Appendix E: Science Consistency Review Report

Part 1

Forest Service response to: The Science Consistency Review Report – September 29, 2003

Review of: Draft Supplemental Environmental Impact Statement, Sierra Nevada Forest Plan Amendment

Introduction

On October 2, 2003, the Pacific Southwest Research delivered a Science Consistency Review (SCR) report concerning the Draft Supplemental Environmental Impact Statement (DSEIS, June 2, 2003) for the Sierra Nevada Forest Plan Amendment (SNFPA), as requested by the Regional Forester. Overall, review team members judged the DSEIS to be generally consistent with available scientific information. There are some exceptions related to 1) completeness and documentation of bibliographic citations in the DSEIS, 2) sufficient detail in the discussion of monitoring plans, and 3) concern that the overall DSEIS in general, and the section that presented the standards and guidelines in particular, was sufficiently confusing so as to not allow a reviewer to clearly understand their intent.

Significant improvements were made in the FSEIS based on the SCR report and discussions with the Consistency Review Team. The review team's findings and the Forest Service's response are summarized in this appendix.

Background

On July 30–31, 2003, a team of 11 scientists was convened by the Pacific Southwest Research Station in Davis, CA. Its task was to evaluate the science consistency of material contained within the DSEIS and incorporated documents - i.e., the Review Team Recommendation Report and the SNFPA Final Environmental Impact Statement (FEIS) from January 2001. The team had expertise in three subject matter areas relevant to the DSEIS: fire and fuels management, forest ecology, and species viability. Following this face-to-face meeting, team members further reviewed pertinent portions of the DSEIS and provided individual comments to the review administrators, Dr. James M. Guldin from the Southern Research Station, Hot Springs, AR; and Dr. Peter A. Stine from the Sierra Nevada Research Center, Pacific Southwest Research Station.

A process for the conduct of science consistency reviews (Guldin and others, in press) guided the team's work. Team members were given copies of the DSEIS prior to the SCR meeting. At the meeting, discussions were held among the team, the technical experts and designated representatives of the Pacific Southwest Region responsible for the DSEIS, and the review administrators. The review was guided by the standardized set of science consistency evaluation criteria (Guldin and others, in press):

1. Has applicable and available scientific information been considered?
2. Is the scientific information interpreted reasonably and accurately?
3. Are the uncertainties associated with the scientific information acknowledged and documented?
4. Have the relevant management consequences, including risks and uncertainties, been identified and documented?

The scope of the initial review was limited to the DSEIS (June 2, 2003). Most reviewers were familiar with the antecedent Final Environmental Impact Statement (FEIS) for the Sierra Nevada Forest Plan (SNFP) and the FEIS was available as a reference, as needed. However, review of that document was not part of this review. A Science Consistency review of the 2001 FEIS was conducted by a team of scientists (including six members of this current team) and their comments were included in a report dated December, 2000.

Individual comments received from the 11 scientists are included in the appendix of the report. The main body of the report attempts to synthesize the comments into the categories that the team agreed captured the key scientific issues that needed attention in this review. An introductory section summarizes the main points made by the team and the review administrators over the course of the team's work.

The review team developed a number of elements for consideration at two comment levels—general comments and specific subject matter comments. Under the specific elements to review, four categories emerged and were used to structure the science consistency review:

1. fire and fuels management
2. forest ecosystem management
3. species viability
4. synthesis issues

Forest Service response to comments

General Comments on the DSEIS

Review Comment: The bibliographic citation comment captures two sets of concerns. The first is a linkage issue with the original SNFP FEIS. That document contains a bibliography, and technical experts charged with preparing the DSEIS undoubtedly referred to that original FEIS bibliography. As a result, the citations included in the DSEIS do not stand alone; in some cases it was very difficult to determine whether or not the relevant information was used because references cited in the FEIS were not carried forward and cited in the DSEIS and many citations of unpublished material were not traceable to a source or a person. The review team collectively agreed that it would be better to include a bibliography in the DSEIS in which all publications cited in the text can be listed, regardless of whether they had been cited in the 2001 FEIS. The second issue is one of omission, in that some references cited in the text of the DSEIS citations were published after the release of the EIS, and thus neither the EIS nor DSEIS included them in the bibliography. In the attached SCR tables, reviewers listed a number of citations for consideration by the technical experts. If both of these concerns are met in a revision of the DSEIS or the Final SEIS, the bibliography of the DSEIS would stand alone; reviewers thought his would be a positive outcome.

FS Response: The concept behind a supplemental EIS is not to repeat what is in the FEIS, but rather bring forward only what is new. References are cited in the DSEIS as necessary to support new information considered in the supplement without revisiting the extensive references in the FEIS.

We thank the Consistency Review Team for pointing out many new references that may be pertinent to the SEIS. The interdisciplinary team (IDT) has reviewed these papers and incorporated many of these into the FSEIS. Some other references are peripheral to evaluating the effects of the alternatives and will not be addressed specifically.

Review Comment: It was generally agreed that the DSEIS was difficult to read, and especially to interpret with respect to the standards and guides tables. Several reviewers offered specific examples of instances where it was difficult to interpret what was denoted or connoted in the entries in the standards and guides tables, and some opined that it was difficult to determine whether consistency with available science was able to be evaluated because the standards and guides tables were difficult to interpret and to crosslink. At the very least, reviewers suggested that the tables somehow denote when a blank cell carries meaning, and when it does not.

FS Response: The Standards and Guidelines are being revised for better clarity, as our other information displays in the FSEIS.

1. **Elements related to fire and fuels management.** The first specific set of elements reviewed by the team fell under the topic of fire and fuels management (noted as Element A). Concerns were raised during the SCR team meeting about six major issues related to fire and fuels management; 1) fire effects and ecology, 2) the use of SPLATs as a viable fuels management approach, 3) treatment of fuels, 4) air quality issues, 5) the use of prescribed fire for purposes of restoration of fire regimes, and 6) the use of fire surrogate treatments. Table 1 lists these elements according to the review criteria.

Key findings of the review team fall in a number of cells of the review matrix. First, there was no element in the entire science consistency review in which more reviewers found opportunity to comment than in A1, the fire effects and ecology element, in light of the first review criterion querying whether available science information had been considered. Several reviewers added specific instances of sources for additional consideration and incorporation that, in their respective opinions, would strengthen the overall DSEIS.

Review Comment: Fire effects in Sierra Nevada forests are significantly complex and merit thorough discussion of the available scientific evidence. The DSEIS is not clear on how the intended objective of restoring natural fire regimes to the Sierra Nevada will be accomplished. The linkage between fuels treatments and anticipated changes in forest function and structure leading to restoration of natural fire regimes needs detail and clarity. Uncertainty in outcomes needs to be described and subsequent management implications should be revealed.

FS Response: The Final SEIS Ch 2.1.1.a discusses Alternatives S1 and S2 sharing overarching goals for fire and fuels management that includes meeting ecological goals for re-introducing fire. Strategically placed area treatments are first designed to change landscape wildland fire behavior. Over time the goal of the treatments shifts toward restoring fire regimes and condition class across the landscape. The Final SEIS, Fire and Fuels, Ch 4.2.4 Sec B discusses the effectiveness of treatments in modifying fire behavior across the landscape which then facilitates the reestablishment of fire as a process. The use of fire as the follow-up/maintenance treatment is intended to provide for the process restoration in the treated areas.

