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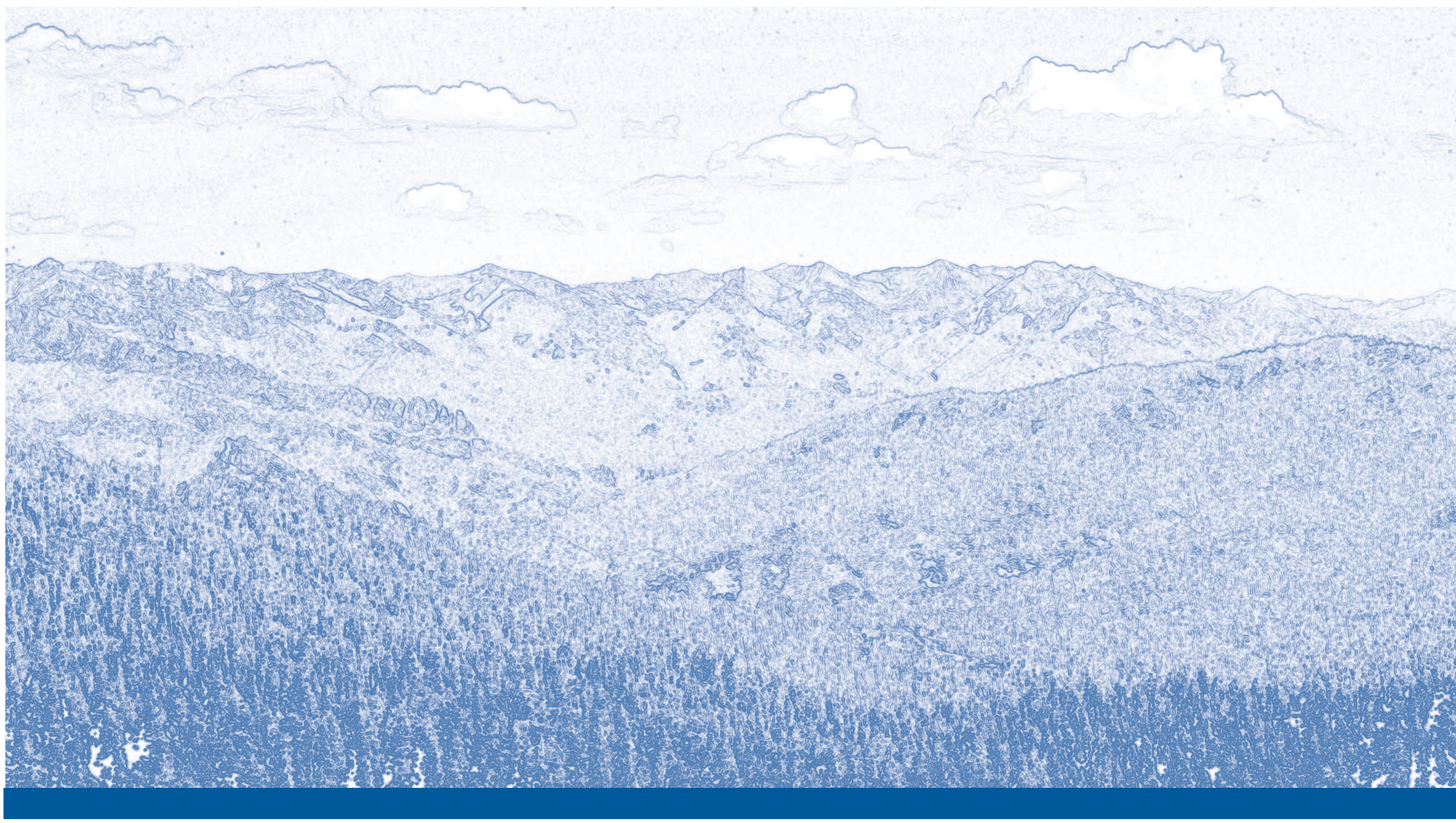
Sierra Nevada Forest Plan Amendment

Draft Supplemental Environmental Impact Statement



Sierra Nevada
Forest Plan Amendment

Draft Supplemental
Environmental Impact Statement

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Summary

The Draft Supplemental Environmental Impact Statement (SEIS) for the Sierra Nevada Forest Plan Amendment (SNFPA) responds to new information regarding several problem areas addressed in the Final Environmental Impact Statement (FEIS) for the Sierra Nevada Forest Plan Amendment (January 2001). Specifically, the Draft SEIS focuses on specific components of the following problem areas: (1) old forest ecosystems and associated species, (2) aquatic, riparian and meadow ecosystems and associated species, and (3) fire and fuels management.

The Draft SEIS presents a range of alternatives for amending the land and resource management plans for the Modoc, Lassen, Plumas, Tahoe, Eldorado, Stanislaus, Sequoia, Sierra, Inyo, and Humboldt-Toiyabe National Forests and the Lake Tahoe Basin Management Unit. One of the alternatives considered in detail is the “no action” alternative, which would continue management direction in the January 2001 Record of Decision (ROD) for the Sierra Nevada Forest Plan Amendment. The Draft SEIS describes new information since the SNFPA FEIS was completed and discloses the expected environmental consequences of the alternatives considered in detail.

Background

The SNFPA FEIS and ROD were the result of more than 10 years of regional planning efforts aimed at managing species and ecosystems of the Sierra Nevada bioregion. After reviewing more than 200 appeals of the SNFPA ROD, the Chief of the Forest Service affirmed the ROD, and directed the Pacific Southwest Region to review certain elements of the decision and the associated SNFPA FEIS.

In December 2001, the Pacific Southwest Regional Forester chartered the Sierra Nevada Forest Plan Amendment Review Team (Team) to evaluate the SNFPA ROD for needed changes relative to six specific areas. The Regional Forester directed the Team to use an open and public process to identify opportunities to:

1. pursue more aggressive fuels treatments while still protecting old forest conditions and species at risk;
2. achieve consistency with the National Fire Plan to ensure accomplishment of community protection and forest health goals;
3. harmonize the decision with the Herger-Feinstein Quincy Library Group (HFQLG) Forest Recovery Act to implement the pilot project to the fullest extent possible;
4. reduce the unintended and adverse impacts on grazing permit holders;
5. reduce the unintended and adverse impacts on recreation users and permit holders; and
6. reduce the unintended and adverse impacts on local communities.

The Team reviewed the SNFPA FEIS and supporting documents and gathered information about each of the above areas to identify specific items that needed to be addressed. To help identify important issues, the Team gathered input from national forests currently implementing the SNFPA and former members of the SNFPA interdisciplinary team, held meetings with interest groups, sponsored field trips, and reviewed work products generated by the Regional Office SNFPA Implementation Team. The Team also reviewed the appeals record and the Chief’s appeal decision.

The Team investigated a number of concerns related to the issue areas identified by the Chief and Regional Forester. In the course of conducting the review, new analytical techniques were developed to provide insight into how management direction was implemented on the ground. New information was collected and compiled about species of concern as additional research findings were published, conservation assessments were developed, and field surveys were completed. Also, as the review was conducted, the USDI Fish and Wildlife Service released listing decisions for two species of concern. The insight and understanding gained through the yearlong review is explicitly addressed in this Draft SEIS. The review is documented in "Sierra Nevada Forest Plan Amendment, Management Review and Recommendations," (March 2003) and is incorporated by reference.

Purpose of and Need for Action

The purpose of the proposed action is to adjust existing management direction to better achieve the goals of the SNFPA. The SNFPA Review described above, combined with insight gained from two years of field implementation, highlighted the need for refinements within three broad problem areas identified in the SNFPA: old forest ecosystems and associated species; aquatic, riparian and meadow ecosystems and associated species; and fire and fuels management.

Old Forest Ecosystems and Associated Species

The Sierra Nevada Ecosystems Project (SNEP) report (chartered by Congress and completed in 1996) found that old forest ecosystems were one of the most altered ecosystems in the Sierra Nevada Region and that habitat or populations of some animals associated with old forests had declined. Accordingly, the SNFPA was intended to provide regionally consistent direction for old forest conservation. Specific goals were to:

- protect, increase, and perpetuate desired conditions of old forest ecosystems and conserve their associated species while meeting people's needs for commodities and outdoor recreation activities;
- increase the density of large trees, increase structural diversity of vegetation, and improve the continuity and distribution of old forests across the landscape; and
- reverse declining trends in abundance of old forest ecosystems and habitats for species that use old forests (SNFPA FEIS, Volume 1, Chapter 1, pages 5 through 6).

The above needs are still valid and must be addressed in the course of making any changes to the existing direction. However, there is new information to consider about species dependent on old forest ecosystems. For example, new scientific analysis of the status and trend of California spotted owl populations in the four study areas within the Sierra Nevada will inform judgment about the risks of active management to more effectively reduce hazardous fuels. In addition, owl reproductive data for the four Sierra Nevada owl study areas has been collected for the spring 2002 breeding period. This new information shows a pulse in reproduction that was not available to be considered in the SNFPA FEIS.

