completion on these prescriptions, but functionally the prescriptions must be very simple with criteria that can be easily measured in the field. Our experience indicates that there are limited circumstances where these written approaches to “marking” trees to remove are acceptable. For example, we have seen DxP used successfully in timber stand improvement in plantations where the intended outcome is to create a fairly uniform stand.

The proposed actions depend on logging to create variable forest stand conditions:

> To best mimic NRV conditions and achieve within-stand and multi-stand diversity, applied silviculture and prescribed fire treatments need to create a pattern of individual trees, clumps of trees, and openings containing various sizes of clumped trees and openings.

(DEIS, p. 13) Accomplishing such a pattern (referred to as ICO) requires judgment by Forest Service professionals on the ground. The same is true for the list of conditions that govern when the removal of trees that exceed a certain limit. See DEIS, p. 24-26. We believe that these outcomes can only be achieved by the Forest Service marking the trees to be removed. If the use of DxD or DxP is intended in the SERAL project, we ask that it be described how the variable density and ICO objectives will be met using these approaches to tree selection and to provide examples of successful applications of these non-marking approaches to achieving similar habitat objectives.

## VIII. Wild and Scenic Rivers (WSRs)

The DEIS notes that two eligible WSR segments are located in the SERAL Project area.[10] While this is technically correct, the statement fails to accurately note that the two segments are not only eligible, they were also found to be suitable and recommended by the Forest Service for designation by Congress.[11] The distinction is important because eligible WSRs not determined suitable lose their interim protection. Interim protection applies only to eligible WSRs that were not subject to a suitability decision/recommendation and to eligible/suitable WSRs. Interim protection for both is identical but the description of this topic in the DEIS should be accurate.

The SERAL Project proposes up to 2,525 acres of treatments, the majority of which is Prescribed Fire Only.[12] Possible ground-disturbing treatments (Hand Pile and Burn, Forest Thinning-Helicopter, Forest Thinning-Skyline, Forest Thinning-Tractor, Understory and Surface Fuel

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[10] SERAL DEIS pg. 72.
[11] Stanislaus National Forest LRMP & ROD, pgs. IV-99 and 13 respectively.
[12] SERAL DEIS, Table 31, pg. 74.

Reduction) range from 44 acres to 191 acres. The SERAL FEIS/ROD should ensure that these activities within the suitable WSR corridors comply with the Forest Plan direction to maintain the Recreation Opportunity Spectrum (ROS) of Semi-Primitive Non-Motorized and Visual Quality Objective (VQO) of Retention for WSRs.

Forest Service guidelines for eligible/suitable WSRs include this specific direction for Vegetation Management in Wild River corridors:

> Cutting of trees and other vegetation is not permitted except when needed in association with a primitive recreation experience, to protect users, or to protect identified outstandingly remarkable values. Examples of such exceptions include activities to maintain trails or suppress wildfires. Prescribed fire and wildfires managed to meet resource objectives may be used to restore or maintain habitat for threatened, endangered, or sensitive species or restore the natural range of variability.[13]

The discussion of possible impacts on suitable WSRs (Issue 5) should be based on and provide assurance that the project will comply with this direction. If any of the proposed ground-disturbing activities in the suitable Wild River corridors does not meet these standards and guidelines (ROS, VQO, Vegetation Management for Wild Rivers), the proposed treatments should be eliminated or adjusted accordingly.

## IX. Near Natural and Scenic Corridor Allocations Surrounding Suitable Wild Rivers

The Stanislaus LRMP allocates land outside the lower Middle Fork WSR corridors to the Near Natural prescription and the lower North Fork WSR to Scenic Corridor and Near Natural Prescriptions.[14] These allocations are intended to protect the outstanding scenery and semi-primitive non-motorized recreation values of the WSR corridors. The SERAL Project Treatments comply with the Visual Quality Objectives and Recreation Opportunity Spectrum of these prescriptions. If any of the proposed ground-disturbing activities in the Near Natural and Scenic Corridor areas outside of the suitable Wild River corridors do not meet these standards and guidelines, the proposed treatments should be eliminated or adjusted accordingly.

Thank you for considering our comments. We would like to meet with you to discuss our concerns, especially those related to the CSO amendments and impacts to CSO, the modeling approach applied, and condition-based management. Our purpose for meeting would be to find ways to resolve our concerns about the project.

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[13] FSH 1909.12 – Land Management Planning Handbook, Chapter 80 – Wild and Scenic Rivers, pg. 31.
[14] Stanislaus LRMP Map I-1.

If you have questions, please contact Susan Britting (britting@earthlink.net). Please also add the email addresses listed below to your circulation list for the SERAL Project.

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**Attachment**

Attachment A: Summary of research on California spotted owl

**Citations**


Blakey, R.V., Siegel, R.B., Webb, E.B., Dillingham, C.P., Bauer, R.L., Johnson, M. and Kesler, D.C., 2019. Space use, forays, and habitat selection by California Spotted Owls (Strix occidentalis occidentalis) during the breeding season: New insights from high resolution GPS tracking. Forest Ecology and Management, 432, pp.912-922.

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Table 1. Summary of the results from studies on California spotted owl demographics and habitat selection.