Review Comment: The literature on strategically placed area treatments was generally viewed favorably, with only one reviewer offering a suggestion for additional literature review. On the other hand, several reviewers suggested that the uncertainty criterion fell short of consistency, largely through comments that suggested that the risks associated with that uncertainty were difficult to understand or poorly documented. Strategically placed area treatments are a theoretical concept that requires field testing to confirm the efficacy of the concept. How will the uncertainty surrounding the outcome of this management strategy be addressed? This should be discussed. Other questions about fuels treatment were tied to questions of management implications or proposed response to perceived risks and uncertainty.

FS Response: The FSEIS includes references and the points made in the report. In addition, there is substantially more information about uncertainty in the FSEIS. The SNFPA FEIS Section 1.2.4 has several discussions about a range of fuels treatment strategies. SNFPA FEIS Volume 1, Chapter 2-page 11, emphasizes the use of varying combinations of these strategies. SNFPA FEIS Volume 1, Chapter 2-page 14 includes discussions about combinations of treatments based on local manager's evaluations of the landscape and determinations of the best combinations of treatments to achieve the desired landscape fire behavior. This discussion is carried into the current SNFPA ROD on pages A-11 to A-13.

Review Comment: No elements in the overall review were as conflicting as those provided under elements A4-A6, in which the review team provided conflicting advice about whether the element was consistent with science. The DSEIS needs to more effectively present the overall fuels management strategy that includes how and when surface and ground fuels will be addressed. There is much discussion about treatment of the ladder and crown fuels through a more aggressive thinning from below strategy but little discussion about how treatments intend to address the surface and ground fuels. The roles of different kinds of fuels and their relative proportion or contribution to the fuels hazard should be more thoroughly discussed. Considering the importance of fuels treatments in this DSEIS, this topic deserves further discussion and clarification.

Related to the above issue is the implication within the proposed management direction that mechanical thinning has ecological equivalence to the physical and ecological effects of fire. Despite the practice of broadcast burning and/or pile burning of slash after mechanical treatments, there is still some important scientific uncertainty around the ecological differences of mechanical thinning and prescribed burning. The DSEIS does not do a thorough job of addressing or acknowledging this issue. There is a large research program that has been underway for several years in a number of locations throughout the United States that specifically attempts to address this issue. Although results are just now beginning to be produced, the SEIS should acknowledge what is known on this topic and discuss the implications of uncertainty.

FS Response: The Final SEIS, Fire and Fuels, Ch 4.2.4 B discusses the need for maintenance and the current assumptions about the types of treatments and the acres likely to be treated. See Table 4.2.4b. The Final has a discussion about the program uncertainties in section Ch 4.2.4. Mechanical entries are intended to set the stage for follow-up reintroduction of fire into the ecosystem under a management regime that is financially operational and that provides relative safety to people, improvements and natural resources.

The Forest Service is participating in a multi-agency nation-wide Fire-Fire Surrogate (FFS) study (www.fs.fed.us/ffs/) designed to fill the voids in our knowledge. Although silvicultural treatments can mimic the effects of fire on structural patterns of woody vegetation, virtually no comparative data exist on how these treatments mimic ecological functions of fire. Thus while silvicultural treatments can create patterns of woody vegetation that appear similar to those that fire would create, the consequences for nutrient cycling, seed scarification, plant diversity, disease and insect abundance, and wildlife are mostly unknown. Similarly, although combining managed fire with silvicultural treatments adds the critical effects of combustion, we know little about ecological effects, economics, and fire hazard reduction of these methods.

These studies have only recently been installed and no results have yet been analyzed. As these results become available, they will be considered in site specific planning and incorporated into the adaptive management framework.

Review Comment: We are also concerned about how the proposed fuels strategy is going to contend with the smoke issues. Given the need to ultimately treat so many acres with prescribed fire, even if not until second entries into stands in many cases, how will this be reconciled with smoke budget and burn day limitations? This is not an easy issue but the success of the overall fuels management strategy will require solutions to this quandary. There is some research and literature on the topics of smoke produced from

wildfires, prescribed fires, and how a smoke budget may relate to a successful fuels management strategy that employs some combination of both mechanical thinning as well as prescribed fire. This available science on these topics needs to be more thoroughly revealed.

FS Response: Fuel treatments will include both prescribed burning and mechanical treatment. Alternative S2 reduces the reliance on prescribed burning as an initial treatment. This should result in less material consumed in any subsequent burns in those areas. The Forest Service is committed to work with the California Air Resource Board and local Air Districts to insure that programs are designed to insure compliance with air quality requirements and that will meet objectives in this SEIS.

2. **Elements related to forest ecosystem management.** The second area reviewed by the SCR team scrutinized elements related to forest ecosystem management (Table 2), noted as Element B. Most of the reviewers' specific comments related to element B1, the most numerous of which raised questions about whether the appropriate citations were included and whether the consequences of risk and uncertainty were appropriately established. There are still shortcomings with the articulation of pre-settlement or historic forest conditions and how this provides guidance for future management direction. Vague descriptions of desired future conditions of forests leave many questions for what managers should be attempting to accomplish.

Review Comment: A clear and scientifically defensible discussion of desired forest conditions (e.g. function, structure, composition, resiliency, etc.) that incorporates natural disturbance factors that play important and unavoidable roles in the Sierra Nevada forest ecosystems, should be presented as a preface to the proposed management strategy. Subsequently, the management strategy should be described in a manner that demonstrates how it can lead towards these conditions. Further discussions of desired forest conditions are included in the Final SEIS.

FS Response: Establishing strategically placed area treatments, using the flexibility provided with S2's Standards and Guidelines allows progress toward those goals and is described in the Final SEIS. Natural disturbances are expected to continue, in non-natural environments, for the foreseeable future on the majority of the area being considered.

Review Comment: Management towards pre-settlement conditions implies significant restoration efforts such as addressing the restoration of forest function, including fire regimes. Re-creation of pre-settlement forest structure alone will not accomplish the underlying objectives. Re-creation of pre-settlement forest stand structure may be an important management objective leading towards the desired future condition but the document should consider the restoration of pre-settlement forest function as a companion objective. This is not adequately addressed in the document.

FS Response: The SEIS Final Ch 2 discusses Alternatives S1 and S2 sharing overarching goals for fire and fuels management that include meeting ecological goals for re-introducing fire. Strategically placed area treatments are first designed to change landscape wildland fire behavior; over time the goal of the treatments shifts toward restoring fire regimes and condition class across the landscape. SEIS Final, Fire and Fuels, Ch 4 Sec B discusses the effectiveness of treatments in modifying fire behavior across the landscape which then facilitates the reestablishment of fire as a process. The use of fire as the follow-up/maintenance treatment is intended to provide for the process restoration in the treated areas.

Review Comment: The concerns about completeness of literature citation were based on whether the literature about the use of group selection silviculture in Sierra Nevada mixed conifers was completely captured. One reviewer noted several recent references that dealt specifically with this subject and that would profoundly inform the issue were not included in the discussion. The general sentiment of the team calls for more disclosure of how proposed management direction is anticipated to accomplish realization of the above stated objectives and how this will specifically contribute to the solution of identified problem issues including old forest restoration and restoration of natural fire regimes.

FS Response: The SEIS incorporates the QLG FEIS by reference for the area affected by that assessment. Implementation of group selection silvicultural systems was addressed in that FEIS.

Review Comment: Other comments raised by reviewers that fall short of science consistency reflect the question about climate change, and whether the literature and the uncertainty regarding old growth restoration and maintenance were adequately captured. Changes in future climate conditions could have important consequences for the appropriate forest conditions to manage towards as well as what the appropriate tools might be for accomplishing desired conditions.