Circumstances surrounding the use and availability of owl habitat on private lands have also changed. California Forest Practices Act regulations require private industrial timberlands to be managed in a sustainable manner and there is a need to consider the potential supply of suitable owl habitat on private lands when evaluating the cumulative effect of Forest Service management activities.

Finally, in February 2003, the U.S. Fish and Wildlife Service announced that after reviewing the best available scientific and commercial information available, listing of the California spotted owl as an endangered species was not warranted. This finding and its rationale provide important information to be considered in the Draft SEIS.

California continues to have unusually high levels of fire activity and the scope of the forest health problem is enormous. Decades of fire suppression have often produced overcrowded vegetation in the forests, weakening trees and making them more fire prone and more susceptible to pests, diseases, and displacement by invasive species. Recent fire seasons illustrate the risks from inaction, and the number and severity of acres burned in wildfires continues to increase. Using historic fire data and recent trends, the FEIS projected habitat losses at 68,000 acres per year over the next decade. At that rate, old forest habitat is burning up faster than it can be replaced. There is a need to reduce expected habitat losses to a rate that is at or below replacement by treating enough acres with enough intensity to significantly modify fire behavior. The SNFPA Review indicated that adjustments to management direction would improve the Forest Service's ability to accomplish this goal.

Aquatic, Riparian, and Meadow Ecosystems

The above-mentioned SNEP report found aquatic, riparian and meadow ecosystems to be the most degraded of all habitats in the Sierra Nevada, although much of this problem was related to lower elevation dams and diversions. In addition, many aquatic and riparian-dependent species such as willow flycatcher and Yosemite toad were at risk of extirpation. The SNFPA was intended to provide regionally consistent direction to address these problems. Specific goals were to:

- Protect and restore desired conditions of aquatic, riparian and meadow ecosystems in Sierra Nevada national forests.
- Provide for the viability of species associated with those ecosystems.

The above needs are still valid and must be addressed in the course of making any changes to the existing direction. However, there is new information to consider about the population status and distribution of Yosemite toad and willow flycatcher gained from 2 years of field surveys to protocol. The recently completed conservation assessment for the willow flycatcher includes updated information about the status of the species and possible refinements to managing and restoring suitable habitat. This information supports the need to consider local data and conditions when planning projects in associated habitat.

New information is also available about the likely reductions in grazing activity that will be caused by the existing standards and guidelines for meadows and meadow-associated species. The Draft SEIS considers changes to management direction that embrace the potential for developing site-specific strategies to allow more economic benefits to be retained while continuing to minimize the risks to sensitive species.

Fire and Fuels Management

The SNFPA FEIS recognized that wildland fire posed a major threat to life, property, financial resources, and natural resources in the Sierra Nevada. In addition, the continued and rapid growth of the region's human population puts increasing numbers of people "in harm's way" and at risk of loss from wildfires unless hazards are mitigated. The SNFPA was intended to provide a coordinated strategy for addressing the risk of catastrophic wildfires from decades of fire suppression and the resulting build-up of hazardous fuels. Specific goals were to:

- Reduce the wildfire threat to human communities and ecosystems and natural resources.
- Maintain ecosystem functions.
- Decrease the cost of fire suppression.

These goals are still valid and must be addressed in the course of making any changes to the existing direction. However, since the ROD was signed, changed circumstances and new information must be considered in framing management direction to attain these objectives.

The National Fire Plan represents a collaborative approach to wildland fire management that has broad support from the administration, Congress, the Western Governors and many other local and regional groups. In May of 2002, the Secretaries of Agriculture and Interior and the Western Governors developed the Implementation Plan for this collaborative effort. Forest Service units at the state and local level are encouraged to work collaboratively with other agencies to accomplish the desired outcomes. The Regional Forester intends for the Southwest Region to achieve the goals of the National Fire Plan. Thus, there is a desire for the management direction for the Sierra Nevada forests to contribute to the goals and performance measures of the Implementation Plan.

The SNFPA Review identified aspects of the existing management direction that must be refined to achieve this goal.[1] Briefly, fuels treatments must significantly lower wildfire intensity and rate of spread, thus directly contributing to more effective suppression and fewer acres burned. Hazardous fuels must be treated in cost-efficient manner to maximize program effectiveness. Management must actively restore fire-adapted ecosystems by making demonstrated progress in moving acres out of an unnaturally dense condition (i.e. moving acres from condition class 2 or 3 to condition class 1).

The SNFPA Review also recognized the by-products of mechanical thinning as an economic opportunity for local communities and includes measures to assess the degree to which fuels reduction programs are meeting that objective. As important as the inherent economic benefit is that the additional economic value of byproducts would provide the ability to treat more acres of hazardous fuels, thereby contributing to overall program effectiveness.

Based on new information collected and analyzed during the SNFPA Review there is also a need to more fully consider three critical aspects of the fire and fuels strategy in the SNFPA. Selected standards and guidelines must be adjusted to ensure that certain conditions can be met. In particular, fuels treatments must: (1) be strategically placed across the landscape, (2) remove enough material to cause a fire to burn at lower intensities and slower rates of spread in the treatment area compared to untreated areas, and (3) be cost-efficient to maximize the number of acres that can be treated under a limited budget. Recent analysis identified the prescriptive nature of the existing standards and guidelines as a primary barrier to meeting these three elements. The potential for this problem was recognized in the FEIS with a statement that “Modified 8 would have stand level structural requirements that could preclude full implementation of the fuels strategy.” (FEIS, Volume 1, Summary, pg. 29)

The SNFPA Review identified the need to adjust the existing management direction to make it less complicated and costly to implement. To that end, there is a need to make the standards and guidelines utilize a wider array of tools and techniques to meet fuels reduction objectives and better respond to local resource conditions in a cost-effective manner. Finally, there is a need to reduce the emphasis on prescribed burning for initial treatments in light of public concerns about smoke levels and limits on available burn days.

Implementation of the Herger-Feinstein Quincy Library Group (HFQLG) Forest Recovery Act Pilot Project

Within the Sierra Nevada bioregion, a number of special plans and projects are underway to more fully understand and learn from alternative management strategies. Some of these were explicitly recognized in the ROD and allowed to continue unimpeded by new direction in the SNFPA. Examples include the Upper Pit River Watershed Restoration Project, The Hackamore Ecosystem Restoration Project, the Warner Mountain Rangeland Management Planning Effort, the Modoc/BLM Experimental Stewardship Project, and the Big Valley Sustained Yield Unit. However, the ROD did not make provisions for the

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HFQLG pilot project to continue in its original form. Instead, it imposed new land allocations, new standards and guidelines for sensitive species, a new fire and fuels strategy, and eliminated the program of group selection.

The Pilot Project was designed and intended to provide information needed to reduce scientific uncertainty regarding the environmental outcomes of certain forest management activities. However, the SNFPA Review found that collectively, the standards and guidelines in the ROD prevent this learning from occurring and compromise the adaptive management strategy that is at the heart of the SNFPA. In addition, the Review found that the goal of commodity production was also compromised by the ROD, which made no provision for regeneration harvest to continue within or outside the HFQLG Pilot Project Area. In light of these findings, there is a need to adjust existing management direction to better reconcile the goals of the HFQLG Pilot Project with those of the SNFPA and its Adaptive Management theme and assumptions.

Proposed Action

The Forest Service proposes to amend the ROD for the SNFPA (January 12, 2001). Specifically, the proposed action responds to changed circumstances and new information identified in the yearlong review of the SNFPA.

The proposed action would replace the standards and guidelines in the existing SNFPA ROD fire and fuels strategy with direction that provides the flexibility needed at the local level to effectively modify wildland fire behavior. Opportunities are also provided to allow for by-products to be generated to offset fuels treatment costs and allow more acres of hazardous fuels to be treated overall. In addition, the basic strategy would be broadened to include other management objectives, such as reducing stand density for forest health, restoring and maintaining ecosystem structure and composition, and restoring ecosystems after severe wildfires and other large catastrophic disturbance events. The resulting integrated fuels and vegetation management strategy is designed to be aggressive enough to minimize the risks to communities from wildfire in the wildland urban intermix and to adequately address the threats to wildlife from catastrophic wildfires across broader landscapes. This objective is balanced with the need to ensure that wildlife and other resource values are protected today and into the future.

The proposed action would change selected standards and guidelines for willow flycatcher habitat, Yosemite toad habitat, great gray owl protected activity centers, and grazing utilization to better reflect the wide array of site conditions encountered in the field and the management opportunities they may provide.

The proposed action would clarify management intent for off-highway vehicles; limit the requirement for limited operating periods to vegetation management activities only; and clarify the application of several of the riparian standards and guidelines to recreation activities, uses, and projects. These changes are proposed to more closely align management direction with management intent and to allow local managers to develop mitigation measures for small and varied recreation projects on a project- and site-specific basis.