| Study | Study Location(s), Sample Size and Unit, and Period | Parameter | Habitat Selection |
|---|---|---|---|
| Blakesley et al. (2005) | Lassen Demographic Study Area, 63 territories, 11 years | Occupancy (pair or single) | The amount of nest area dominated by large trees (>24 in dbh) and canopy cover >70% was positively associated with site occupancy. The amount of nest area dominated by medium- trees (12-24 in dbh) with canopy cover >70% and the amount of area unforested or dominated by small trees (6-12 in dbh) were negatively associated with site occupancy. |
| | | Survival | Apparent survival increased with greater amounts of forest dominated by large trees (>24 in dbh) with normal (40-70%) to good (>70%) canopy cover containing large (>30 in dbh) remnant trees. |
| | | Reproduction | Reproduction decreased as the amount of nest area that was unforested or dominated by small trees increased. |
| | | Nest Success | Nest success was higher when large remnant trees were present in the nest stand. |
| Seamans and Gutierrez (2007) | Eldorado Demographic Study Area, 66 territories, 15 years | Extinction | The amount of conifer forest dominated by medium (12-24 in dbh trees) and large trees (>24 in dbh) with >70% canopy cover was negatively correlated with the probability of territory extinction. |
| | | Colonization | The amount of conifer forest dominated by medium (12-24 in dbh trees) and large trees (>24 in dbh) with >70% canopy cover was positively correlated with the probability of territory colonization. |
| Roberts et al. (2011) | Yosemite National Park, 16 burned and 16 unburned territories, 2-14 years post-fire | Occupancy (pair) | The top model suggested that nest and roost site occupancy were best predicted by the combined positive effect of basal area and the negative effect of coarse woody debris. However, there was also support for an alternative model suggesting that higher canopy closure and tree basal area were also useful predictors of nest and roost site occupancy. |
| Tempel et al. (2014) | Eldorado Demographic Study Area, 70 territories, 20 years | Reproduction | Reproduction was negatively related to the area of hardwood forest with <10% conifer canopy cover. |
| | | Survival | The amount of high (>70%) canopy cover forest dominated by 12-24 in and >24 in dbh trees occurred in the top-ranked models for survival, territory extinction, and territory colonization rates, and explained more variation in population growth rate and equilibrium occupancy than other covariates. Forests dominated by trees >24 in dbh and <30% canopy cover were not associated with demographic parameters. |
| | | Extinction | |
| | | Colonization | |
| | | Occupancy (single or pair) | |
| Tempel et al. (2016) | Lassen, Eldorado, Sierra, and Sequoia-Kings Canyon demographic study areas, 275 territories, 19 years | Extinction | Forests with high (>70%) and medium (40-70%) canopy cover were the only habitat covariates that were consistently identified as important for all four study areas. Occupancy reached its lowest value when high and medium canopy cover were minimized and occupancy reached its highest value when these covariates were maximized. Occupancy for the 40–49% canopy cover class was lower than occupancy for the 50–59% and 60–69% canopy cover classes. Occupancy rates are likely to be negatively affected if canopy cover is consistently reduced to 40%. |
| | | Colonization | |
| | | Occupancy (single or pair) | |
| North et al. (2017) | Sequoia-Kings Canyon, Eldorado, and Sierra demographic study areas and Tahoe National Forest, 316 territories, sites that were occupied by an owl pair at least once between 2001 and 2013 | Occupancy (pair) | Across the four study areas, the average values of total canopy cover and cover in trees >48 m (157 ft) was highest at nest sites, and consistently decreased as area expanded to PACs, territories and then the surrounding landscape. A similar trend of decreasing values from nest sites to landscape was identified for the 32–48 m (105-157 ft) strata on the three National Forest study areas but not on Sequoia-Kings Canyon. The amount of cover of trees in the 2-16 m (7-52 ft) height strata was lowest near nest sites and decreased as area expanded to PACs, territories, and then the surrounding landscape. |
| Jones et al. (2017) | Lassen, Eldorado, Sierra, and Sequoia-Kings Canyon | Extinction | Extinction rates increased as the amount of forest characterized by large trees (≥24 in dbh) and high canopy cover (>70% cover) decreased. Median proportion of an owl site containing large trees and high canopy cover forest on national forests ranged from 0.03-0.06, corresponding with higher predicted rates of local extinction and ongoing declines in |

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| | demographic study areas, 275 territories, 19 years | Occupancy (pair or single) | occupancy. The median proportion of forest characterized by large trees and high canopy cover in owl territories on Sequoia-Kings Canyon was 0.19, which had a lower predicted extinction rate and stable occupancy. |
| Blakey et al. (2019) | Plumas National Forest, 15 owls, 3 years | Roosting and Foraging | Owls selected against roosting and foraging sites with <50% canopy cover, selected for areas with >70% cover, and used areas with 50 -70% cover in proportion to availability. They also selected against areas dominated by trees <12 in dbh. |
| Atuo et al. (2019) | Northern and Central Sierra Nevada, 53 owls, 1 year | Home Range Size | Home range sizes increased as spatial heterogeneity and elevation increased and decreased as with increasing amounts of forest with >50% canopy cover and QMD 11-13 inches. |
| Hobart et al. (2019a) | Northern and Central Sierra Nevada, 151 owl sites, 5 years | Occupancy | Probability of initial site occupancy increased as elevation decreased. Probability of a site being colonized or remaining occupied declined with increasing elevation, younger forest, and open area. Probability of a site being colonized or remaining occupied was lowest when previously unoccupied, and highest when previously occupied with successful reproduction. |
| | | Reproduction | Probability of reproduction increased as elevation decreased, when territories had more north-facing slope, and more younger forest with high basal area of hardwoods. |
| Hobart et al. (2019b) | Across the Sierra Nevada Bioregion | Extinction | Territory extinction probability was lower when owl diets contained more woodrats and pocket gophers |
| | | Home Range | Home range sizes decreased as the dietary proportion of woodrats and pocket gophers increased. |
| Temple et al. (2022) | Southern CSO population on San Bernardino and Angeles NMS; 1991-2019; combined lower elevation oak and higher elevation pine/ MC territories. | Extinction | Extinction declined by half as tree density increased to 20 trees/ha, then extinction leveled off (large trees defined as =/>50 cm dab). |
| | | Colonization | Territory colonization increased as large tree density increased to about 20 trees/ha in low elevation sites, then declined with greater tree density in higher elevation sites. Differences between hardwood and conifer ecotypes in study were apparent in large trees associations. Positive association between occupancy and proportion of WUXI in territory was unexpected. |
| | | Reproduction | Positive linear relationship between high canopy cover forest and reproductive output. In addition, territories located in proportionally more drainages or on northeast facing slopes also had greater reproductive output. |

Table 2. Summary of results from studies on the effects of logging and fuel reduction on spotted owl demographics.

| Study | Study Location(s), Sample Size and Unit, and Period | Disturbance Type(s) Evaluated | Parameter | Response (Effect on Demographic Parameter) |
|---|---|---|---|---|
| Seamans and Gutierrez (2007) | Eldorado Demographic Study Area, 66 territories, 15 years. | High Severity Fire (including salvage), Logging | Extinction | **Negative** - Alteration of ≥50 acres of mature conifer forest was positively correlated with territory extinction probability. |
| | | | Colonization | **Negative** - Probability of colonization was related to the amount of mature conifer forest habitat in the territory and the alteration of such habitat reduced the probability of colonization. |
| Clark et al. (2013) | Southwest Oregon, 31 burned/103 unburned territories, up to 15 years pre-fire and 4-5 years post-fire. | Logging, High Severity Fire, Salvage Logging | Extinction | **Negative** - Probability of extinction increased due to the interactive effect of past timber harvest, high severity fire, and salvage logging. |
| | | | Colonization | **Unclear** - Few colonization events were observed. |
| | | | Occupancy (pair) | **Negative** - Declines in occupancy were driven by increases in extinction, attributable to past timber harvest, high severity fire, and salvage logging. |
| Tempel et al. (2014) | Eldorado Demographic Study Area, 70 territories, 20 years. | High-intensity Logging, Wildfire (including salvage), and Medium-intensity Logging. | Reproduction | **Negative** - Medium-intensity timber harvests characteristic of proposed fuel treatments were negatively related to reproduction of Spotted Owls in our study. Reproduction appeared sensitive to modest amounts of medium-intensity harvests, and was predicted to decline from 0.54 to 0.45 when 20 ha were treated. |
| | | | Survival | **Negative** - Medium-intensity logging, when implemented in high canopy cover forests, was associated with reductions in survival. |
| | | | Extinction | **Positive** - Extinction was negatively correlated with the area of high-intensity timber harvest. High intensity timber harvest occur on 5.4% of the total area within owl territories in the study. |
| | | | Colonization | **Negative** - Medium-intensity logging, when implemented in high canopy cover forests, were associated with reductions in colonization. |
| | | | Occupancy (single or pair) | **Negative** - Equilibrium occupancy was negatively correlated with wildfire. |
| Stephens et al. (2014) | Plumas National Forest, 8 territories, 4-5 years pre-treatment, 3-4 years | Group Selection and Fuels Treatments | Occupancy (single or pair) | **Negative** - By 3–4 years post-treatment, the number of occupied sites declined decline by 43% from the pretreatment numbers. |
| Tempel et al. (2015) | Tahoe National Forest, 4 territories, modeled 30 years post-treatment. | Fuels Treatment, Wildfire | Fitness | **Negative** - Fuels treatment had a negative effect on fitness, an effect that was still present after 30 years of simulated forest growth. **Negative** - Simulated wildfire without fuels treatment negatively affected fitness. **Negative** - Fuels treatment with simulated wildfire negatively affected fitness, but the effect was not a great as the effect of simulated wildfire without fuels treatment. |
| | | | Occupancy (single and pair) | **Negative** - Fuels treatment alone had a negative effect on equilibrium occupancy, an effect that was still present after 30 years of simulated forest growth. **Negative** - Simulated wildfire without fuels treatment negatively affected equilibrium occupancy. **Negative** - Simulated wildfire with fuels treatment negatively affected equilibrium occupancy, but the effect was not a great as the effect of simulated wildfire without fuels treatment. |
| Tempel et al. | Lassen, Eldorado, Sierra, and Sequoia-Kings Canyon | Wildfire (including salvage on | Extinction | **Positive** - On the ELD study area, logging less than 1% of a territory in the previous 3 years was negatively correlated with extinction. **Neutral** - No support for an effect of logging less than 1% of a territory in the previous 3 years was detected for the LAS or SIE study areas. **Positive** - On the SKC study area, wildfire was negatively related to extinction. **Neutral** - No support for an effect of wildfire was detected on the ELD, LAS, or SIE study areas. |