FS Response: The final SEIS, section 3.1.1, incorporates additional discussion of climate change, its context for this plan and linkage to adaptive management.

3. **Elements Related to species viability.** The species viability issue included a number of reviewer suggestions that addressed the individual elements associated with species of concern (Table 3), noted as Element C. Element C1, pertaining to montane meadow and riparian ecosystem management and restoration, attracted the most reviewer attention within this element, largely because of the scope of the science information presented in the DSEIS, and the reviewers' feeling that assessments of uncertainty and risk were incomplete. Several reviewers suggested additional literature citations for integration into the DSEIS as background information for development of alternatives. Other reviewers suggested a more detailed explanation or provision for monitoring the effects of the alternatives in light of the risk and uncertainty associated with their proposed implementation.

Review Comment: The team made a particular point that species at risk in montane meadow systems could be addressed more effectively through a more holistic ecosystem approach. By this we mean that conservation issues for such species should be approached and analyzed by addressing physical and biological ecosystem function (e.g. through development of conceptual models that identify hydrological cycles, energy and nutrient cycles, trophic relationships, etc.), thereby understanding key ecological relationships and limiting factors that may influence population performance of species of concern. Such analyses can and should include management activities such as grazing which is identified as a key issue. We believe more effective management strategies can be developed when more thorough understanding of system function is created. The discussions on willow flycatcher and Yosemite toad in the DSEIS focused directly on some specific management concerns (e.g. effects of grazing on viability of these taxa) with little or no mention of the contextual issues of overall habitat integrity in montane meadow systems. Further elaboration on these broader issues in the decision document would help the reader understand the potential influences of the management issues on habitat integrity that are the subject of concern to the Forest Service. The proposed Adaptive Management Program includes the continuation of the Status and Change Monitoring Plan for meadows to increase.

FS Response: In addition, a "more holistic approach" could occur during landscape analysis, which is a part of S1 and S2. This approach could only be described as an analysis process, it could not be analyzed at this bioregional scale.

Evaluating energy and nutrient cycles, trophic relationships for individual meadows is not reasonable for all or most meadows and due to variability, would not likely be easily extrapolated from study sites to other meadows. This could be an area for future focused studies, but at this point are not an area of focus.

Review Comment: Several reviewers commented on specific concerns associated with the element of fisher and marten ecology and responses of those species to management. These concerns and/or comments included suggestions for citing additional literature, more thorough interpretation of the available literature, capturing the risk and uncertainty of our knowledge in the alternatives, and more clear provisions to account for potential effect of management actions in light of risk and uncertainty. Our knowledge base on fisher and marten, particularly for this portion of their range (the southern most extent for both taxa) is fairly sparse. This relative lack of information results in a relatively high degree of

uncertainty regarding a number of important ecological factors related to these species in the Sierra. For example, it is unclear what habitat conditions both marten and fisher require to survive and reproduce at a rate that would sustain their population (let alone expand in the case of fisher). It is quite possible, as one member of the team has cited, that forest carnivore populations respond to elements of their habitat/environment only indirectly related to structural features of the vegetation that are being preserved. Sources of mortality that may affect population stability are also unclear. This makes it difficult to, in turn, understand how such species will respond to the proposed treatments. These sources of scientific uncertainty should be discussed in the context of risks to the population that could be increased through more aggressive fuels treatments. We do not know that proposed fuels treatments will have negative impacts on marten and especially fisher populations but the point is that we cannot be sure that they will not either.

FS Response: These are factors that will be addressed in the Conservation Assessment for Forest Carnivores. The Conservation Assessment will identify risk factors and their relative contributions to forest carnivore population stability will be assessed. The Conservation Assessment will also address areas of uncertainty and suggest methods and opportunities to gather information and knowledge.

It is acknowledged throughout the SEIS and in the FEIS that the strategically placed area treatments strategy is theoretical with limited field testing. It is also acknowledged that species information specific to the Sierra Nevada is generally lacking. The adaptive management framework of Alternative S2 will allow for adjustments to be made as more information becomes available. Several actions to increase understanding of the habitat relationship between management actions of fisher and marten are part of the adaptive management program of Alternative S2.

4. **Elements related to synthesis issues.** Several elements were grouped into a catchall category called ‘synthesis issues’ (Table 4). The greatest number of comments in this category dealt with concerns about the implications of climate change in regard to the Sierra Nevada, and on the possible effects of climate change on proposed management strategies. A number of additional citations were proposed for incorporation in the DSEIS that might shed more light on the potential ramifications of proposed management alternatives that will result from the implementation of the SEIS.

Review Comment: The team realizes that dealing with this complex issue of how vegetation in the Sierra Nevada may change over the next few decades due to apparent changes in temperature and precipitation is perhaps overwhelming at this stage of the planning process. However, we believe that it would be prudent for this decision document to acknowledge this phenomenon and its potential effects on vegetation communities and hydrologic cycles. There is apparently some important uncertainty associated with the outcomes of management activities when considered in light of the potential effects of climate change. It would be logical for the decision document to acknowledge these potential uncertainties and explain how they will be dealt with in the future. This acknowledgement could include a commitment, as part of an adaptive management strategy, to seek further scientific evidence on the potential implications of climate change for informing future planning cycles for both individual Forests as well as future efforts to provide management guidance collectively to all Forests in the Sierra Nevada ecoregion.

FS Response: The final SEIS and ROD addresses climate change and recognizes its role in shaping current vegetation in the Sierra and its continuing role in a highly dynamic system. The Forest Service will continue to monitor new developments, pertinent research and monitor for responses to changing climate as part of the adaptive management strategy. Changes in climate will be addressed, as well, during future planning cycles.

Review Comment: There was a separate element in this category that pertained to adaptive management (i.e. research and monitoring strategies coupled with management objectives) that enable adaptive management to proceed. A few reviewer comments were sufficiently general that the best means to summarize them was to insert them in this element. However, research and monitoring in an adaptive

management context were also raised in a number of the elements already presented, especially in those instances where the concern was captured in the context of a specific resource-related element. The reviewers see the concept of adaptive management as an important institutional process to acknowledge and ultimately address those instances where science information is incomplete or contradictory. Reviewers see implementation of an adaptive management strategy as an agency response based in the concept that research and monitoring can reduce or palliate those risks and uncertainty with respect to the response of a species or resource element to a management regime. Any revision of the DSEIS should address in greater detail both the question about what level of detail is appropriate in an EIS with regard to the different kinds of research and monitoring associated with situations of scientific risk and uncertainty, and the nature of the adaptive management process that would be triggered in the event that research and monitoring reveals unintended or unanticipated effects.

This concept is the one that probably resonated most loudly amongst the members of the team. It is important that the SEIS clearly define what is intended by invoking the concept of adaptive management. There are various interpretations of what such a concept really means in practice. Part of the requirements of successful adaptive management involves at least some level of design for data collection. Depending on the question being addressed, the credibility of the information will depend on some kind of experimental design. In the face of scientific uncertainty there should be structured efforts that can produce defensible data to inform future iterations of management direction.

A final thought on the expectations of adaptive management, albeit outside the strict scope of a science consistency review. We recognize that adaptive management is difficult to execute, particularly with the scope and complexity of the problems in the Sierra Nevada. Nevertheless, beginning with a limited set of questions and a true dedication to learning, this kind of program can prove to be very valuable, both scientifically in informing management decisions and socio-politically in involving interested parties. It will require, however, dedication of sufficient resources to support the necessary efforts. We urge you not to underestimate the resources necessary to make this work successfully.