Decision to be made

The decision to be made is whether to amend the Land and Resource Management Plans for the Humboldt-Toiyabe, Modoc, Lassen, Plumas, Tahoe, Eldorado, Stanislaus, Sierra, Sequoia, and Inyo National Forests and the Lake Tahoe Basin Management Unit.

Public Participation

No formal public scoping period was held or required for the Draft SEIS; however, the extensive and open public process used to complete the SNFPA Review informed development of the proposed action. The yearlong Review was a transparent and highly collaborative process conducted by local Forest Service employees working with a host of key stakeholders, including elected officials, tribes, interest groups and other government agencies. Insight was obtained from dozens of public meetings, workshops, and field trips held with employees, interest groups, scientists, other government agencies, journalists, and others. An Internet website and biweekly electronic news brief were developed to keep the public informed throughout the Review. The issues identified in the SNFPA FEIS (Volume 1, Chapter 1, pages 12 through 16) reflect the broad areas of concern, debate and disagreement that also surfaced during the Review.

The Alternatives

The Draft SEIS considers 10 alternatives in detail: the no action alternative (Alternative S1), the proposed action (Alternative S2), partial application of the proposed action (Alternative S3), and seven action alternatives from the FEIS (Alternatives F2-F8). The no action alternative (Alternative S1) continues management in the 11 Sierra Nevada national forests consistent with the Sierra Nevada Forest Plan Amendment (SNFPA) Record of Decision (ROD, January 2001). Alternative S2 proposes specific changes to the SNFPA ROD to respond to direction from the Chief of the Forest Service and the Pacific Southwest Regional Forester described above under “Background.” Alternatives 2 through 8 of the SNFPA FEIS are briefly described in the Draft SEIS as Alternatives F2-F8. Readers can refer to the SNFPA FEIS, Volume 1, Chapter 2, pages 83-164, for more detailed descriptions of these alternatives.

Alternative S1 (No Action)

The no action alternative (Alternative S1) would continue management in the 11 Sierra Nevada national forests consistent with the Sierra Nevada Forest Plan Amendment (SNFPA) Record of Decision (ROD, January 2001). Alternative S1’s approach for conserving old forest ecosystems and associated species and managing fire and fuels responds to concerns that impacts from mechanical fuels treatments may pose greater risks to habitats, particularly in the short-term, than the risks posed by potential wildland fires. As such, Alternative S1 applies a cautious approach for conducting activities in habitats for sensitive species, particularly species associated with old forest ecosystems. Alternative S1 includes standards and guidelines for retaining canopy cover and limiting the sizes of trees that can be removed during fuels treatments and imposing limited operating periods for activities within the vicinity of nest and den sites. Under Alternative S1, vegetation treatments are focused on fire hazard reduction, maintenance activities, and public health and safety.

The No Action Alternative also provides direction for limiting and, in some cases, eliminating grazing from habitat that is or has been occupied by the Yosemite toad and willow flycatcher. This alternative applies limited operating periods to vegetation management activities in the vicinity of California spotted owl and northern goshawk nest sites and forest carnivore den sites. Limited operating periods may apply where analysis of proposed projects or activities determines that such activities are likely to result in nest or den site disturbance.

Alternative S2 (Proposed Action, the Preferred Alternative)

Alternative S2 proposes changes to specific elements of the SNFPA ROD, primarily in the strategies for old forest ecosystem and associated species conservation and fire and fuels management. Alternative S2 retains the existing SNFPA ROD's goals for conserving old forest ecosystems and associated species and managing fire and fuels. This alternative uses a more active management approach, where Forest Service managers use thinning, salvage, and prescribed and natural fires to make forests less susceptible to the effects of uncharacteristically severe wildland fires as well as invasive pests and diseases. It also provides mechanisms that allow fuels and forest health treatments to generate revenues through commercial forest products to increase the number of acres that can be treated with available appropriated funds. Alternative S2 responds to concerns that impacts from large, severe wildland fires may pose greater risks to habitats for sensitive species than short-term risks from vegetation and fuels management activities. This alternative's active vegetation and fuels management approach acknowledges the short-term risks of temporarily changing some habitat for California spotted owls and other species with similar habitat needs to mitigate the longer-term risks associated with the impacts of large, severe wildland fires on both wildlife habitats and human communities.

Alternative S2 proposes an integrated vegetation management strategy with objectives for protecting communities and modifying landscape-scale fire behavior to reduce the size and severity of wildland fires, similar to those described in the SNFPA ROD. However, Alternative S2's integrated vegetation management strategy clarifies the intent of the existing SNFPA ROD as it relates to these objectives for fire and fuels management. The integrated vegetation management strategy also includes objectives for enhancing forest health, restoring and maintaining ecosystem structure and composition, and restoring ecosystems after large wildland fires and other large-scale disturbance events.

Alternative S2 would retain the SNFPA ROD's network of land allocations and their associated desired conditions. Alternative S2 would, however, replace many of the SNFPA ROD standards and guidelines pertaining to old forest ecosystems and associated species conservation and fire and fuels management. Alternative S2's replacement standards and guidelines provide greater flexibility to local managers to design projects that respond to local conditions while meeting the objectives for which the original standards and guidelines were designed.

Alternative S2 would provide for implementation of the HFQLG Forest Recovery Act pilot project, consistent with the HFQLG Forest Recovery Act Record of Decision (August 1999) with the following two exceptions: (1) The mitigation measure to avoid resource management activities, as defined in the HFQLG Forest Recovery Act, in suitable owl habitat would be dropped; and (2) DFPZ completion would be allowed in LSOGs 4 and 5 with direction to avoid altering old forest patches within this land allocation. Upon completion of the pilot project, management activities on the Plumas and Lassen National Forests and the Sierraville Ranger District of the Tahoe National Forest would be guided by the direction under Alternative S2 for the Sierra Nevada national forests.

Alternative S2 would also include standards and guidelines for managing grazing within habitat that is or has been occupied by the Yosemite toad and willow flycatcher. Management direction would be designed to adjust local management to respond to highly variable site-specific conditions across the Sierra Nevada bioregion and Modoc Plateau. This alternative would apply limited operating periods to vegetation management activities in the vicinity of California spotted owl and northern goshawk nest sites and forest carnivore den sites.

Alternative S3

Alternative S3 would only implement the proposed action for fuels treatments (Alternative S2) in the wildland urban intermix (WUI) defense zone for the first 5 years to protect the communities in the Sierra Nevada from catastrophic wildfire. Four adaptive management studies would be initiated in the four

California spotted owl demographic study areas to learn the response of owls to various treatments designed to reduce and/or modify fire behavior. If reliable information resulted from the adaptive management studies after 5 years, fuels treatments could be expanded to WUI threat zones under the standards and guidelines set forth under Alternative S2. Management outside the defense zone would be guided by the existing SNFPA ROD (Alternative S1) for the first 5 years and beyond, except in threat zones for the second 5 years, where Alternative S2 would apply, contingent on the results of the adaptive management studies. Under Alternative S3, the HFQLG area would be guided by the same direction as the rest of SNFPA planning area.

Alternative F2 (FEIS Alternative 2)

Alternative F2 establishes large reserves where human management is very limited, to maintain and perpetuate old forest, aquatic, riparian, meadow, and hardwood ecosystems. Alternative F2 responds to views that ecosystems should be protected from all but minimal human-caused disturbances and conditions that “nature” delivers are desired.

Alternative F3 (FEIS Alternative 3)

Alternative F3 emphasizes restoration of desired ecosystem conditions and ecological processes through active management determined through landscape analysis, monitoring, and local collaboration. Management activities would promote ecosystem conditions and ecological processes expected within natural ranges of variability under prevailing climates.

Alternative F4 (FEIS Alternative 4)

Alternative F4 emphasizes the development of forest ecosystem conditions that anticipate and are resilient to large-scale, severe disturbances, such as drought and high intensity wildfire, common to the Sierra Nevada. The alternative is consistent with the view that ecosystems should be actively managed to meet ecological goals and socioeconomic expectations. Alternative F4 would have the greatest number of acres available for active management including timber harvest.

Alternative F5 (FEIS Alternative 5)

Alternative F5 limits impacts from active management through range-wide management standards and guidelines. Alternative F5 preserves existing undisturbed areas and restores others to achieve ecological goals. Alternative F5 emphasizes reintroducing fire as a natural process and using fire to reduce fires and fuel accumulations.

Unroaded areas larger than 5,000 acres, ecologically significant unroaded areas between 1,000 and 5,000 acres, and inner zones of riparian areas would be persevered and left to develop under natural processes. Other areas, including old forest emphasis areas and general forest, would be restored under a limited active management approach to increase the amount of, and enhance processes associated with old forest conditions. Alternative F5 limits impacts from management activities by specifying range-wide management standards and guidelines.