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| (2016) | demographic study areas, 275 territories, 19 years. | National Forests), Prescribed Fire, Logging | Colonization | **Neutral** - No support for an effect of logging less than 1% of a territory in the previous 3 years was detected for the ELD, LAS, or SIE study areas. **Negative** - On the SKC study area, prescribed fire was negatively associated with colonization. |
| | | | Occupancy (single or pair) | **Neutral** - No support for an effect of logging when less than 1% of a territory was logged in the previous 3 years for the LAS, or SIE study areas. **Positive** - On the ELD study area, logging less than 1% of a territory in the previous 3 years was positively associated with occupancy. |
| Jones (2019) | Lassen, Eldorado, Sierra, and Sequoia-Kings Canyon demographic study areas, 275 territories, modeled forward from 2012 -2064. | Wildfire and Fuel Reduction Treatments | Occupancy (single or pair) | **Negative** - Treatments that converted CWHR 5D to 5M negatively affected occupancy. There were uniform benefits to midcentury occupancy when treatments were excluded from owl territories, compared to a no-treatment scenario. When treatments occurred within territories, benefits were greater when treatments were designed to avoid modifying large tree/high canopy cover forest. |
| Temple et al. (2022) | Southern CSO population on San Bernardino and Angeles NMS; 1991-2019; combined lower elevation oak and higher elevation pine/ MC territories. | Small portion of fuel reduction within 10 years after fire in 40 CSO territories; 37 territories had <5% fuels treatment whereas area burned by high-severity fire was 17% of all 40 territories. | Extinction | **Positive**- fuel reduction treatments were correlated with increased territory extinction. |
| | | | Colonization | **Neutral**- no impact on colonization. |
| | | | Reproduction | **Negative-** fuel reduction reduced reproductive output. 19 fewer young between 2006-2019 than without fuels treatments. Fuel treatments may have caused small declines in occupancy and total reproductive output but these effects were minor compared to the effects of fire on occupancy and reproduction. |
| Jones et al. (2021b) | Lassen, Eldorado, Sierra, and Sequoia-Kings Canyon demographic study areas, 275 territories, modeled forward from 2035 -2064. | Wildfire and Fuel Reduction Modeling | Occupancy (single or pair) | Negative - Treatments that converted CHAR 5D to 5M negatively affected occupancy. "it is essential that large, old trees and core nesting/roosting areas within territories be maintained (Jones et al. 2018)" There were uniform benefits to midcentury occupancy when treatments were excluded from owl territories, compared to a no-treatment scenario. Benefits were greatest for CSO when treatments occurred on >40% of treatable lands including CSO territories (including PACs), but only when treatments were designed to avoid modifying large tree/high canopy cover forest in territories and PACs. More intensive treatments in CSO territories that altered CSO habitat by reducing canopy cover further reduced CSO occupancy and it took until midcentury or later for CSO population to recover. |

Table 3. Summary of the results from studies on the effects of fire and salvage logging on spotted owl demographics.

| Study | Study Location(s), Sample Size and Unit, and Period | Disturbance Type(s) Evaluated | Parameter | Response (Effect on Parameter) |
|---|---|---|---|---|
| Bond et al. (2002) | Shasta-Trinity, Klamath, San Bernardino, Coconino, and Gila National Forests, 11 burned and >300 unburned territories, 9-16 years for unburned and 1 year post-fire for burned territories. | Wildfire | Survival | **Neutral** - No difference in survival was detected between burned and unburned territories. |
| | | | Reproduction | **Positive** - Reproductive success was higher in burned territories the year following fire than in unburned territories. |
| | | | Fidelity | **Neutral** - No difference in fidelity was detected between burned and unburned territories. |
| Jenness et al. (2004) | Coconino, Gila, Coronado, and Lincoln National Forests, 33 burned and 31 unburned territories, 1-4 years post-fire. | Wildfire and Prescribed Fire | Reproduction | **Negative** - Unburned territories tended to be occupied by pairs and more reproductive pairs than burned territories. |
| | | | Occupancy (single or pair) | **Negative** - Probability of occupancy was higher in unburned sites compared to burned sites. |
| Seamans and Gutierrez (2007) | Eldorado Demographic Study Area, 66 territories, 15 years. | High Severity Fire (including salvage), Logging | Extinction | **Negative** - Alteration of ≥50 acres of mature conifer forest was positively correlated with territory extinction probability. |
| | | | Colonization | **Negative** - Probability of colonization was related to the amount of mature conifer forest habitat in the territory and the alteration of such habitat reduced the probability of colonization. |
| Clark et al. (2011) | Southwest Oregon, 23 radio-marked birds, years 3 and 4 post-fire. | Wildfire (including salvage) | Survival | **Negative** - Average annual survival of owls living inside burn perimeters (also salvage logged) was lower than outside the burn perimeters and was lower than survival rates of spotted owls in all other areas with survival estimates at the time of the study. |
| Roberts et al. (2011) | Yosemite National Park, 16 burned and 16 unburned territories, 2-14 years post-fire. | Wildfire and Prescribed Fire | Occupancy (pair) | **Neutral** - Fire did not reduce the probability of occupancy. |
| Lee et al. (2012) | Sierra Nevada-wide, 41 burned/145 unburned territories, up to 7 years post-fire. | Wildfire (including salvage) | Extinction | **Neutral** - No significant difference between burned and unburned sites in probability of local extinction. |
| | | | Colonization | **Neutral** - No significant difference between burned and unburned sites in probability of colonization. |
| | | | Occupancy (single or pair) | **Neutral** - No significant effect of high severity fire on occupancy. |
| Clark et al. (2013) | Southwest Oregon, 31 burned/103 unburned territories, up to 15 years pre-fire and 4-5 years post-fire. | Logging, High Severity Fire, Salvage Logging | Extinction | **Negative** - Probability of extinction increased due to the interactive effect of past timber harvest, high severity fire, and salvage logging. |
| | | | Colonization | **Unclear** - Few colonization events were observed. |
| | | | Occupancy (pair) | **Negative** - Declines in occupancy were driven by increases in extinction, attributable to past timber harvest, high severity fire, and salvage logging. |
| Lee et al. (2013) | San Bernardino National Forest, 78 unburned/58 burned territories, 9 years for | High Severity Fire, Salvage | Extinction | **Negative** - Average annual extinction probability was higher in burned territories, increased as the amount of habitat that burned at high severity increased, and increased as the amount of habitat that was salvage logged increased. |
| | | | Colonization | **Negative** - Mean annual probability of colonization was lower in burned sites than unburned sites, but was not affected by salvage logging. |