FS Response: The Adaptive Management Program in the FSEIS has been substantially revised and strengthened to address these concerns and those raised by Forest Service managers and the public.

Review Summary

Review Comment: The science consistency review of the Sierra Nevada DSEIS has not resolved all questions of whether the document is consistent with available scientific information. Upon revision of the DSEIS, efforts should concentrate on several key findings.

First, reviewers thought this DSEIS should be a stand-alone document, not tiered to the FEIS. The DSEIS bibliography should include all citations mentioned in the text, figures, and tables of the DSEIS itself. Similarly, reviewers thought a glossary specific to the DSEIS would add to its independent stature.

FS Response: By definition, the Draft SEIS is not a stand alone document. The concept behind a supplemental EIS is not to repeat what is in the FEIS, but rather bring forward only what is new. References are cited in the DSEIS as necessary to support new information considered in the supplement without revisiting the extensive references in the FEIS.

Review Comment: It may be too large a task for revision of the standards and guides tables to better inform the reader as to the meaning of entries within a cell, especially a blank entry, and to crosslink tables more effectively so as to render the document more interpretable. This is not a criticism of the science consistency of the DSEIS, but rather a point of observation that the evaluation of science consistency was made more difficult by the fact that the DSEIS is somewhat confusing. Confusion in conveying the true content of this decision document could be a significant problem for many readers.

FS Response: The FSEIS/ROD have been modified to more clearly communicate the decision.

Part 2

Forest Service response to: The Science Consistency Review Report - Supplement #1, 3 November 2003

Introduction

On November 3, 2003, the Science Consistency Review team submitted a supplement to the Science Consistency Review Report for the Draft Supplemental Environmental Impact Statement (DSEIS) submitted to Regional Forester Jack Blackwell and Sierra Nevada Planning Team staff on October 2, 2003.

Supplement #1 poses additional questions that arose during a meeting held by the Regional Forester and the Planning Team with scientists and administrators from Forest Service Research and Development on October 16-17, 2003. At that meeting, sixteen issues were identified that required further thought by the Planning Team, and there was some thought that some of those outstanding issues might benefit from further consideration of the science upon which they are founded. Upon examination of the issues, the SCR review administrators judged nine to have elements that might benefit from a second examination by the science consistency review team (Table 1), with two of those nine being condensed as one issue. The remaining issues were not included in the supplement due to: 1) not being a science issue, 2) beyond the scope of the DSEIS, 3) being referred to review by another team of scientists (California spotted owl).

Forest Service response to comments

Issues 1 and 2: NFP Condition Classes 2 and 3; Too Little, Too Slow

Review Comment: The SCR team still has concerns about the modeling that underlies the projections of change from condition classes 2 and 3 to condition class 1; that modeling should be more carefully explained. Similarly, there are expressions of caution that the SPLATs approach remains a theoretical conceptual model, and that translation to reality will require careful consideration of site-specific locations in which these SPLATs treatments are to be imposed. These arguments touch on the distinctions between science and implementation, but the team would be more comfortable if these points were more fully explained in the SEIS.

FS Response: The strategy in the SNFPA does not specifically target Condition Class 2 and 3. The strategy relies on the treatments being strategically located and, where that can be achieved by treating CC2 and CC3, it is encouraged. The treated areas will most likely result in CC1 following treatment. The proposed action reduces the emphasis on prescribed burning and increases the emphasis on mechanical treatment.

The SEIS treatment schedule will result in the treatments being completed in 20-25 years. The NFP does not require all treatments to be completed in 10 years. The SNFPA strategy is not realistically implementable in 10 years due to budget realities and the unacceptable level of impacts.

SPLATS are a strategy to change landscape fire behavior. Additional treatments may be necessary in the future. SEIS Final, Fire and Fuels, Ch 4.2.4 B discusses effectiveness of SPLATS and the treatments and the need for maintenance. Section D discusses the uncertainties about fire behavior and effectiveness.

Issue 3: 90th Percentile

Review Comment: The suggestion by the SCR reviewers on this issue is that the 90th percentile figure is appropriate for most cases. But there is also comment regarding the need to reconcile the percentiles with the application of the appropriate fuels models. In terms of priority for understanding fire behavior, surface fuels and ladder fuels are more important in that they trigger crown fires. The weather standard, according the SCR scientists, was less of a critical issue in modeling fire spread than the question associated with fuels treatment, especially of surface and ladder fuels.

FS Response: We are continuing the use of the 90th percentile for our standard condition to evaluate treatment conditions. The primary goal of the fuels treatment standards and guidelines is to treat the surface fuels and ladder fuels to a condition that results in acceptable levels of fire behavior. The SEIS Final discusses effectiveness, and the need for surface and ladder fuel treatment, in Fire and Fuels, Chapter 3.1.2 and the section titled Effectiveness of Fuels Treatments on Fire Behavior. Recent fires and research are cited. Ch 4.2.4 B discusses effectiveness of SPLATS.

Issue 4: Pacific Fisher Viability

Review Comment: Reviewers think that the literature suggests that fishers prefer dense, lower-elevation continuous-canopy forests with high structural diversity. Fuels treatments could affect fisher habitat, but the effects of catastrophic fires would seem to be much more damaging. The literature also suggests that the abundance and diversity of suitable prey species and den sites are just as important as vegetation structure in defining fisher habitat. Thus, the SEIS should include language related more from the more holistic view of the fisher's requirements instead of vegetation structure per se.

FS Response: It is clear that there is a strong preference by fisher for dense canopied mixed conifer forest at mid slope elevations. Unfortunately this is the area most at risk of stand replacing fire and poses the greatest threat to life and property. S2 proposes to treat approximately 25% of the landscape within 20-25 years. Treatments are more continuous around communities where risk to life and property are paramount and more patchy in old forest and other areas. This introduces or maintains heterogeneous mosaics across the landscape that provide dense patches for rest sites, den sites and habitat for a wide variety of prey while providing more open areas with lower fuel loading that will be more resilient to effects of fire. This can reduce the presumed quality of some habitat with the underlying theory that damaging effects of wildfire will be reduced at a landscape scale. At a minimum the more open patches with reduced fuel provide a hedge against stand replacing effects over a landscape by providing patches of structural diversity and green islands. These are the tradeoffs land managers have to consider.

Literature suggests that fisher are able to utilize landscapes that have more open characteristics where there is patchiness that provides high density islands (0.1 acre and larger) of suitable resting habitat (>60% canopy closure with large trees, snags or down logs. Guidelines within S2 provide for identification and retention of these kinds of habitat elements within fuel treatments in the SSFCA. Guidelines from S1 have been modified to meet realistic goals for canopy cover retention in the SSFCA and provide flexibility to treat (possibly degrade but not remove) high quality fisher habitat to achieve objectives of reducing threat to larger landscapes including communities and the majority of high quality fisher habitat that lies outside of the 25% of the landscape proposed for treatments. (This is a pretty complex issue that is hard to effectively address in 50 words or less expanded discussion follows in the background notes below).