Alternative F6 (FEIS Alternative 6)

Alternative F6 integrates desired condition for old forest and hardwood conservation with fires and fuels management. This alternative provides direction for implementing a landscape-scale strategic fuels treatment program in high-risk vegetation types across Sierra Nevada landscapes to: (a) reduce the potential for large severe wildfires, and (b) increase and perpetuation old forest and hardwood ecosystems, providing for the viability of species associated with those ecosystems.

Alternative F7 (FEIS Alternative 7)

Alternative F7 aims to establish and maintain a diversity of forest ages and structures over the landscape in a mosaic approximating patterns that would be expected under natural conditions, that is conditions characterized by current and expected future climates, biota and natural processes. Ecosystems and ecological processes would be actively managed to maintain and restore them to desired conditions. Silvicultural treatments could produce timber and other forest products.

Alternative F7 relies on few land allocations, applying what is commonly termed a “whole forest approach.” Most lands are designated in the “general forest” land allocation where active management is used to move landscapes toward desired conditions. Management is linked to desired conditions for California Wildlife Habitat Relationships (CWHR) stages and old forest condition goals, specific to the manor Sierra Nevada forest types.

Alternative F8 (FEIS Alternative 8)

Alternative F8 emphasizes a cautious approach to treating fuels in sensitive wildlife habitat. New information from research and administrative studies would be developed to reduce uncertainty about the effects of management on sensitive species. Until further guidelines were developed, treatments in suitable California spotted owl habitat would retain specific levels of large trees, canopy cover, canopy layers, snags, and down woody material.

Environmental Consequences

This section of the summary compares the alternatives by summarizing their environmental consequences. Note that environmental consequences for Alternatives F2 through F8 are fully described in the SNFPA FEIS and are not repeated in the Draft SEIS.

Old Forest Ecosystems

All of the alternatives would maintain and enhance old forest conditions across Sierra Nevada landscapes. However, they would have different effects on: (1) amounts and distribution of old forest conditions, (2) potential losses of old forests to wildfire, and (3) old forest ecosystem functions and processes.

Amount and Distribution of Old Forest Conditions. The number of large, old trees would increase under all alternatives. However, Alternatives F4 and F6 would have the greatest likelihood of maintaining large, live trees with a net increase in large trees in both the short and long term. Alternatives F2, F5 and F8 could provide the greatest amounts of old forest patches with high canopy closure (cover) in the short-term; however, because of restrictive or less effective fuel treatments these increases could be offset by increased future losses to wildfire. Alternative F6 would have increases in old forest patches with high and moderate canopy closure (cover) and the greatest certainty that more old forest patches could be protected from wildfire losses.

Alternatives S1, S2, and S3 initially focus activities primarily in the WUI where less old forest is likely to occur. Alternatives S1 and S3 contain specific management direction for old forest emphasis areas which could provide greater amounts of old forest patches with high canopy closure (cover) in the short-term than Alternative S2; however, because of restrictive or less effective fuel treatments, these increases could be offset by increased future losses to wildfire. Alternative S2 has greater risk to recruitment of old forest conditions in eastside forests than Alternatives S1 or S3 because it raises the retention diameter limit from 24” dbh to 30” dbh. The effects of Alternative S3 would be similar to Alternative S1 in that it initially only applies the changed direction to the defense zone of the WUI and applies the existing direction in the remainder of the areas. Pending the outcome and learnings of the adaptive management studies, it could implement the changed direction to the threat zone of the WUI in the second five years. In that situation, treatments in the WUI would be similar to Alternative S2, and treatments outside the WUI would be similar to Alternative S1.

Potential Losses to Severe Wildland Fires. Predicted acres burned during wildfires decreases in Alternatives F3, F4, F6, and F7; slight increase in Alternative F8; greater increases in Alternatives F2 and F5. What is more important to effects on old forests is the probability of future fires in concentrations of existing old forest and the level of mortality associated with the predicted fires. Alternatives F4 and F6 emphasize fuel treatments in a strategic pattern, and watersheds with the highest fire hazard and risk have highest priority for treatment. Therefore, expected losses of old forest from severe wildfire are least for these alternatives. Alternative F8 also use a strategic fuels reduction approach, and watersheds with the highest fire hazard and risk rating have highest priority for treatment. However, fuel treatment levels and rates in Alternative F8 are less than in Alternatives F4 and F6; therefore, the expected reduction in effects is less certain. In particular, the most restrictions on fuel treatments in Alternative F8 would apply in areas likely to contain concentrations of old forest: habitat associated with the California spotted owl and the fisher. Therefore, Alternatives F8 would have a higher likelihood of loss of old forest to high severity fire compared to Alternatives F4, F6, or F7, despite their similarity in overall predicted decreases in wildfire acres burned. Alternative F7 would also likely have a higher loss of old forest to high severity fire than Alternatives F4 or F6 because this alternative does not emphasize treatments in concentrations of old forests represented in old forest emphasis areas (as would occur under Alternatives F4 or F6).

The pattern and location of strategic fuels treatments would be similar in Alternatives S1, S2 and S3, however the treatment intensity and methods would vary, which results in changes in the effectiveness of fuel treatments for changing fire behavior and ultimately for predicted fire size and severity. For many of the same reasons provided in the discussion above for the amount and distribution of old forest conditions, Alternative S2 has the higher likelihood of reducing the potential losses to severe wildfire compared to Alternatives S1 and S3.

Old Forest Ecosystem Functions and Processes. Alternatives F5, F6, and F8 have the greatest emphasis on prescribed burning, and consequently the greatest emphasis on reintroducing fire as a process in old forest ecosystems. Alternatives F5 and F8 have more restrictions on prescribed burning than Alternative F6. Alternative F6 however provides explicit priority for restoring fire as a process in old forests, which is different than any other alternative. Alternative F6 has the greatest planned restoration of fire as a process in old forests. Alternatives F4 and F7 have low to moderate amounts of prescribed burning. However, treatment locations rely more on local discretion, so the extent to which these alternatives would restore fire to old forests is unknown. Alternative F8 has higher levels of prescribed burning; however, restrictions in this alternative’s standards and guidelines limit the extent of prescribed burning and therefore the amount of fire restoration in old forests. Alternative F2 has very little prescribed burning, and thus minimal restoration of fire to old forests.

The alternatives with the highest likelihood of connectivity between large blocks dedicated to old forests are listed in order as follows: Alternative F2, F5, F3, F8, and F6. Alternative F4 has moderate-sized blocks dedicated to old forests, but they are widely distributed and more limited in providing connectivity. Alternatives F3, F4, F5, F6, F7, and F8 have provisions for maintaining old forest patches in the general forest that would contribute to connectivity.

Alternatives S1, S2 and S3 emphasize the use of prescribed fire as a treatment method. Alternatives S1 and S3 have a strong preference for the use of prescribed fire as the treatment method in several situations, such as spotted owl and northern goshawk PACs outside of defense zones, however limitations due to smoke management and high existing fuel loadings may hamper some prescribed burn projects. Alternative S2 allows more use of mechanical treatments as an initial treatment with a desire to use prescribed burning as a follow-up treatment but maintains use of prescribed burning as the initial treatment in PACs outside the WUI. Alternative S3 would be intermediate, initially with slightly more mechanical treatment opportunity than Alternative S1 by setting standards and guidelines that allow more mechanical treatment in the defense zone. If adaptive management studies allow, treatments in the threat zone in the second five years would allow more use of mechanical treatments instead of prescribed burning as an initial treatment. Since most treatments in these alternatives would be focused on the WUI, the potential to directly benefit old forests would be limited. Alternative S2 allows treatments outside the WUI and for forest health outside of the WUI; however, it does not require treatments. The extent that treatments outside of the WUI would occur is predicted to be low.

Alternatives S1 and S3 has prescriptive standards and guidelines for treatments in old forest emphasis areas and for retention of medium and large trees across broad areas resulting in a low to moderate level of uncertainty. Alternative S2 retains the same land allocations and intents for management as Alternative S1 but lacks specific direction in standards and guidelines, which provides for greater uncertainty. Alternative S3 also has low to moderate uncertainty based on the limitations on treatments and dependence upon adaptive management studies prior to expanding treatments to the threat zone.

Aquatic, Riparian, and Meadow Ecosystems

The action alternatives would meet the aquatic management strategy (AMS) goals to varying degrees. Alternatives F2, F5, F6 and F8 would most closely meet the AMS goals because they provide the greatest protection for water quality and riparian, aquatic, and meadow ecosystems. Alternative F4 would provide a reduced level of water quality protection compared to Alternatives F2, F5, F6 and F8 primarily due to the likelihood of high severity wildfire impacts under this alternative. Alternatives F3 and F7 would provide somewhat less protection to riparian areas compared to Alternatives F2, F5, F6 and F8. Alternative F4 would be the least effective of the action alternatives in meeting the AMS goals.