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| | unburned and 8 years post-fire for burned territories. | Logging | Occupancy (single and pair) | **Negative** - When >50 ha of forested habitat burned at high severity, site occupancy probability decreased by 0.003 for every additional hectare of forested habitat severely burned and post-fire salvage logging exacerbated the effect by decreasing occupancy probability an additional 0.05. |
| Tempel et al. (2014b) | Eldorado Demographic Study Area, 70 territories, 20 years. | High-intensity Logging, Wildfire (including salvage), and Medium-intensity Logging | Reproduction | **Negative** - Medium-intensity timber harvests were negatively related to reproduction. Reproduction was sensitive to modest amounts of medium-intensity harvests. |
| | | | Survival | **Negative** - Medium-intensity logging, when implemented in high canopy cover forests, was associated with reductions in survival. |
| | | | Extinction | **Positive** - Extinction was negatively correlated with the area of high-intensity timber harvest. |
| | | | Colonization | **Negative** - Medium-intensity logging, when implemented in high canopy cover forests, were associated with reductions in colonization. |
| | | | Occupancy (single or pair) | **Negative** - Equilibrium occupancy was negatively correlated with wildfire. |
| Lee and Bond (2015a) | Stanislaus National Forest, 45 territories, 1 year post-fire. | High Severity Fire | Occupancy (single and pair) | **Neutral** - Probability of occupancy of a single individual 1 year post-fire was relatively high, compared to other studies on the species in burned or unburned forest in the Sierra Nevada, with most sites being occupied by pairs. |
| Lee and Bond (2015b) | San Bernardino National Forest, 76 unburned/52 burned, 9 years for unburned and 4-8 years post-fire for burned territories. | High Severity Fire, Salvage Logging | Reproduction | **Neutral** - No significant effect of fire or logging on reproduction were detected. |
| | | | Occupancy (single or pair) | **Negative** - Occupancy was lower in burned vs. unburned sites and was further reduced by the amount of salvage logging that occurred. |
| Tempel et al. (2016) | Lassen, Eldorado, Sierra, and Sequoia-Kings Canyon demographic study areas, 275 territories, 19 years. | Wildfire (including salvage on National Forests), Prescribed Fire, Logging | Extinction | **Positive** - On the ELD study area, logging less than 1% of a territory in the previous 3 years was negatively correlated with extinction. **Neutral** - No support for an effect of logging less than 1% of a territory in the previous 3 years was detected for the LAS or SIE study areas. **Positive** - On the SKC study area, wildfire was negatively related to extinction.<br>**Neutral** - No support for an effect of wildfire was detected on the ELD, LAS, or SIE study areas. |
| | | | Colonization | **Neutral** - No support for an effect of logging less than 1% of a territory in the previous 3 years was detected for the ELD, LAS, or SIE study areas. **Negative** - On the SKC study area, prescribed fire was negatively associated with colonization. |
| | | | Occupancy (single or pair) | **Neutral** - No support for an effect of logging when less than 1% of a territory was logged in the previous 3 years for the LAS, or SIE study areas.<br>**Positive** - On the ELD study area, logging less than 1% of a territory in the previous 3 years was positively associated with occupancy. |
| Jones et al. (2016) | Eldorado demographic study area, 15 | High Severity Fire | Extinction | **Negative** - Probability of extinction increased as the proportion of high-severity fire increased and extinction was 7 times more likely in territories that burned with >50% high severity. |
| | | | Colonization | **Negative** - Sites that burned at <50% high-severity were more likely to be colonized after the fire than unburned territories or territories that burned with <50% high severity. |
| | | | Occupancy (single or pair) | **Negative** - Probability occupancy was nine times lower for territories that burned with >50% high-severity fire effects than unburned sites. |
| Rockweit et al. (2017) | Klamath Province, 24 burned/70 unburned territories, 26 years for unburned and 4 | Wildfire | Survival | **Negative** - As the total amount of high severity and moderate severity fire effects increased, apparent survival decreased. |