Issue 5: Willow Flycatcher Viability; Issue 6: Yosemite Toad Viability

Review Comment: After receiving the comment from the SCR reviewers, these two issues seem closely linked in a 'montane meadow' context. Critical to the comfort that scientists have on WIFL and YT are the plans that are, or will be, put in place regarding the monitoring of populations of these species and the commitment to changes in management should that monitoring suggest population declines. There is also

concern that the number of ungrazed controls for such an adaptive approach is limited and inadequate. This finds itself in the view that the available information on mountain meadow decline has neither been considered or interpreted reasonably nor have the uncertainties been dealt with properly, and also that additional research is needed to better quantify effects for these species.

Questions were also raised about the extent of the populations, and data should be cited to support the numbers of toad populations that are stated to exist.

FS Response: Alternatives S1 and S2 includes direction to monitor existing populations. Alternative S1 does not include alternative direction to be applied if local populations appear to be declining. Alternative S2 allows site-specific management plans to be developed which could adjust management activities to respond to population declines. In areas where active allotments overlap with occupied habitat, the Forest Service is proposing to initiate a number of adaptive management studies as part of the site-specific management plans. The studies will adhere to experimental design and questions about the number of controls needed and to validate results will be addressed at that time. Close cooperation with the PSW research station is anticipated throughout the life of these projects.

Factors that may contribute to mountain meadow decline are discussed generally in the FEIS (vol 2. ch. 3, part 3.4, pages 218-237). Related to these two species, the SEIS (chapter 4.2.3) and the FEIS (vol 2., ch. 3, part 3.4) discuss direct, indirect and cumulative effects of management activities of wildfire risk, wildfire recovery, timber salvage, fuel treatments, and grazing.

References to “hundreds” has been removed in reference to sites that have a history of grazing and still have YOTO occupancy. Clarification was added that some habitats may have been irretrievably lost and others have recovered or are recovering as a result of historic land management. Yosemite toad population data has not yet been collected in a corporate database. This information will be evaluated in the Conservation Assessment that is currently being prepared.

Issue 7: Adaptive Management and Monitoring

Review Comment: The scientists on the SCR review team think that several of these issues will rise and fall on the rigor of implementation of the monitoring and research program, and on the commitment by the agency to follow up with timely modification of treatments under indications that populations are being affected. Anything that the planning team could do to more precisely state how monitoring will be done and how treatments will be modified in response to monitoring will be appropriate.

There is an underlying concern that while plans can be set in place for adaptive management and monitoring, the funding to operate those plans over the long term is tenuous. In the long term, the commitment given by the Region to funding the monitoring and the execution of treatment modifications in light of the monitoring will be critical to future planning efforts as well as to the success of the current effort.

FS Response: A revised section on adaptive management in the final SEIS is a product of ongoing discussions with the PSW research station and others from the academic community who specialize in this subject area. Since the draft SEIS was issued, more work has been done to develop the specific questions to be answered and to identify the research and monitoring activities needed to address the most critical knowledge gaps. This was done in part, due to an acknowledgement of the limited funding likely to be available on a sustained basis and the need to make thoughtful decisions about the admittedly, long-term commitments some of these research efforts will entail. At the present time, the Region is spending $2-$3 million dollars annually on various research and monitoring efforts. The strategy in the SEIS is predicated on continuing at roughly the same level of expenditure with some redistribution of funds to initiate work on questions of most immediate concern. The adaptive management strategy is characterized by a high degree of collaboration and transparency to ensure that new information and understanding is shared widely and that changes to management direction are initiated, as appropriate.

Issue 8: Desired Future Conditions - HRCAs and OFEAs

Review Comment: The scientists reviewing this issue arrived at different conclusions; one thought that the treatments would effectively restore the old growth conditions, others thought that continued commitments to treatments would be needed that were perhaps beyond what had been indicated in the alternatives.

FS Response: The Final SEIS describes DFCs differently. It recognizes the widespread existence of large trees with intermingled patches of smaller trees. It is recognized that fire played an important role as a process, shaping the pre-settlement forest. It is assumed that prescribed fire would be used to manage surface fuel levels, especially after mechanical treatments.

Part 3

Forest Service response to: The Science Consistency Review Report - Supplement: content pertaining to California Spotted Owl, 3 November 2003

Introduction

On November 3, 2003, the Science Consistency Review team submitted a supplement to the Science Consistency Review Report for the Draft Supplemental Environmental Impact Statement (DSEIS) submitted to Regional Forester Jack Blackwell and Sierra Nevada Planning Team staff on October 2, 2003.

The supplement pertaining to content in the FSEIS on the California Spotted Owl (CASPO) was requested by the Regional Forester and his staff and was to focus on three primary topics:

- Stand structure needs of CASPO (number of big trees, degree of canopy closure, understory)
- Landscape level considerations desired to sustain owl habitat
- Desired future conditions for Protected Activity Centers (PACs); are they consistent with available scientific information.

The SCR team added two additional items

- General owl biology
- Risk and uncertainty

The review process follows the same format used for the Science Consistency Review, responding to the criteria:

1. Has applicable and available scientific information been considered?
2. Is the scientific information interpreted reasonably and accurately?
3. Are the uncertainties associated with the scientific information acknowledged and documented?
4. Have the relevant management consequences, including risks and uncertainties, been identified and documented?

The team rated each of the three elements by each of the above four evaluation criteria. A matrix was used to structure the review of the elements within the review criteria. The comments of the SCR team and the Forest Service response follow in this report.

Forest Service response to comments

General Comments

Review Comment: 1 (pg. 3) - We recommend using more references to published literature to support statements and assumptions made in the documents. Some of this material may be rehashed from years of document preparation and the original sources may have become obscured. However, it is important that facts, statements, and assumptions be linked to supporting documentation.

FS Response: More references were included throughout the Environmental Consequences section of the FSEIS.

Review Comment: 2 (pg. 3) - Overall, we believe the documents, particularly Section 4.3.2.3, could be presented more clearly. The effects analysis is inherently complex so it is important that the presentation of information be clear.

FS Response: More comparative tables and references were added to help clarify the effects analysis.

Review Comment: 3 (pg. 3) - The effects of the S2 prescription are difficult to quantify or interpret. What does retention of 40% of the basal area in the largest trees typically result in? It would be helpful to illustrate this with some examples in different kinds of owl habitat (e.g. average 4M, 4D, 5D stands). Visuals using FVS graphics of pre- and post-treatment stand structure under prescriptions for S1 and S2 for several classes of stands would be very useful for demonstrating how similar or dissimilar the treatments might be.

FS Response: The FSEIS incorporates additional visual displays and graphics to aid in the description of treatment effects. Post-treatment conditions will vary as diameter distribution varies. Stands with larger trees will have fewer residual trees as compared to stands with more medium-sized trees. Also, in stands where the diameter distribution is uneven, the post-treatment conditions may maintain higher levels of the original variation. As canopy cover is also a design criterion, differences between treated stands are not expected to vary widely.

Review Comment: 4 (pg. 3) - It would also be helpful to describe, in detail with references to published literature definitions for what is suitable owl habitat, what is suitable nesting habitat, etc. These terms are used rather loosely and it is not clear what they are intended to mean or what their significance is. Reference to the effects analysis in the SNFPA FEIS would be useful or perhaps it might be possible to incorporate some of those materials and discussions into the SEIS.

FS Response: Suitable owl, nesting, and high capability habitat have been clearly defined in the final.