Alternatives S1, S2 and S3 all include the aquatic management strategy goals as a management objective. Alternatives S1 and S3 provides the highest assurance of meeting the AMS goals, primarily due to their limitations on treatment methods and intensities in various land allocations. Alternative S2 could meet the AMS goals to similar levels, however, the assurance at a bioregional level would be less because decisions on project design and treatment methods and intensities are made at the project level. Alternative S3 has slightly more uncertainty than Alternative S1 because it allows more use of mechanical treatments in the defense zone and potentially also in the threat zone. This is not likely to be substantial though since most defense zone treatments are unlikely to contain high amounts of aquatic, riparian, and meadow ecosystems.

Fire and Fuels

Weather, topography and fuels influence the behavior of fires. All alternatives influence fires in the Sierra Nevada through a fire suppression program and modification of fuels and vegetation. Alternatives F3, F4, F6 and F7 would reduce the average annual wildfire acres burned in the first decade after treatments are implemented compared to historical averages over the 27-year period from 1970 through 1996. These alternatives apply the strategically placed fuel treatment approach, but the probability of their effectiveness varies. Alternatives F4, F6, and F7 have landscape structural requirements with flexibility that allows full implementation of the fuels strategy.

Fire effects are more difficult to estimate; however, the alternatives most likely to reduce acres lethally burned each year by wildfire are (in decreasing order): Alternative F4, F3, F6, F7, F8 and F5, and F2. Alternatives F2, F5, and F8 would result in the greatest number of acres burned annually at lethal levels by wildfire.

Alternatives F3, F4, F6, and F7 would enhance conditions for initial wildfire attack efficiency. Alternative F5, F6, and F8 have the greatest emphasis on fire reintroduction. Alternatives F3, F4, F6, F7 and F8 would provide the greatest protection for property within the WUI.

Alternatives S1, S2 and S3 all initially focus treatments within the WUI using a defense zone and a threat zone and a pattern of strategically placed fuel treatments. Alternative S2 has the potential to reduce the average annual wildfire acres burned by allowing local managers to adjust some site-specific prescriptions to result in a greater effectiveness in changing fire behavior than Alternative S1, which is more prescriptive with limited ability for local adjustments. Alternative S3 initially restricts this increased flexibility to the defense zone for the first 5 years. It may be applied to the threat zone in the second five years if adaptive management studies determine that it is an appropriate practice.

Noxious Weeds and Invasive Nonnative Plants

Implementation of an integrated weed management program is common to all alternatives. This program would improve suppression and control of noxious weeds in Sierra Nevada national forests.

Hardwood Ecosystems

Effects of the alternatives on hardwood ecosystems are analyzed in terms of hardwood ecosystem sustainability and biodiversity. Sustainability is a desired condition for hardwood ecosystems, and is affected by the balance between mature tree removal and young tree growth. Hardwood ecosystems support a diversity of plant and animal species; the alternatives differ in how they protect and perpetuate these diverse conditions.

Sustainability in Hardwood Ecosystems

Alternatives F3, F4, F6, and F7 rank highest in their contribution to blue oak and montane hardwood ecosystem sustainability; however, each alternative has different strengths and uncertainties. These alternatives all provide a balance between information gathering and uncertainty while incurring high levels of protection from wildfire. Alternative F4 provides managers with the most flexibility for applying mechanical treatments and has the highest potential for reducing wildfire. However, Alternative F4 has the highest degree of uncertainty because it has fewer requirements for gathering information about hardwoods and their management. Alternatives F6 and F7 provide both fuels treatments and information gathering. Because of the local flexibility built into Alternative F7, it would have more uncertainty than Alternative F6, though this uncertainty should be balanced against the likelihood that benefits would be increased through local flexibility. The additional reforestation standards in Alternatives F6 and F7 would contribute to sustainability over Alternative F4 by reducing the likelihood that blue oak and montane hardwood stands would be converted to conifer stands. Alternative F3 would use the most cautious approach, providing many opportunities to gather information, but little opportunity to actively manage hardwood ecosystems and provide needed disturbance. Alternative F8 would require a high degree of information gathering and provides moderate protection from wildfire, but management is more limited, particularly in suitable California spotted owl habitat. Alternatives F2 and F3 generally rank low to moderate in contributing to hardwood sustainability due to fewer information-gathering requirements and generally fewer opportunities for conducting treatments.

There are no direct differences between the Alternatives regarding hardwood management. All alternatives follow the same Conservation Strategy for Lower Westside Hardwood Ecosystems and Forest-wide Standards and Guidelines. These include direction to identify opportunities for restoration and enhancement during landscape analysis and project planning.

Biodiversity in Hardwood Ecosystems

Key concerns for montane hardwood ecosystems are lack of late seral conditions, large trees, and open canopy conditions. Blue oak woodlands appear to have sufficient distribution of canopy cover classes, but numbers of medium and large trees are a concern.

Short-Term Effects. Alternative F6 would retain large trees and snags in the short term, and would allow a moderate level of treatment to develop hardwood stands in the long term. Alternatives F2, F3 and F5 would retain large trees and snags in the short term, but would limit treatment and development of hardwood stands in the long term. Alternatives F4 and F7 would not retain large trees and snags to the same degree as the other alternatives in the short term, and would permit treatments over the greatest area to develop hardwood stands in the long term. Alternative F8 would likely retain large trees and snags in the short term, but long-term effects are uncertain.

Long-Term Effects. Alternatives F6 and F7 would provide the highest degree of maintaining long-term biodiversity of hardwood ecosystems. Alternative F4, which has limited large tree retention standards, ranks lower than Alternatives F6, F7, and F8. Alternatives F2, F3, and F5 rank below the other alternatives due to inability of these alternatives to reduce conifer encroachment, which could result in a long-term loss of hardwood communities.

The short-term and long-term effects are similar between Alternatives S1, S2 and S3. All of these alternatives apply the same hardwood conservation strategy and standards and guidelines that direct consideration of hardwood ecosystems in landscape analysis and project planning and protection measures during project implementation. Alternatives S2, S2, and S3 retain large hardwoods and include considerations for hardwood regeneration. Alternative S2 allows the greatest opportunity for improvement in hardwood conditions because it allows the most mechanical treatments and has lower canopy cover retention limits and potentially allows more treatment across the landscape, although the difference may be slight depending upon the emphasis on hardwood ecosystems placed at the project level.

Focal Species

California Spotted Owl

All alternatives show projected increases in quantity and quality of useable habitat available for the California spotted owl across its range. The alternatives are distinguished by differences in the amount of habitat and management of individual owl nest locations and home range areas. Alternative F4 is projected to produce slight declines in high quality California spotted owl habitats, and would not protect all spotted owl nest (or primary roost) stands. Among the remaining alternatives, Alternative F7 is projected to provide lower amounts of useable habitat. Alternatives F2, F3, F5, F6 and F8 protect all California spotted owl nest stands and have the highest projected increase in habitat values. These alternatives should provide positive benefits to California spotted owls to the extent that habitat on national forests limits population numbers. Alternative F2, F5 and F8 limit activities within California spotted owl home ranges to a greater extent than other alternatives, and could provide increased short-term protection. Improved understanding of relationships between habitat patterns at the home range scale and California spotted owl demographics, and application of this knowledge at smaller scales could reduce the risks of implementing any of the alternatives.

Alternative S2 has a higher level of risk and uncertainty for maintaining spotted owl habitat within home ranges than Alternative S1 because it provides less limitations on treatment methods and intensity within PACs and HRCAs. Alternative S3 would be more similar to Alternative S1, except for the PACs within the WUI, which would be treated more similar to Alternative S2. It is unknowable at the bioregional scale how the direction to avoid treatments within PACs and HRCAs to the extent possible will affect the spotted owl because the extent of treatments will be determined locally.

The number of spotted owl PACs treated varies between the alternatives because the metric changes between Alternative S1 (limits the number of PACs treated) and Alternative S2 (limits the number of acres of PACs treated). The exact differences can only be determined during project planning and following implementation, which would require a rigorous implementation monitoring process maintained at the regional level. For this analysis, a modeling exercise was used to estimate the numbers and acres that might theoretically be affected. Alternative S1 was modeled to treat within 264 PACs, which is the limit of 20 percent over 2 decades of treatment. This would affect 5 percent of the total acres of PACs. Alternative S2 was modeled to treat within 37,000 acres of PACs, which is 9 percent of the total acres of PACs and well below the 20 percent allowed over the 2 decades of treatment. This would affect 48 percent of the total number of PACs, although most of the treatments would only affect a portion of a PAC. Alternative S3 would affect the least number of PACs and would likely be less than the 5 percent by number per year and 10 percent by number per decade.

Northern Goshawk

Alternatives F3, F5, F6 and F8 would provide the greatest contribution to maintaining and enhancing conditions for northern goshawk throughout the Sierra Nevada. These alternatives would protect all northern goshawk territories and all show projected increases in overall amounts of high suitability habitat. Alternatives F4 and F7 would provide less certainty because of the high rates of mechanical treatments – however, would provide greater protection from loss to natural disturbance events.