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| (2017) | for unburned and 4-26 years post-fire for burned territories. | | Recruitment | **Neutral or Positive** - There was no significant difference between post-fire recruitment rates and the control group, except for owls affected by wildfire in 2008, where recruitment rates increased. |
| Jones et al. (2019) | Simulated model of fuel reduction impacts to both extreme fire behavior and CSO demography across entire Sierra Nevada. | Simulated fuel treatments on public lands without operational constraints, about 35% of entire Sierra Nevada. Total treatment extent varying by 18%, 36%, 54%, 72% and 90%. | Severe Fire Area | **Negative**- Treatments reduced predicted severe fire area by 1.6% to 30.5% from 2035-2064, depending on treatment extent, treatment location, and climate scenario. |
| | | | Regional CSO Population with HRCA and PAC treatments | **Weak Positive-** There was a benefit to treating owl territories (HRCA and PACs) rather than excluding them from fuel reduction, but this regional population benefit was modest. *****<u>FUEL TREATMENTS ALWAYS KEPT LARGE TREES</u>** over 61cm QMD and reduced existing high canopy cover to between 40-70% cover post-treatment. |
| | | | Regional CSO Population without HRCA or PAC Treatments | **Positive**- At the individual territory scale, treatments that avoided territories benefitted these territories to mid-century. These benefits grew when fuel treatments included surface and ladder fuel treatments in HRCAs and PACs, but did not reduce habitat quality. |
| Jones et al. (2020) | ENF and TNF demographic study areas including 2014 King Fire. 23 owls tracked with backpack GPS units over 3 years post-fire. | Severe Wildfire and Salvage Logging | Population-Level Habitat Selection | **Neutral-** Severe fire (>75% canopy mortality) and pyrodiversity (mix of low, moderate and high severity fire) did not explain population-level habitat use.<br>**Weakly Negative**- Effect of severe fire on foraging was negative, but confidence intervals included zero; effect of pyrodiversity was slightly positive but included zero with high degree of variability among individuals. Population-level habitat use was best explained by two factors: 1) distance to activity center and 2) avoidance of habitat with sparse cover pre-fire (<40% cc). |
| | | | Individual Habitat Selection | **Variable and Scale-Dependent-** Individual owls selected severely burned habitat only when it represented a small proportion of their home range (<5%) but avoided severely burned forest when it was more prevalent. Individual owls tended to select larger patches of severe fire when the average patch size was smaller than 115 ha. Owls selected smaller patches of severe fire when their home ranges contained larger patches severe fire. Individual response to severely burned forest varied significantly depending on individual level habitat availability (aka. functional availability of habitat). Forays into severely burned areas occurred at distances < 100 m.<br>**Salvage Logging Negative-** Owls avoided post-fire logged areas, especially in large patches. Negative response to salvage logged areas was stronger than for just patches of severely burned forest alone. |
| | | | Occupancy | **Neutral or Negative**- Individual owls continued to occupy territories where <40% of territory was burned by severe wildfire. Territories were abandoned after that threshold. |
| Schofield et al. (2020) | YNP 27 CSO territories: 12 within and 15 outside 2013 Rim Fire. 4 years of post-fire monitoring. | Wildfire | Occupancy | **Negative Beyond a Threshold-** Territories with greater than 30% severe fire were unoccupied post-fire. Maximum percent of occupied territory with high severity burn was 27%.<br>**Neutral-** mean RdNBR (quantified burn severity) did not predict post-fire CSO occupancy. The only predictor of post-fire occupancy was a high pre-fire canopy cover at territory scale (similar to PAC ie.153 ha). Change in canopy cover or NDVI did not predict post-fire occupancy (NDVI is normalized difference vegetation index derived from LANDSAT). *"Additional habitat variables [such as prey availability] may be important in mediating the consequences of high severity fire on owl persistence."* |
| | | | Nesting | **Neutral-** mean RdNBR (quantified burn severity) did not predict post-fire CSO nesting rates. CSO nested after fire in similar numbers to before even though canopy cover and NDVI were lower. CSO nests or roosts (core areas) shifted from historical sites after fire, but there was little distinction between recent territories and the surrounding landscape. |
| | ENF and TNF demographic study areas including 2014 King Fire that burned 34 out of 83 owl | | Site Persistence | **Negative-** Severe wildfire (>50% severe fire, defined as >75% canopy mortality) reduced probability of owl site persistence across all 4 spatial scales; strongest negative effect was at territory scale; odds of site persistence decreased for every 10ha increase in severely burned area.<br>**Positive or Neutral-** a mosaic of burn intensity (<50% severe fire aka. pyrodiversity) increased probability of site persistence at 2 finer spatial scales, but had no effect on owl site persistence at 2 largest spatial scales.<br>**Salvage Logging Neutral-** no effect of salvage logging on site persistence across all 4 |

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| Jones et al. (2021) | [illegible] sites. 6 ys post-fire monitoring at 4 spatial scales (nest 300m/ PAC 700m/ territory 1100m/ home range 1500m). | Wildfire and Salvage Logging | Colonization | **Negative-** Extensive severe fire reduced the probability of site colonization at all 4 spatial sales; strongest negative effect was at territory scale; odds of site colonization decreased as severely burned area increased. **Mixed-Severity Fire Neutral-** no effect on site colonization regardless of scale |
| | | | Occupancy | **Negative-** Occupancy dropped sharply in the year after severe fire and then dropped again to near zero for next 5 years of study at home range scale. **Neutral**- sites that burned less severely had slight decrease in colonization probability the first year then stable for the next 5 years following burn. **Neutral**- site occupancy of unburned sites remained stable or slightly increased compared to 25-year pre-fire decline in occupancy in demography study. |
| Wood et al. (2021c) | Statistical power analysis of remote monitoring as a tool to detect hypothetical population impacts from simulated wildfire events using 72 remote monitoring scenarios. | Remote Monitoring After Wildfire Event | Ability to Detect an Effect of Fire on Occupancy (hypothetical species) | **Positive**-Statistical power to not underestimate the effect of a megafire on site occupancy was fairly high overall. **Negative**- statistical power to accurately identify the correct population response was low. Power to correctly estimate site occupancy was also low. |
| | | | Ability to Detect Effect of Fire on BBWP and CSO Populations | **Positive**- Case-study simulations based on existing ARU (autonomous recording unit) monitoring in the Sierra Nevada indicate that there are enough sampling stations to accurately detect an impact of wildfire on populations of CSO or BBWP. **Negative-** Existing ARUs are inadequate to describe any nuance in population level impacts or accurately detect trends in site occupancy for CSO or BBWP. |
| Tempel et al. (2022) | Southern CSO population on San Bernadino and Angeles NFs; 1991-2019 | High severity fire burned 17% of 40 CSO territories combined. | Occupancy (single or pair) | **Negative-** High severity fire accounted for 9.6% decline in long term occupancy. Additional causes of decline should be investigated. Low to moderate severity fire impacts were drawn from a small sample size (6 territories), so caution should be taken in interpreting the results, however low to moderate severity fire had an unexpected negative impact on initial probability of occupancy. This may be related to prey availability if dusky footed woodrat in this study were impacted they way desert woodrat were by fire in southern CA woodlands in another study. |
| | | | Colonization | **Negative-** As area burned by severe fire approached 40%, territory occupancy was reduced to zero. |
| | | | Reproduction | **Low-moderate Severity Fire Negative-** 141 fewer young in territories that experienced low to moderate severity fire in past 10 years. This data was from a small sample size of 6 territories. |

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**Recent California Spotted Owl Foraging Studies 1-23-2022**

**Blakey, R.V., R.B. Siegel, E.B. Webb, C.P. Dillingham, R.L Bauer, M. Johnson, and D.C. Kesler. 2019. Space use, forays, and habitat selection by California spotted owls (*Strix occidentalis occidentalis*) during the breeding season: New insights from high resolution GPS tracking.**

Sample Size and Methods: Tracked 8 female and 7 male spotted owls with GPS in 2015-2017 on the Mount Hough Ranger District of the Plumas National Forest.

Results: Owls selected for >70% canopy cover in areas dominated by medium and large trees for foraging and against low and very low canopy cover dominated by small trees or open areas. There was low overlap between PACs and roost locations (<50%) and foraging space (<25%), including <5% foraging and roost locations being contained within the PAC for some owls.

Notes: Good quote from discussion (p. 920) "Based on the relatively low overlap between PAC areas and roosting and foraging habitat use by the owls we studied, we hypothesize that insufficient habitat protection from stand-altering activities outside PAC areas could partially explain ongoing population declines. Most of the habitat used by owls for roosting and foraging in our study was outside of PACs and therefore available for stand-altering forestry activities. Even where PACs protect nesting stand conditions conducive to successful reproduction, stand-altering activities elsewhere in owl home ranges may reduce occupancy or reproductive success."

**Bond, M.L., D.E. Lee, R.B. Siegel, J.P. Ward. 2009. Habitat use and selection by California spotted owls in a postfire landscape. Journal of Wildlife Management DOI: 10.2193/2008-248.**

Sample Size and Methods: Greenhorn Mountains and Kern Plateau. Sequoia National Forest. 2002 McNally Fire footprint. Radio telemetry of foraging habitat selection for 3 male and 4 female CSO from 4 territories during the 2006 breeding season.