Review Comment: 5 (pg. 4) - The presentation of results used to determine effects is not clear. We need clear, well-constructed tables that describes the following items:

a) total numbers of PACs and HRCAs

b) total acres of PACs and HRCAs

c) total acres of so called suitable habitat and nesting habitat

d) these above items displayed by the different land allocations

e) projected treatments in all of the above, represented in time steps

f) changes in 4M, 4D, 5M, 5D, and 6 by alternative at 20-30 years and 130 years.

g) display contributions from HFQLG versus changes on non-HFQLG forests

h) number of PACs and HRCAs that could be treated.

FS Response: The suggested tables are now incorporated in the document.

Review Comment: 5A (pg. 4) - The effects analysis is confusing and potentially misleading. You can probably make a more compelling case if you pay special attention to the spatial-temporal dynamic of the treatment strategy. Forest dynamics is a crucial issue with respect to owl (or, for that matter, any old forest dependent taxon) population persistence. In order to thoroughly understand potential effects to CASPO the reader needs to be able to assess population distribution and abundance as it may persist over space and time in response to both management manipulations as well as natural perturbations and processes that will affect forest landscape structure and function.

FS Response: In the Final SEIS, spatial and temporal effects were evaluated within the effects analysis and the results are displayed. The modeling results illustrate the effects of static treatment areas. It is expected that a more dynamic strategy will be developed before the end of the initial implementation phase.

Review Comment: 3 (pg. 4) - Short term effects of management activities are probably more relevant to owl population persistence than long-term projections in habitat change. The latter are more uncertain and will undoubtedly be subject to subsequent changes in management direction as well as unforeseen ecological circumstances. Changes in habitat conditions due to directed forest stand management and subsequent fires over the next 10 to 20 years probably results in the most relevant forces affecting owl population persistence for this analysis.

FS Response: More emphasis was added for the potential short term effects within the document. The FEIS discusses short-term impacts of the Alternatives on CASPO and has considered the tradeoffs of treatments to protect and enhance long-term sustainability of resources, species viability, and impacts on multiple resources. It is the responsibility of the Responsible Official to weigh this information and select the alternative that best balances risk, uncertainty, effects to resources, and public welfare and safety.

Review Comment: 4 (pg. 4) - Modeling appears to be a major tool used to evaluate effects. In addition to quantifying the error around outputs derived from modeling, be sure to explain the assumptions and limitations imbedded in these modeling efforts. For example, assumed effectiveness of future fuels treatments. Is maintenance of SPLATs over time assumed, even though this is not addressed? We need to understand the parameters that govern these models in order to evaluate the consequences inferred from the results. This refers to modeling used for both habitat and fire. Results for increases or decreases in both habitat and fire over time are apparently based on deterministic projections of a single set of parameter values, yielding a single estimate of future outcomes. However, all input parameters are characterized by various degrees of variation or uncertainty. Modeling should attempt to capture this variation and display how this variation might effect future projections, for example, by providing confidence limits around mean values. Without accompanying measures of variation it is not defensible to solely rely on a single deterministic projection. Assessing the effects of uncertainty might involve sensitivity analyses using full stochastic models where all parameters are allowed to vary within hypothesized ranges. Another approach might be to vary one or more parameters at a time to bound hypothesized maximum and minimum parameter values. This type of approach would provide some insight into possible maximum or minimum ranges on projected outcomes. In any case, without measures of uncertainty on model projections the use of these results will remain controversial and their use for projecting future conditions beyond 20-30 years is not defensible.

FS Response: The parameters and sensitivity of models used in analysis for the FSEIS is discussed in Appendix B-3. Risk, uncertainty and ambiguity is also analyzed and disclosed.

Review Comment: 5 (pg. 5) - Certain portions of these documents include speculations that have no scientific evidence presented in support of the assertions. For example, the document suggests that:

> Implementation of the HFQLG Pilot Project has the potential to increase the risk identified for widening gaps between habitat parcels, resulting in reduced owl densities and reduction in distribution of owls and owl habitat in AOC 1 on the Lassen National Forest. On the other hand, these actions could create conditions that maintain owl habitat longer due to the reduction in large fire potential.

Such assertions are not necessarily wrong, they simply need to be anchored to some line of reasoning or moreover, scientific reference(s) that can support the assertion.

FS Response: Assertions were anchored to scientific references where available, interpretation of statistics or were based on professional judgment when supporting documentation was not available.

Review Comment: 6 (pg. 5) - Assumptions and Limitations: We cannot find this info in the FEIS on page 82 (Volume 3, Chapter 3, Part 4.4).

FS Response: This was removed, and replaced with factors used to assess the effects of the alternatives.

Review Comment: 7 (pg. 5) - Under Outcomes and Cumulative Effects there is a discussion of the Plumas Lassen Study. This discussion should be edited to state that "In April 2003 a decision was made to restructure the design of the field work to accommodate the change in management direction that intended to allow for full implementation of the HFQLG Pilot Project. The fundamental objectives of the study were retained to the extent possible. A new study design has been prepared and full study plan development will be completed over the winter of 2003-2004.

FS Response: The suggested edit was incorporated in the final.

Review Comment: 8 (pg. 5) - It does not appear that land allocations such as OFEAs and HRCAs have any meaning under S2 because a single thinning prescription will be used, with the spatial location of treatments dictated by WUIs and SPLATs. Why retain these allocations if they are not used to guide management or used as categories to assess effects (e.g., change in amounts of 5D within HRCAs, etc.)? Do the DFCs for HRCAs or OFEAs have much meaning or utility when projects are planned?

FS Response: Under Alternative S2, the DFCs are integral to determining the individual treatment unit prescription. The desired conditions, management intent, and vegetation and fuels objectives provide direction to land managers for designing and developing fuels and vegetation management projects that are consistent with the objectives for actively managing fire and fuels, old forest ecosystems, and California spotted owl habitat. The individual fuels and vegetation management standards and guidelines in Alternative S2 are meant to be considered in concert with each other. Actual treatment unit prescriptions would be set to best meet the desired conditions and management intent of the land allocation while not violating any one of the standards and guidelines.

Review Comment: 9 (pg. 5) - The discussion regarding adjustments to PAC acreage in Section 3.2.2.3 Updated Information on California Spotted Owls requires further discussion and clarification. The gross numbers suggest a small increase in the number of PACs from 1310 to 1321 yet a 31% reduction in PAC acres (from 613,138 to 421,780) based on re-mapping efforts. The rationale for reducing PAC acres needs to be clearly explained. I assume it involves a reduction in the number and size of original SOHAs (1000 acres) that became large PACs when the PAC network was adopted plus elimination of older PACs presumed lost to fire or unoccupied. Further clarification is required as this could be a point of contention.

FS Response: This has been clarified in the FSEIS. The correction is based upon updated geographic information system maps created by the individual national forests. The reduction in PAC acres is explained to be a function of better mapping that brings the average size of PACs closer to the required size of 300 acres.

Stand Structure Needs of CASPO

Review Comment: 10 (pg. 5) - The amount and distribution of Forest Health Treatments is highly uncertain. The argument that it could be around 1000 acres per year based on current funding does not seem logical given that the universal thinning prescription would make such treatments economically feasible and therefore remove available funding limitations. These treatments were not included in the SNFPA FEIS and are not well described or quantified in the Draft SEIS. Therefore, they introduce scientific uncertainty, of some unknown magnitude, and are likely to be highly controversial. Further, they can be targeted to stand classes 4M, 4D, 5M, 5D, and 6, resulting in additional impacts on owl habitat beyond those incurred during SPLAT and WUI treatments. We suggest that this important issue be addressed and the uncertainty described and quantified.