Alternatives S1, S2 and S3 protect all northern goshawk territories and show projected increases in overall amounts of high suitability habitat. Alternative S2 would provide less certainty because of the slightly higher rates of mechanical treatments compared to Alternative S1– however, as stated above, it would provide greater protection from loss to natural disturbance events.

Willow Flycatcher

The alternatives use different approaches for managing and conserving willow flycatcher habitat and populations. Alternatives F2 and F8 provide the greatest improvement of conditions for willow flycatchers during the breeding season. Given the available data and uncertainties, Alternative F2, which excludes livestock grazing year-round in occupied willow flycatcher habitats, presents the greatest benefits to the species. Of all the action alternatives, Alternative F2 is the most likely to support long-term distribution and abundance of the willow flycatcher in Sierra Nevada national forests. Furthermore, Alternative F2 excludes grazing in meadow habitat within 5 miles of occupied sites, allowing for restoration and potential re-colonization of these sites and the opportunity for willow flycatcher population expansion and recovery.

Alternatives F3, F5 and F6 would provide slightly less improvement of conditions affecting the willow flycatcher than Alternatives F2 and F8. Alternatives F3 and F5 would provide more stringent guidelines than other alternatives regarding general streambank use but weaker protections than Alternatives F2 and

F8 specific to willow flycatcher habitat. Alternatives F3, F4, and F7 would provide an equal to slightly greater level of improvement of conditions associated with the willow flycatcher.

Alternatives S1, S2 and S3 apply the same Aquatic Management Strategy and Standards and Guidelines for aquatic, riparian, and meadow ecosystems. Specific Standards and Guidelines for willow flycatchers are developed for these alternatives that strive to accomplish the same objectives. Alternative S2 has slight differences related to grazing where surveys have not been completed and allowing development of a site-specific management plan to address grazing management where occupied willow flycatcher exists. These alternative management strategies are locally determined and are designed to provide sufficient protections for this species. Although the intent of these alternative management strategies is to provide for and protect habitat for the species, there are implementation difficulties that may increase the risk of success at avoiding impacts to willow flycatchers. Some of these risks exist within Alternatives S1 and S3 as well and are due to the difficulty in managing livestock in the forest environment. The levels of surveys required are the same between these alternatives. Alternative S2 includes a Standard and Guideline that requires assessment of "unoccupied" habitat to determine if habitat restoration is warranted.

Fisher

Alternatives F5 and F8 would have the greatest improvements to fisher persistence and habitat. Both alternatives would provide fisher habitat through their provisions for retaining and recruiting large trees, snags and coarse woody debris; retaining dense forest canopy; and promoting hardwoods on conifer sites.

Alternative F2 would provide habitat protections similar to Alternatives F5 and F8; however, because Alternative F2 relies primarily on fire suppression to manage the threat of severe wildfires, the risk of catastrophic fire would be higher under this alternative.

Alternative F3 would have less beneficial impacts on fishers in terms of dead and down wood and hardwoods on conifer sites than either Alternative F5 or F8. Under Alternative F6, canopy closure in denning areas could be reduced to 40 percent in developed areas within urban wildland intermix zones.

All of the action alternatives would protect fisher den sites from human disturbance; however, none of the alternatives would reduce road-related risks to the same extent as Alternative F5. Alternative F5 would reduce potential recreation-related impacts in close proximity to fisher locations and would reduce the impacts of roads and related human disturbance by reducing road density and protecting unroaded areas.

Alternatives F4 and F7 would overall provide no change or slight increases to fisher environment and population than the other alternatives. Alternative 4 would result in lower fisher abundance and distribution as it would slight decrease the availability of habitat elements important to fishers. Alternative F7 would reduce forest canopy from levels associated with denning habitat to levels associated with travel and foraging, but would have no change from the current situation.

Alternatives S1, S2 and S3 are similar in projected amounts of fisher habitat over time, with differences primarily due to predicted change in habitat reduction from large wildfires. All alternatives would develop a Conservation Assessment that could be used to develop a conservation strategy that would improve management consistency across the species range. This, coupled with ongoing research, should reduce the level of uncertainty regarding proposed treatments.

Marten

While there are slight differences between Alternatives, in general, environmental conditions and population would not be expected to change significantly from the current condition under any of the Alternatives. All alternatives would retain and develop large trees at sufficient levels.

Under Alternatives F5, F6 and F8, new recreational developments (for example ski areas) would be evaluated for compatibility with marten needs when they were proposed in suitable marten habitat. In addition, Alternative F5 would reduce the impact of roads and related human disturbance by protecting unroaded areas.

Alternative F2 provides direction for protecting marten habitat; however, this alternative has an increased risk of catastrophic fire, which could have negative effects on habitat for this species. Compared to Alternatives F5 and F8, Alternative F3 could provide less dead and down wood and hardwoods on conifer sites. Alternative F6 does not protect habitat as well as Alternatives F5 and F8 because it would allow canopy closure in denning areas to be reduced to 40 percent in developed areas within urban wildland intermix zones.

Alternative F4 would only slightly decrease overall environmental conditions and predicted populations compared to the current condition. Alternative F4 could slightly reduce forest canopy cover because it would establish and maintain both defensible fuels profile zones (DFPZs) and strategically placed area fuels treatments (SPLATs). Alternatives F4 and F7 provide less snag protection, which could lead to lower levels of recruitment of coarse woody debris over time. Alternative F4 has the highest level of fuels treatment and could result in less coarse woody debris recruitment. Alternative F7 emphasizes mechanical treatments over prescribed fire, possibly reducing coarse woody debris recruitment.

Alternatives S1, S2 and S3 are similar in terms of overall effect, with slight differences in terms of vegetation composition and structure. Alternative S2 allows more use of mechanical treatment than Alternatives S1 or S3, however, the effects would primarily affect marten at the local scale and would result in little overall affect at the context of the broad planning area.

Sierra Nevada Red Fox

Although the current distribution of the Sierra Nevada red fox in California is uncertain, the species' range appears to have contracted from the continuous distribution described by Grinnell in the 1930s. Of all the alternatives, Alternative F5 would likely lead towards the greatest improvement to environmental conditions and population for Sierra Nevada red fox, because it provides the greatest level of meadow protection, emphasizes reducing road densities across landscapes, and encourages new Sierra Nevada red fox surveys. Alternatives F3 and F5 propose restrictions on recreational activities in unroaded areas. Alternatives F5, F6 and F8 would further evaluate recreational development on the basis of Sierra Nevada red fox detections and the presence of suitable habitat. Alternatives F6 and F8 would not require surveys, and these alternatives place fewer restrictions on recreation and roads. Alternatives F4 and F7 would provide more of the open forest habitat preferred by the Sierra Nevada red fox than Alternative F5; however, these alternatives place fewer restrictions on recreation and would provide moderate reductions in roads. Alternative F2 would prohibit OHV and over snow vehicle (OSV) use in den site buffers; Alternative F2 would not require new surveys for the Sierra Nevada red fox.

Alternatives S1, S2 and S3 are all similar in terms of effects to Sierra Nevada red fox. Alternative S2 clarifies direction to validate sightings of this species by qualified researchers and clarifies the implementation of a limited operating period to better ensure that it is applied when warranted to reduce the potential to breeding individuals. This would likely have little biological effect and was primarily meant to balance social impacts with the potential for adverse biological effects.

Wolverine

Consequences to wolverines are primarily influenced by: (1) recreation and roads and (2) survey requirements and site protection. Based on the combined categories, Alternatives F5 and F8 appear to represent the greatest benefit to wolverine persistence and recovery. Alternative F5 and F3 would restrict recreational activities in unroaded areas. Alternative F5, F6 and F8 would evaluate recreational development on the basis of wolverine detections and the presence of suitable habitat. Alternative F5 would emphasize reducing road densities and would encourage new surveys. Alternative F3 would not provide the same level of benefits as Alternatives F5 and F8 because they would not require surveys, however they would limit activities around verified wolverine sightings.

All Alternatives would increase the suitability of wolverine habitat from the current condition, ranging from 5.4 to 9.1 percent. Alternatives F4 and F7 would have only slight increases. However, this variation does not significantly influence conclusions because none of the alternatives substantially affect the vegetation element of wolverine habitat, either as interpreted from the standards and guidelines or from habitat utility values projected by the California Wildlife Habitat Relationships (CWHR) model. Alternatives F4 and F7 would not encourage surveys, and they would have greater potential for new road development than the other alternatives.

Alternative F2 would have more risks related to the effects of roads and survey requirements than Alternative F5, but would generally provide greater benefits to wolverines than Alternatives F4, and F7.

As with the Sierra Nevada red fox, Alternatives S1, S2 and S3 are similar in effects for this species. Alternative S2 applies the same clarification regarding verification of sightings by qualified researchers and implementation of a limited operating period as described for the Sierra Nevada red fox.