Results: The vast majority of roosts were in unburned and low severity patches, but 15% of the roosts did occur in moderate and one roost may have been in high severity. "Probability that any of these 7 owls would use a site for foraging was greatest when the site was burned and was located within approximately 1 km of a nest or roost center (Fig. 1). For 5 of 7 owls, strongest selection for foraging areas was in high-severity burned forest within 1.5 km from the center of their foraging ranges. Although selection of burned forest for foraging was strong, high standard errors indicate selection was variable among owls."

Notes: Based on maps provided by Monica, salvage did occur in the area, especially near the center of one of the territories. From an eyeball analysis, several birds appear to be foraging along the perimeters of salvaged areas.

Statistical analysis used a sample size of 7, but there are potential issues with pseudo replication, since spotted owls are central place foragers, the 3 males shared territories with the females and CSO do not forage independently.

**Eyes, S.A., S.L. Roberts, and M.D. Johnson. 2017. California spotted owl (*Strix occidentalis occidentalis*) habitat use patterns in a burned landscape. The Condor DOI: 10.1650/CONDOR-16-184.1**

Sample Size and Methods: Used radio telemetry to study foraging locations of 13 spotted owls with territories that overlapped burned areas in Yosemite National Park.

Results: The average area that was unburned or unchanged in all spotted owl home ranges was 53 percent, while 25 percent burned at low, 16 percent at moderate, and 4 percent at high severity. The proportion of the home range in each fire severity category declined with increasing severity, and the average size of patches used more than once by owls varied depending on fire severity, with the largest used patches burned at low to moderate severities." "The odds of owls using the high contrast edge type were 2.78 times greater than odds for the low contrast edge type and 3.5 times greater than for the no edge type."

Notes: Not included in the analysis, large portions of the study area had burned in other wildfires within the past 30 years. In effect, the results are of an area that has repeatedly burned.

**Gallagher, C.V., J.J. Keane, P.A. Shaklee, H. Anu Kramer, and R. Gerrard. 2019. Spotted owl foraging patters following fuels treatments, Sierra Nevada, California. Journal of Wildlife Management 83(2):487-501. DOI: 10.1002/jwmg.21586.**

Sample Size and Methods: Used GPS and LiDAR to study 10 spotted owls (6 females, 4 males) in the Meadow Valley project area on the Plumas National Forest from 2007 to 2008.

Results: "The top model for owl foraging locations in a post-treatment landscape included negative correlations with mechanical thin, high (>70%) canopy cover in the 32-m height strata, proportion of gaps, and distance to the owl's site center, and a marginally positive correlation with slope." "Owl foraging locations contained greater proportions of high (>70%) overall canopy cover than random locations." "probability of use for owl foraging was negatively related to the proportion of gaps (canopy height <2 m) in the ellipse, and edge was not a component in competitive models."

Notes: Gaps were defined as any area >2-m x 2-m (~36 $ft^2$) with maximum canopy height <2 meters. Such a small gap size may not be biologically meaningful and the high number of small gaps may be swamp the ability to detect selection of larger gaps.

**Hobart, B.K., Kramer, H.A., Jones, G.M., Dotters, B.P., Whitmore, S.A., Keane, J.J. and Peery, M.Z. 2021. Stable isotopes reveal unexpected relationships between fire history and the diet of Spotted Owls. Ibis 163(1):253-259.**

Sample Size and Methods: YNP, SEKI NPs- 2-year diet study with 41 owls in 31 territories, used pellets and feather isotope analyses; fire history examined in 5, 10, 20 and 33- year increments.

Results: Wildfire history is positively correlated with proportional flying squirrel consumption. Woodrats and gophers were dominant prey in study overall, but as owl territories experienced more wildfire, the proportion of woodrats and gophers in owl diets decreased. This is an unexpected result.

Notes: Several mechanisms for an increase in flying squirrel consumption following wildfire are discussed including greater availability of flying squirrel food (hypogeous fungi), a reduction in woodrat and gopher hiding and nesting habitats, and influx of flying squirrels from adjacent severely burnt forest. CSO with flying squirrel diets are associated with fire suppression regimes, decreased fitness and decreased demographic benefits in other studies on USFS lands. Authors wonder if fire heterogeneity in this study may increase biomass of prey overall, thus increasing fitness. Fire history on NPS lands is closer to NRV than USFS lands.

**Irwin, L.L., D.F. Rock, S.C. Rock, C. Loehle and P. Van Deusen. 2015. Forest ecosystem restoration: initial response of spotted owls to partial harvesting. Forest Ecology and Management 354:232-242.**

Sample Size and Methods: Used radio telemetry to study foraging habitat selection of 16 northern and 3 California spotted owls 2 years before and 2 years after logging (primarily seed-tree and shelterwood harvest methods) on 5 study sites in the Klamath in western Oregon and California and the southern Cascades in Oregon and California. Study sites were a mixture of federal, private, and state lands, with the only California spotted owl study site having been composed almost entirely of private timberlands.

Results: Radio-tagged owls selected against stands scheduled for harvest and selected recently harvested stands in proportion to availability. Nearly 50% of the harvested units were not found to be used before or after harvest. They also found weak evidence for a positive effect of retained basal area of trees over 26 inches dbh and strong evidence for a quadratic effect of basal area of mid-story conifers. The authors did not observe site abandonment during the study.

Notes: The authors did not include any variables associated with the forest structure of stands scheduled for treatment in their models.

**Jones, G.M. and Tingley, M.W. 2021. Pyrodiversity and biodiversity: a history, synthesis, and outlook. Diversity and Distributions March 2021.**

Sample Size and Methods: Literature review of pyrodiversity and biodiversity: 33 studies with discussion of CSO and BBWP.

Results: A total of 18 (44%) studies presented evidence that pyrodiversity increases biodiversity, 23 studies (56%) did not find a relationship. Influencing factors were mechanism (investigating 1 fire vs. fire history across landscape), evolutionary history (ie. tropical temperate or boreal forests) and scale (geographic and temporal). CSO were expected to avoid pyrodiversity because of their association with old forest, but CSO were instead found to forage in severe fire if patches were small relative to their territory (Jones et al. 2020 and Kramer et al. 2021). Surprisingly, these two studies describe opposite CSO responses to pyrodiversity. *"Relative importance of pyrodiversity in creating owl foraging habitat may depend on the existing degree of surrounding landscape heterogeneity in forest structure."* (p.10).
BBWP were also expected to avoid pyrodiversity because of their affinity to recent severely burned forest; yet, BBWP were not found in several recent megafires as expected. Rather they nested in areas with higher heterogeneity in burn severity perhaps because, as other studies have shown, juvenile survival is low (due to predation) in large high severity burns without nearby cover in green forest.

Notes: Authors identify six research gaps and suggest forest pyrodiversity brings a “boon of resources” adjacent to areas with more protection and cover, thus facilitating patch diversity and intermediate disturbance regimes that are hypothesized to support greater biodiversity.