FS Response: The FEIS now clearly describes that the acreage described in the Draft SEIS, as "forest health" treatments, is meant to include projects funded by the Forest Health Protection Staff. These types

of projects may range from mistletoe reduction to chainsaw thinning in young planted stands. It is anticipated that many of the treatments affecting forest structure will likely overlap with the strategically-placed area treatments.

When the term is used in S2's desired future condition statements, it is meant to describe density reduction treatments that may be incorporated with actions taken to achieve fuel reduction. This effect is taken into consideration during the analysis. The acreage treated is not expected to be outside the modeled total.

Review Comment: 1 (pg. 6) - How will canopy cover be measured? Will there be standard methods used by all? How is the inherent error in these instruments accounted for in meeting stated objectives and adhering to prescribed limitations? Canopy cover restrictions may exceed the sensitivity of instruments available to measure the structural feature.

FS Response: Canopy cover can be measured as described in the ROD of FSEIS. There is no intent to require specified levels of precision for field measurements. Given the high level of spatial variation over even an acre, there is little to be gained by overly prescriptive requirements for either measurement or restrictions related to canopy cover.

Review Comment: 2 (pg. 6) - The SEIS could be strengthened by including a coherent, complete, updated discussion of owl habitat associations at multiple spatial scales. Verner et al (1992) summarize information on owl habitat associations. Much further discussion is also available in the SNFPA FEIS. The draft document summarizing DFCs for owl HRCAs provides an update of studies by Franklin et al. (2000), Hunsaker et al. (2000) and Blakesley (2003). Care must be taken in defining and discussing effects at multiple spatial scales. These spatial scales include: (1) the veg-plot scale (0.05-1.0 ha) defining habitat structure and composition at nest sites and foraging sites; (2) habitat associations conditions at the PAC spatial scale; (3) use of stands/veg polygons within HRCAs; and (4) composition of HRCAs. These discussions should also include the amount of variation explained in the response variables (e.g., reproduction, apparent survival, occupancy) by explanatory habitat variables.

FS Response: The spatial complexity of defining DFCs for HRCAs has been better described in the FSEIS.

Review Comment: 2A (pg. 6) - Care needs to be taken in accurately describing knowledge of habitat associations from the literature. For example, the Draft DFC for owl HRCA document citing Blakesley (2003) states that "Another important finding was a positive association for site occupancy when the nest area was dominated by large trees and >70% canopy cover." Referring directly to Blakesley (2003), she states "this means that the amount of nest area dominated by large trees and >70% canopy cover was positively associated with site occupancy whereas the amount of nest area dominated by medium-sized trees with canopy cover >70% was negatively associated with site occupancy" (page 13, first paragraph). Looking at Table 1.4 of these results (Blakesley 2003, page 23) the mean proportion of large trees with >70% canopy cover (SELCCG) in the nest areas was 24% (CV = 0.88) and that the best model explained 18% of the variation in the relationship. Clearly there is a positive and important relationship between large tree, >70% canopy cover habitat associations and site occupancy based on multi-model inferences, however, the discussion as currently presented in the draft SEIS DFC section misinterprets these results. The point here is that a coherent, precise, and synthetic updated discussion of owl habitat associations would benefit the DSEIS and provide a scientific foundation to interpret the proposed actions.

FS Response: The DFC discussion for HRCAs has been revised to correct this statement. The DFC for HRCAs in Alternative S2 is now unchanged from the DFC for Alternative S1.

Review Comment: 2B (pg. 6) - The current draft summarizes acres by habitat class cumulatively across PACs and HRCAs. It would be informative to present existing habitat within PACs and HRCAs on an individual basis. This would allow assessment of amounts and distribution of important habitat classes (e.g., 4M, 4D, 5M, 5D, 6, other). This could then be compared with projected habitat conditions within

PACs and HRCAs under S1 and S2. These data on changes in habitat composition within PACs and HRCAs, in conjunction with overall landscape changes, provides a more defensible and comprehensive base of information for assessing possible future outcomes.

FS Response: The underlying premise of both alternatives is that the spatial location of SPLATs is critical to effectively changing landscape wildfire intensity and behavior. At the bioregional scale, the method used to approximate this spatial placement of SPLATs was to apply a regular grid across the bioregion. This is clearly understood to not represent expected actual areas of SPLAT implementation. Direction in Alternative S2 includes a strong emphasis to avoid PACs when designing treatments at the project level and to design prescriptions to consider the desired condition of HRCAs. An evaluation of projected effects to individual PACs and HRCAs based upon the bioregional modeling would not be meaningful in assessing how actual projects might be implemented. The aggregate evaluation used provides a reasonable estimate of potential effects to PACs and HRCAs across the bioregion. Effects to individual PACs and HRCAs would be fully evaluated during site-specific project planning and cumulative effects across the bioregion would be assessed by implementation monitoring.

Review Comment: 2C (pg. 7) - Although existing research results indicate that canopy cover is important for owls there are some important uncertainties that should be acknowledged. Threshold tolerances for canopy cover have not been established. It is uncertain how much of each habitat class is required within HRCAs to provide for high survival and replacement level reproduction.

FS Response: This information has been reflected in the discussion of DFCs for HRCAs

Review Comment: 2D (pg. 7) - Results from observational studies to date provide recommendations but we are uncertain regarding amounts of habitat by structure class that are necessary to provide for high survival and replacement-rate reproduction. Analyses to date have been based on habitat composition within circles centered on owl nest areas. These circles function as surrogate measures of HRCAs. However, we have little information on how owls use habitat within HRCAs and what are the critical amounts, types, and distribution of habitat within HRCAs required for high survival and reproduction. Until further research is conducted the results from observational studies and descriptions of habitat associations provide the best available scientific information.

FS Response: This information has been reflected in the discussion of DFCs for HRCAs.

Review Comment: 3 (pg. 7) - Results reported in the effects analysis suggest S1 maintains only slightly more canopy cover after 30 years than S2 would. How was this determined? If this includes factoring in canopy cover expansion after thinning treatments then that should be discussed, quantified, and linked to scientific sources that have documented this. Surely there is some response in the canopy of trees that are retained after thinning so this should be explained and linked to references that support this notion. Again, a much more clear presentation and discussion of results is required.

FS Response: Canopy cover, as an average for the entire analysis area, varies only slightly between S1 and S2. The crown expansion of residual trees is included in this average. We have not described stand-by-stand canopy cover changes. In general, the treatment area canopy cover, assuming maintenance, is not expected to vary significantly over time.

Landscape level conditions desired to sustain owl habitat

Review Comment: 1 (pg. 7) - The scientific rationale for using different time frames for analysis is not clear. For example, quantifying loss of PACs over an eight year average (as opposed to any other time frame) was not explained. There is significant annual variation in variables such as fire extent so it would strengthen the analysis to be more purposeful in establishing time frames for analysis.

FS Response: The analysis of fire effects on PACs has been revised to clarify the analysis conducted and the conclusions drawn. The timelines chosen reflect the availability of reasonable data for analysis. Wildfire effects to PACs is evaluated from 1993-2002 because 1993 was the year when PACs were

formally identified. The effects of wildfires on PACs in recent years is limited to 1999-2002 because data on the status of individual PACs was available for fires during that timeframe. The annual average rate of PAC damage or loss from recent wildfires is presented to provide an indication of potential losses should the current trend in large, high intensity wildfires continue.