Foothill Yellow-Legged Frog

Alternatives F2 and F5 appear to provide the greatest level of protection to the foothill yellow-legged frog, because they provide the most effective management approaches for this species' persistence and recovery. Alternatives F3, F6, F7, and F8 would provide a slight improvement from the current condition. Alternative F4 would decrease environmental conditions compared with the current condition. Information and research gaps, especially regarding the impacts of livestock grass and shrub utilization standards on the foothill yellow-legged frog, add uncertainty to this assessment.

Alternatives S1, S2 and S3 apply the same Aquatic Management Strategy and standards and guidelines for aquatic, riparian, and meadow ecosystems relative to this species. These alternatives protect populations as they are discovered by designating Critical Aquatic Refuges. The differences in the amounts of mechanical and prescribed burning between the alternatives will likely be tempered by the application of the Aquatic Management Strategy.

Mountain Yellow-Legged Frog

Alternatives F3, F5 and F8, appear to provide the greatest improvements of environmental outcomes for the mountain yellow-legged frog because they provide the most effective management approaches for this species' persistence and recovery. Alternatives F4, F6, and F7 provide less improvement for the mountain yellow-legged frog. All of the action alternatives (Alternatives F2 through F8) provide significantly greater protection to the mountain yellow-legged frog then the current condition.

Alternatives S1, S2 and S3 apply the same Aquatic Management Strategy and standards and guidelines for aquatic, riparian, and meadow ecosystems relative to this species. These alternatives protect populations as they are discovered by designating Critical Aquatic Refuges. The differences in the amounts of mechanical and prescribed burning between the alternatives will likely be tempered by the application of the Aquatic Management Strategy. Some mountain yellow-legged frog populations may overlap with habitat for the Yosemite toad, willow flycatcher or great gray owl. Alternative S2 changes some of the grazing management standards and guidelines related to these species that could potentially indirectly affect the mountain yellow-legged frog. However, these changes require site-specific analysis that would include a biological evaluation that would address all species occurring within the affected area so the implications of this change are minimal.

The Fish and Wildlife Service has determined that this species is warranted for listing but action towards listing is currently precluded due to other priorities. If this species is formally listed in the future, changes in management direction may be warranted.

Yosemite Toad

Alternative F8 provides the greatest improvement of environmental conditions for the Yosemite toad, because they provide the most effective management approaches for this species' persistence and recovery. Alternatives F2, F3, and F5 provide slightly less improvement, because of lack of specific direction limiting livestock grazing at Yosemite toad sites. Alternative F2 includes provisions for establishing an amphibian reserve system to protect known occupied and suitable unoccupied amphibian habitats (FEIS Appendix D standard and FEIS guideline AM12). Alternatives F3 and F5 would protect known occupied amphibian habitats, based on records over the last 25 years (FEIS Appendix D standard and FEIS guideline AM13). Alternative F4 would provide for improvement from the current condition.

Alternatives S1, S2 and S3 apply the same Aquatic Management Strategy and Standards and Guidelines for aquatic, riparian, and meadow ecosystems. These alternatives protect populations as they are discovered by designating Critical Aquatic Refuges. The differences in the amounts of mechanical and prescribed burning between the alternatives will likely be tempered by the application of the Aquatic Management Strategy. Alternative S2 changes some of the grazing management standards and guidelines related to the Yosemite toad. It allows use of alternative management strategies that are locally determined to provide sufficient protections for this species. Although the intent of these alternative management strategies is to provide for and protect habitat for the species, there are implementation difficulties that may increase the risk of success at avoiding impacts to Yosemite toads. Some of these risks exist within Alternatives S1 and S3 as well and are due to the difficulty in managing livestock in the forest environment.

The U.S. Fish and Wildlife Service has determined that this species is warranted for listing but action towards listing is currently precluded due to other priorities. If this species is formally listed in the future, changes in management direction may be warranted.

Cascades Frog and Northern Leopard Frog

Alternatives F5 and F8, appear to provide the greatest improvement of conditions for the Cascades frogs and northern leopard frogs, because they provide the most effective management approaches for this species' persistence and recovery.

Alternatives S1, S2 and S3 apply the same Aquatic Management Strategy and Standards and Guidelines for aquatic, riparian, and meadow ecosystems. These alternatives protect populations as they are discovered by designating Critical Aquatic Refuges. The differences in the amounts of mechanical and prescribed burning between the alternatives will likely be tempered by the application of the Aquatic Management Strategy. Some populations of these species may overlap with habitat for the Yosemite toad, willow flycatcher or great gray owl. Alternative S2 changes some of the grazing management standards and guidelines related to these species that could potentially indirectly affect these species. However, these changes require site-specific analysis that would include a biological evaluation that would address all species occurring within the affected area so the implications of this change are minimal.

Socio-Economic Concerns

Commercial Forest Products

During the first decade, alternatives F2 to F8 are projected to produce between 21 and 534 million Board Feet (MMBF) of live timber annually from the Sierra Nevada national forests. These estimates include 5 years of timber harvest conducted under the pilot project implementing the Record of Decision for the Herger-Feinstein Quincy Library Group Forest Recovery Act. Upon completion of the pilot project, timber harvests are projected to decline. An assessment of the pilot project would be made following its completion. This assessment could lead to the adoption of similar strategies throughout the Sierra Nevada. However, at this time, any assumption about assessment results would be speculative. In the second decade, timber harvest volumes in Alternatives F4, F6, F7, and F8 would decline further, as the need for fuel treatments would lessen and treatments would produce lower timber volumes than treatments conducted in the first decade.

Alternatives F4 and F7 would produce the most timber volume over the first decade. Alternatives F3 and F6 would produce an intermediate level of timber volume. Alternatives F2, F5, and F8 would produce the least timber volume. Alternatives F4 and F7 would continue to produce the most timber volume during the second decade and Alternatives F2, F3, F5, and F8 would produce the least.

Alternative S2 would produce the most timber volume in the first decade and overall. Alternative S1 would produce an intermediate level of timber volume and Alternative S3 would produce the least timber volume.

Grazing

Grazing Use Levels. Alternatives F4 and F7 would cause the least reduction in grazing use. Alternatives F2, F5 and F8 would cause the greatest reductions in grazing use. Alternative F3 would cause a reduction that would be higher than Alternatives F4 and F7, but lower than Alternatives F2, F5 and F8. The reduction in grazing use under Alternative F6 would be higher than Alternative F3, but lower than Alternatives F2, F5 and F8.

Acres Available for Grazing. Alternatives F4 and F7 would have more suitable rangeland (acres available for grazing) than Alternatives F2, F3, F5, F6 and F8. Suitable rangeland acres under Alternative F8 would be similar to those for Alternative F5, and more than those provided in Alternative F2. Alternatives F2 and F5 would provide the least amount of suitable rangeland acres for grazing.

Animal Unit Months. All alternatives show a decrease in Animal Unit Months (AUMs) offered by the national forests from allotments in the Sierra Nevada compared to current conditions. Implementation of existing forest plan standards and guidelines over the past 10 years has resulted in reduced numbers of livestock grazing. Other factors that have affected grazing levels include implementation of management requirements for threatened and endangered species and water quality standards.

Alternatives F2, F5 and F8 would establish more conservative standards and guidelines related to grazing activities than the other alternatives. These standards and guidelines would remain in effect until a range analysis could be completed to determine the condition of the range. In many cases, these conservative standards would make it uneconomical for permittees to graze their allotments while waiting for an analysis to be completed. Since it would take many years to complete the analysis on several hundred allotments, it is assumed that many permittees would give up their permits.

Alternatives S1, S2, and S3 were evaluated by estimating the effects on allotment permittees. By employing alternative strategies to protect wildlife species, Alternative S2 is estimated to eliminate impacts on 14 allotment permittees. Alternatives S1 and S3 continue to impact these 14 allotment permittees. Seven permittees would have very high impacts under Alternatives S1, S2, and S3.

Mining

Mining activities would change in the future as ongoing Forest Service management would continue to include proposals for mineral withdrawals and mitigation for natural resource protection.

Alternatives F3, F4, and F7 are similar in that they do not contain proposals for new mineral withdrawals. Alternative F7 has the least Known Mineral Deposit Area (KMDA) acreage and fewest mining claims in restrictive land allocations; Alternative F3 has the most; and Alternative F4 falls between Alternatives F3 and F7 in terms of acreages in KMDAs and numbers of mining claims affected by mining restrictions. Overall, differences between these three alternatives do not appear to be significant. However, impacts from Alternative F3 are less certain because withdrawals and mitigation measures would be based on findings in landscape analyses.