**Kramer, A., Jones, G.M., Whitmore, S.A., Keane, J.J., Atuo, F.A., Dotters, B.P., Sawyer, S.C., Stock, S.L., Gutiérrez, R.J. and Peery, M.Z. 2021a. California spotted owl habitat selection in a fire-managed landscape suggests conservation benefit of restoring historical fire regimes. Forest Ecology and Management (479):118576.**

Sample Size and Methods: YNP (13 owls), SEKI NPs (9 owls), foraging habitat selection of 22 GPS tagged spotted owls (18 male, 4 female) during 2018 breeding season. Recent fires occurred 2002-2017.

Results: Spotted owls avoided foraging in larger patches of severely burned forest. Median size of severe fire burn in this study was relatively small at 18 ha. Largest severe fire patch was 225 ha. (in comparison King Fire severe burn patches were sometimes 8,000 ha). Nevertheless, odds of CSO selection for severe fire decreased by 20% with every 10 ha increase in severe fire patch size. Maximum permeation distance into severe fire patches was 169 m. Selection for lower-severity recent fires increased as this type of burned area became more abundant within home ranges (indicating a functional response to habitat availability); although owls showed neutral selection for lower severity burns overall without considering availability of this habitat in individual home ranges. Owls showed weakly negative selection against pyrodiversity as they slightly select against areas that were only composed of low severity or unburned areas. This result is the opposite of the King Fire and Jones et al. (2020) who found a stronger selection against pyrodiversity was explained by an avoidance of large areas of severe fire. Owls showed no preference for areas that burned between 1953-2002. Owls selected for forests dominated by large and medium trees (>40% cc and QMD >25 cm) and avoided areas with small trees (<40% cc and QMD <25 cm).

Notes: Authors conclude that owls are resilient and likely adapted to a patchwork of fire effects that characterize frequent-fire regimes on NPS lands (primarily low- and moderate-severity intermixed with small-high severity patches). These three National Parks have been managed for use-fire for approximately the past 50 years and are closer to NRV compared to USFS lands managed with fire-suppression.

**Kramer, H.A., Jones, G.M., Kane, V.R., Bartl-Geller, B., Kane, J.T., Whitmore, S.A., Berigan, W.J., Dotters, B.P., Roberts, K.N., Sawyer, S.C. and Keane, J.J. 2021b. Elevational gradients strongly mediate habitat selection patterns in a nocturnal predator. Ecosphere 12(5):e03500.**

Sample Size and Methods: TNF and interspersed private lands, foraging study with 16-18 GPS tagged CSO at between 500 m to 1800 m elevation. LiDAR-derived tree metrics taken with deciduous leaves still on trees was later corrected for.

Results: Owls at lower elevations were more likely to forage in areas with 10% more short stand area (young trees, LiDAR tallest trees 2 to 20 m). Owls at lower elevations selected for homogeneous stands with shorter trees, near ridges, and southwest aspect. Owls at higher elevation were more likely to select interior areas of forest stands with medium and tall trees (older trees, LiDAR tallest trees 20 to >32m). Owls at higher elevation selected stands with higher seral stage diversity overall, further away from hard edges, with less ridge and less southwest aspect.

Notes: Differences in foraging habitat selection were strongly associated with elevation and likely correspond to CSO prey availability. Flying squirrels occur in higher elevation closed canopy forests, and woodrats in lower elevation forests with masting black oak.

**Lee, D.E., 2020. Spotted owls and forest fire: Reply. Ecosphere 11(12):e03310.**

Sample Size and Methods: Reply to critique of Lee et al. 2018 meta-analysis of fire effects on spotted owl in Jones et al. 2020.

Results: Lee re-analyzed part of his 2018 meta-analysis in response to critiques from Jones et al. 2020 including: 1) statistical threshold for significance (p=0.05 vs. p<0.05), 2) post-fire logging compounding severe fire effects, 3) data duplication, and 4) separation of results by subspecies (CSO vs. MSO). His second analysis per these suggestions did not lead to different results than Lee et al. 2018. Both Lee et al. 2018 and Jones et al. 2020 agree spotted owl responses to recent mixed severity fires are variable and that severe fire can pose negative consequences for CSO; There is disagreement between these authors about how to characterize recent megafires and magnitude of consequences megafires pose for CSO populations.

Notes:
Lee suggests that land managers emphasize fire management in human communities rather than owl communities because of limited resources for fuel reduction treatments.

**Reid, D.S., Wood, C.M., Whitmore, S.A., Berigan, W.J., Keane, J.J., Sawyer, S.C., Shaklee, P.A., Kramer, H.A., Kelly, K.G., Reiss, A. and Kryshak, N. 2021. Noisy neighbors and reticent residents: Distinguishing resident from non-resident individuals to improve passive acoustic monitoring. Global Ecology and Conservation (28):e01710.**

Sample Size and Methods: Testing spotted owl acoustic monitoring programs in the Lassen demographic study area where occupancy is well known. Comparing passive acoustic monitoring (PAM) during 2018-2019 and GPS-tagged/acoustic monitoring from 2019-2020 with known results from the mark-recapture demographic study. Acoustic/GPS monitoring collected acoustic and location data from 17 owls for < one week. PAM arrays recorded sounds for four months.

Results: PAM was effective in detecting all known resident owls, and the array was able to avoid double counting the same owls; yet, false positive error rates were high (false positive error rate of 0.39). PAM over estimated the number of resident owls, whereas active nighttime CSO surveys identified floater individuals at six sites during that same time period. This suggests the overestimate by PAM was not from double counting but from the inability to distinguish between resident and floaters. An experienced CSO survey crew could make this distinction.

Notes: Adjusting diurnal and seasonal timing of PAM may help with false positive errors.

**Williams, P.J., R.J. Gutiérrez, and S.A. Whitmore. 2011. Home range and habitat selection of spotted owls in the central Sierra Nevada. Journal of Wildlife Management 75:333-343.**

Sample Size and Methods: Used radio telemetry to study foraging in 14 spotted owl territories in the Eldorado Study Area in the central Sierra Nevada in 2006.

Results: Home-range size variation was most correlated with the number of patches of distinct vegetation classes within home ranges (i.e., habitat heterogeneity), with home-range size increasing as heterogeneity increased. Although owls selected mature forests with medium and high canopy cover most often relative to their availability, there was sparse distribution of large stands of mature forests outside of PACs.

Notes: None of the pairs successfully reproduced during the study, so it cannot be suggested that such foraging selection represents high quality foraging habitat.

**Williams, P.J., S.A. Whitmore, and R.J. Gutierrez. 2014. Use of private lands for foraging by California spotted owls in the central Sierra Nevada. Wildlife Society Bulletin 38:705-709.**

Sample Size and Methods: Primarily industrial private timber lands, for foraging by 14 radio marked spotted owls in the central Sierra Nevada in 2006.
Results: Spotted owls were more likely to select public land than private land for foraging.

Notes: The authors conclude that privately owned land is not equivalent to publicly owned land as a contributor to spotted owl conservation in the central Sierra Nevada.