Review Comment: 2 (pg. 7) - The modeled changes in CWHR type as a result of treatments over time could benefit from presenting more of the "raw" data. The only table presented shows absolute differences in acreage in different CWHR classes between S1 and S2 in 20 year and 130 year time steps. This presumes that this is all one needs to know to evaluate effects. Presentation of more raw information, as suggested above in constructing well-designed tables about where and when treatments will go and allowing the reader to evaluate might be more effective. The modeling outputs, especially after 130 years, are fraught with assumptions that are not fully revealed.

FS Response: The suggested tables are now incorporated in the final and assumptions are more clearly explained.

Review Comment: 3 (pg. 7) - The "Geographic Areas of Concern" have some significance in terms of maintaining the distribution of birds and in facilitating dispersal across relatively constraining geographic barriers. The description of effects to these areas, specifically AOC 1, 2, and 3, is rather vague and needs to be quantified. Saying "small portions" of an AOC is located on Forest Service lands or the "majority of this AOC is in private ownership" makes evaluating effects difficult. The potential effects were apparently address in the HFQLG EIS BE but are not discussed here nor put in context of the entire Sierra. This discussion should be expanded to include current habitat conditions in all AOCs, management within AOCs, and projected habitat conditions in 20-30 years. Does S1 or S2 result in improved habitat conditions for owls within AOCs?

FS Response: AOCs are more thoroughly addressed in the document. There are no special management directions for activities within the AOCs.

Review Comment: 4 (pg. 8) - Under the discussion of "Retention of Duff Layer" it states that "S2 has a slightly greater potential for disturbance of the total duff layer and associated micro-habitat that might be important to spotted owl prey." What is the scientific basis for making this assertion? How do we know it more or less than S1 and what is the significance of any disturbance of the duff layer?

FS Response: This was more thoroughly discussed and anchored to science within the document.

Desired future conditions for Protected Activity Centers

Review Comment: 1 (pg. 8) - The section on "acres of mechanical vegetation treatment" states that entry into PACs is discouraged and it also states that "replacement acres" would be applied to PACs to replace acres disturbed through management actions. In concept this makes sense but it is hard to evaluate how this might manifest itself in practice. Presumably this evaluation must assume that the maximum number of acres will be entered. It is difficult to know what, if any, suitable acres will be available to "replace" acres that are treated.

FS Response: The replacement acres concept and reference has been dropped from the document. PAC boundaries would be assessed at the project level, and if appropriate boundaries may be adjusted.

Review Comment: 1A (pg. 8) - It would be useful to discuss the utility of PACs; what is their purpose, do we expect them to be permanent features, are certain locations inherently suitable for long term habitat value, how do PACs mesh with longer term forest management strategies that acknowledge and provide for dynamic forest conditions over time and space, etc. Furthermore, how will Forest Service policy provide for subtle to more significant shifts in actual PAC configuration that results from changes in landscape conditions and/or selection by individual pairs?

FS Response: The FEIS and FSEIS present a short-term strategy for fuels and vegetation management. PACs are a component that fit with this short-term strategy just like they did in the FEIS. A long term strategy for PACs was not presented in the FEIS and is not addressed in the FSEIS.

General Owl Biology

Review Comment: 1 (pg. 8) - The discussion of the owl population trends in Section 3.2.2.3 slightly misinterprets the findings in the CASPO meta-analysis. The sentence "However, the capture-recapture methodology is not statistically different than $\lambda = 1$, which would indicate a stable population." suggests a conclusion that is not shared by the authors in the meta-analysis report. In Franklin et al. 2003, the authors state that there are still uncertainties in interpreting λ for various reasons, including such factors as source sink population dynamics, most point estimates of λ were < 1, and relatively low apparent adult survival rates on four of the five study areas that could be the most crucial measure. We recognize that the draft documents you have prepared also acknowledge (in fact immediately after the above cited statement) the uncertainty around rangewide population trends. Nevertheless, given the careful scrutiny that this subject matter will be subject to in the final review of the documents we recommend very careful treatment of the interpretation of findings and full disclosure of the complete facts.

FS Response: This clarification is incorporated into chapter 3.

Review Comment: 1A (pg. 8) - The group of scientists who authored the meta-analysis report stated that the selected demographic study areas cannot be considered representative of owl demographic trends throughout the Sierra Nevada. There are various sampling design factors that explain this conclusion, some that are stated in Section 3.2.2.3 and others including non random selection of study areas. However, the authors further conclude that the extant population studies span a major latitudinal gradient over the range of this subspecies and each of the five study areas had unique characteristics that capture much of the inherent environmental variation within the California spotted owl range. We suggest that it is important to include these additional details in explaining the degree to which inferences can and should be drawn from these data.

FS Response: This clarification is incorporated into chapter 3.

Review Comment: 2 (pg. 9) - The citation of Stein (sic) pers. comm. in Section 3.2.2.3 should be replaced by Franklin et al. 2003.

FS Response: The suggested change has been incorporated in the FEIS.

Review Comment: 3 (pg. 9) - Throughout this document point estimates for one variable or another (often derived from modeling exercises) are presented but almost always there is no error estimate provided for these data. It is very difficult to interpret the significance or meaning of these data without error estimates or confidence limits to describe the uncertainty around these estimated values.

FS Response: It was identified within the FSEIS that the modeling is only an estimate, and that it should be considered as such. Uncertainty around these estimates has been addressed within the document.

Review Comment: 4 (pg. 9) - In the same vein as the above comment, there are many instances where vague descriptive terms are used, e.g. "general increase" or "moderate probability", to characterize habitat changes due to treatments. These vague terms make it very difficult if not impossible to interpret the significance of the statement that is being described.

FS Response: More estimated numbers and comparisons were incorporated in the FSEIS.

Review Comment: 4A (pg. 9) - There are also many instances where quantified estimates of, for example, change in habitat conditions such as number of large trees after 20 years, are presented without any explanation of how these estimates were derived. If these are important statistics, meaningful in terms of revealing the anticipated impacts (or lack thereof) of alternative treatments, we need to have

confidence in these estimates. We need to understand what the scientific underpinnings of these estimates are.

FS Response: Descriptions as to the importance of special attributes and references were added to the document.

Review Comment: 5 (pg. 9) - In the discussion on snags and down wood, it appears that retention requirements are intended to reflect per acre numbers but this is not stated as such.

FS Response: The reference to snags/acre was added to this section.

Risk and Uncertainty

Review Comment: 1 (pg. 9) - The conclusion (Outcomes and Cumulative Effects – Section 4.3.2.3) states that it is uncertain what the long-term effects would be under either Alternative S1 or S2. As described throughout the preceding discussion, the SEIS would greatly benefit from a more coherent and complete presentation of expected results on which to assess possible outcomes over the short and long terms. Alternative S2 likely incurs greater risk to owl persistence because of: (1) potential to treat more PACs (51% of total PACs); (2) canopy cover reduction in PACs (3) more aggressive vegetation treatments compared to S1 (lower canopy cover retention, increased harvest of mid-sized trees <30” dbh); (4) full implementation of HFQLG; and (5) unquantified amounts of Forest Health treatments. Given continued concern regarding owl population trends Alternative S2 likely incurs greater risk. This makes it critical that a defensible adaptive management program is an integral part of implementation in order to address key uncertainties. Currently, the adaptive management program is not defined and there is scientific uncertainty regarding whether or not a valid program will be developed to accompany the greater risk perceived with Alternative S2.

FS Response: More emphases and discussion on short-term effects and associated risk was added to the FSEIS and is considered in the Adaptive Management process.