**Wood, C.M., Zulla, C., Whitmore, S., Reid, D., Kramer, H.A., Keane, J.J., Sawyer, S.C., Roberts, K.N., Dotters, B.P., Klinck, H. and Berigan, W. 2021a. Illuminating the nocturnal habits of owls with emerging tagging technologies. Wildlife Society Bulletin 45(1):138-143.**

Sample Size and Methods: Central Sierra CSO diet study: 5 nesting CSO males with tail feather GPS tags for 4-12 days and infrared cameras focused on their nests. Acoustic study: 8 CSO with tail feather GPS tags for 3-5 days.

Results: CSO consumed 21 woodrats, 10 flying squirrels, 2 voles, 2 mice and 1 gopher. Non-nesting owls, especially males, produced more territorial vocalizations and were more likely to give calls throughout their home range. Nesting spotted owls produced mostly non-territorial contact calls from their nest areas.

Notes: Further study should investigate influence of habitat type on prey capture success.

## BARRED OWL RESEARCH IN SIERRA NEVADA

**Hofstadter, D.F., Kryshak, N.F., Wood, C.M., Dotters, B.P., Roberts, K.N., Kelly, K.G., Keane, J.J., Sawyer, S.C., Shaklee, P.A., Kramer, H.A. and R. J. Gutiérrez. 2022. Arresting the spread** of **invasive species in continental systems. Frontiers in Ecology and the Environment**

**https://doi.org/10.1002/fee.2458**

Sample Size and Methods: From 2018 to 2020, 76 owls were removed (63 BAOW and 13 hybrids). Most of these removals (69) occurred in the northern Sierra Nevada, 10 in central Sierra and one in southern Sierra.

267 PAM sites [regional multispecies passive acoustic monitoring program (PAM) using autonomous recording units (ARUs)] in Northern Sierra Nevada were surveyed 1-year pre- and 1-year post-removal.

Results: Early eradication was a success. 56% recolonization rate by CSO once BAOW removed. Of 27 former CSO territories invaded by BAOW, 15 sites had CSO back again within 1 year of BAOW removal.

BAOW site occupancy was reduced by a factor of six from 0.1 to 0.03. In 2018, there were 45 of 246 PAM sites with BAOW detections; after removal in 2020 there were 7 of 267 sites with BAOW.

These results are in contrast to NSO range where hundreds of BAOW removals were necessary to see even modest recolonization by NSO.

Notes: BAOW have narrow entry to SN from Klamath/ Cascade area across Pitt River. This makes SN like an island surrounded by non-habitat, aiding the effort to control invasion. Regional surveillance (PAM) was a strength. Private partnership also a strength. 'Forever management' is a possibility to manage BAOW invasion in Sierra Nevada. SPI was given assurances and 'flexibility' under ESA for their participation.

**Hofstadter, D., Kryshak, N., Gabriel, M., Wood, C., Wengert, G., Dotters, B., Roberts, K., Fountain, E., Kelly, K., Keane, J. and Whitmore, S. 2021. High rates of anticoagulant rodenticide exposure in California Barred Owls are associated with the wildland–urban interface. *Ornithological Applications 24(123):1-13*.**

Sample Size and Methods: Toxicology on livers of 115 Barred Owls (BO) and 12 hybrid (Northern or California Spotted Owl cross with BO) collected from the Sierra Nevada (Plumas and Lassen) and Klamath areas. Authors also collected 7 ovaries of female BO.

Results: BO in proximity of WUI were more likely to be exposed to AR. A total of 62% of BO and hybrids had anticoagulant rodenticide in liver; most were trace amounts, but 9 BO had significant amounts of AR that caused internal hemorrhaging in NSO and Golden Eagle in other studies. This is first reported potential AR exposure for California Spotted Owl.

Notes: Although most samples contained trace rodenticide, results could indicate dangerous and widespread exposure to AR in BO and CSO. Owls exposed to higher amounts of AR may not have shown up in study because they could be dead and unavailable for collection. CSO eat more rodents than BO, thus increasing potential of exposure for CSO. These results point to widespread exposure of forest raptors to AR banned in the state in 2014 except for licensed applicators. Could be AR is from illegal cannabis grows, or from illegal home use. WUI link points to illegal home use, but half-life of AR is long, so birds could move around after exposure.

**Wood, C.M., Gutiérrez, R.J., Keane, J.J. and Peery, M.Z. 2020. Early detection of rapid Barred Owl population growth within the range of the California Spotted Owl advises the Precautionary Principle. The Condor 122(1):duz058.**

Sample Size and Methods: LNF and PNF autonomous recording units (ARU) from 167 sites in 2017 and 346 sites in 2018; GPS tail feather tags on 10 Barred Owls (BO).

Results: Barred Owls (BO) were detected in 12% of sites in 2017 and 21% of sites in 2018 representing a 2.6-fold increase in BO site occupancy between 2017-2018 in core CSO range. Old forest cover (cc >40% and QMD >61cm) favored BO occupancy and colonization of CSO habitat. Medium forest cover (canopy cover >40% and QMD 31-61 cm) favored CSO occupancy (indicating CSO may be pushed out of high suitability habitat by BO, as happened with NSO in PNW). Sites with steeper slopes had reduced probability of BO invasion. Mean BO home range in Sierra Nevada was 2,004 ha, mean territory size was 411 ha.

Notes: Rapid replacement of Northern Spotted Owl by BO was density-dependent and the Sierra Nevada may be experiencing the beginning stages of invasion before rapid colonization. The BO invaded Pacific Northwest 60 ys. ago, but rapid colonization only happened 20 ys. ago after BO population built up for 40 ys.

**Wood, C.M., Kryshak, N., Gustafson, M., Hofstadter, D.F., Hobart, B.K., Whitmore, S.A., Dotters, B.P., Roberts, K.N., Keane, J.J., Sawyer, S.C. and Gutiérrez, R.J., 2021b. Density dependence influences competition and hybridization at an invasion front. Diversity and Distributions 27(5):901-912.**

Sample Size and Methods: LNF and PNF autonomous recording units (ARU) from 167 sites in 2017 and 346 sites in 2018; GPS tail feather tags on 11 CSO and 10 Barred Owl (BO); feather isotopes (to determine diet) from 29 CSO and 34 BO in 2016 and 2019.

Results: BO and CSO site occupancy were negatively related to open forest cover (canopy cover <40%). Overlap in foraging habitat selection is high, with both species selecting young forest for foraging (> 40% cc and QMD < 31cm) perhaps because primary prey (woodrat and pocket gopher) are associated with this habitat. BO diet overlapped entirely with CSO diet (99%); CSO diet overlapped with BO by 52%. A total of 38 barred or hybrid owls were detected. Amount of hybrids (10) was 36% number of BO (28).

Notes: BO/CSO niche overlap for landscape-scale habitat selection is less than in Pacific Northwest because the Sierra Nevada is at the beginning of an invasion before rapid colonization. See Wood et al. (2020) for additional BO site occupancy patterns in Sierra Nevada. Diet overlap is also less than in the PNW diets where more advanced colonization is underway. Hybridization was observed at beginning of invasion because the phenomenon is density dependent and likely due to lack of conspecific mates. Hybridization is now rare in PNW where BO density is much higher and direct competition between NSO and BO displaces NSO to lower quality habitat.