Alternatives F2, F5, F6 and F8 propose new mineral withdrawals. Alternative F2 proposes withdrawals of up to 75 percent of the Sierra Nevada national forests' acreage in KMDAs and 78 percent of the active claims. Alternative F5 proposes withdrawals of up to 45 percent of the Sierra Nevada national forest's acreage in KMDAs and 40 percent of the active claims. Alternatives F6 and F8 propose withdrawals of up to 11 percent of the national forest's acreage in KMDAs and 9 percent of the active claims.

Alternatives F6 and F8 are slightly more restrictive to mining than Alternatives F4 and F7 and likely less restrictive than Alternative F3. Alternatives F2 and F5 would have the greatest impacts to mining due to the large amounts of land and high numbers of active claims affected by potential withdrawals. In addition, the level of constraints in riparian areas under Alternative F5 could withdraw mining operations in these areas.

There is no difference between Alternatives S1, S2 and S3 regarding mining activities. These alternatives would contain the same land allocations and desired conditions. New mineral withdrawals are proposed in these alternatives and are similar to Alternatives F6 and F8.

Roads

Alternative S2 would have different effects from roads than the other alternatives.

Alternatives F2 to F8 and S1 and S3

The forest development road arterial system would remain in its current location in these Alternatives. No arterial roads would be decommissioned. Improving arterial roads would continue to be a priority for road construction funding.

The forest development road collector system would also remain in its current location in these Alternatives. Construction or decommissioning of collector roads would be unlikely. Collector roads would be improved and managed to provide a more stable road surface, primarily using gravel and dust abatement.

The most dramatic change in the forest development road system would be changes in the mileage and conditions of local roads. Some roads would be improved to reduce impacts on adjacent resources, but typically these roads would have lower maintenance priority. It could become impossible to drive on some local roads due to vegetative encroachment. There would be fewer miles, as some local roads would be decommissioned.

There would be fewer miles of unclassified roads. Unclassified roads would be evaluated as they were found. Some unclassified roads (those supporting unauthorized uses) would be decommissioned. Others providing needed access would be added to the forest development road system. In some areas the size of the forest development road system could actually increase as needed roads were added to the system. If these roads were supporting authorized uses, adding them to the forest development road system would not affect existing public access.

Alternative S2

Alternative S2 would allow construction, maintenance and decommissioning of roads as described for Alternative 2 in the FEIS for the HFQLG pilot project. This will result in an increase in the number of miles in the forest development roads and the collector system along with decommissioning other roads. The effects of these activities are described in the FEIS for the Herger-Feinstein Quincy Library Group.

Air Quality

Particulate emissions from prescribed burning would contribute to PM_{10} loading; however, analysis indicates that activities proposed in the SEIS alternatives would not likely create conditions that violated Ambient Air Quality Standards. Alternatives F6, F8, F7, F3 and F4 would likely have short –term noticeable increases in emissions from prescribed burning to reduce forest fuels. These treatments could however lead to long-term reductions in emissions from wildfires. Alternatives to burning, such as mechanical treatments, would be expected to reduce wildfire emissions over the long-term.

Alternative S2 would include prescribed burning on the slightly more acres than Alternative S1, although the primary difference is in follow-up burning which may have reduced emissions over initial burn treatments because they would have lower fuel loading. Alternative S3 would have the least prescribed burning and the highest risk of emissions from future wildfires. All alternatives are very similar in terms of PM_{10} emissions in the first decade.

Remote communities use firewood for household heating. Combined with prescribed burning, this could aggravate the background levels of PM_{10} and $PM_{2.5}$ during winter and early spring.

Short-lived unpleasant odors and reduced visibility (in 15 Class I Areas) could be detected by wilderness visitors and could affect the recreational experience of those trying to seek solitude and escape signs of human activity.

The amount of ozone produced is unknown. Ozone production would not vary among the alternatives because the major sources are located outside national forest boundaries. The amounts of NO_x (precursor to ozone formation) produced per project are small. The highest potential for risk of injury to plants (ponderosa pine and Jeffrey pine) from ozone is in those plant communities already stressed by drought, insect and pathogen attacks, and soil acidification. The alternatives that resulted in less acreage of diseased trees would be able to withstand higher amounts of pollution. It is difficult to quantify the effects of ozone concentration on old forests, hardwood ecosystems, noxious weeds, aquatic and riparian ecosystems, and other flora and fauna with the available research.

Recreation

In general, all of the alternatives could have localized effects on certain types of recreation activities on national forest lands. Alternatives F2, F3, F5, F6 and F8 would cause a slight reduction in the number of recreation visitor days (RVDs). These alternatives favor a trend toward more dispersed, non-motorized recreation, such as hiking and backcountry camping. Alternatives F4 and F7 would maintain the current level of RVDs.

Alternatives S1, S2 and S3 are similar in effects to recreation. Alternatives S2 clarifies direction contained in Alternatives S1 and S3 that explicitly applies some limited operating periods that protect various wildlife species to vegetation treatments and not recreation related activities. The effects of this change are negligible, as recreation activities that require analysis under NEPA or for permit issuance generally require evaluation for effects to wildlife and recommendations for limited operating periods could be adopted as deemed necessary at the project level. Alternatives S1 and S3 include direction that may limit recreational packstock activities in meadows containing or potentially containing willow flycatchers and/or Yosemite toads if required surveys are not completed. These activities may affect outfitter guide services.

Socioeconomic

The level of active management in each alternative directly affects the socioeconomic climate of the Sierra Nevada through county revenues, employment, and income derived from resource extraction, production, and use. Receipts from timber sales on national forest lands can provide revenues to affected counties for roads and schools. Timber harvest from national forest lands provides a flow of products to area industries. Short-term economic effects vary with the level of resource extraction. Alternative F4 would have the greatest direct economic benefit, while Alternative F2 would have the lowest in the short-term. Long-term direct and indirect economic effects could be associated with sustaining ecosystems to benefit the broader California population that may exceed 60 million people by mid-century.

Alternative S2 provides approximately twice the employment (direct, indirect, and induced) related to timber harvest than Alternative S1. Alternative S3 provides substantially fewer employment opportunities.

Summary Table: Comparison of Alternatives

Treatments, outputs, and selected environmental, social and economic consequences are displayed by alternative to allow easy comparison.

Effect on Wildfire. Over the last 30 years the Sierra Nevada has averaged about 43,000 acres of wildfire per year. In the last ten years, the average has risen to about 63,000 acres per year. It will take at least two decades of fuels treatments before we expect significant changes in wildfire. Because we want to reintroduce fire as an ecosystem process, the reduction in fire severity is more important than the reduction in total acres burned by wildfire.

	Alt S1	Alt S2	Alt S3 [1]
Annual acres of wildfire, First decade	64,000	60,000	68,561
Annual acres of wildfire, Fifth decade	63,000	49,000	76,315
Percent change in annual wildfire acres from First decade to Fifth decade	-2%	-22%	+10%

[1] *Values for Alt S3 are derived from the SNFPA FEIS for Alternative 2.*

Effect on Air Quality. Fuels treatments, both mechanical and prescribed fire, can reduce the amount of particulate from wildfires and from prescribed burns. In addition, timing of prescribed burns helps reduce particulate emissions during periods of critical air quality.

	Alt S1	Alt S2	Alt S3 [1]
Annual wildfire PM_{10} emissions (tons), First decade	23,600	22,100	25,300
Annual prescribed fire tons of PM_{10} emissions (tons), First decade	2,200	2,200	3,500
Total annual PM_{10} emissions (tons), First decade	25,800	24,300	28,800

[1] *Values for Alt S3 are derived from the SNFPA FEIS for Alternative 2*

Fuels Treatments. The following tables summarize the estimated fuels treatments to be accomplished by each Alternative. *(Source: SPECTRUM runs)*

	Alt S1	Alt S2	Alt S3 [1]
Total acres of mechanical fuels treatment, all Sierra Nevada National Forests, 20 years	1,566,000	1,596,000	140,000
Total acres of prescribed burn, all Sierra Nevada National Forests, 20 years	676,000	677,000	300,000

[1] *Values for Alt S3 are derived from the SNFPA FEIS for Alternative 2*

Principal Forest Products. Estimated offering. The first decade includes treatments under the HFQLG pilot project. During the six years (1988-1993) preceding the 1993 CASPO Interim Guidelines, the average timber offered for sale (green plus salvage) was 879 million board feet (mmbf) per year; amount sold was 765 mmbf/yr. The average amount of timber offered during the six years since the CASPO Guidelines, 1994-1999, was 372 mmbf/yr.; amount sold was 179 mmbf/yr.

First Decade			
	Alt S1	**Alt S2**	**Alt S3** [1]
Estimated Salvage timber to offer for sale, mmbf/yr, all SNFP National Forests	30	90	17
Estimated green timber to offer for sale, mmbf/yr, all SNFP National Forests	127	358	22
First Decade Total	**157**	**448**	**39**
Second Decade			
Estimated Salvage timber to offer for sale, mmbf/yr, all SNFP National Forests	30	90	17
Estimated green timber to offer for sale, mmbf/yr, all SNFP National Forests	66	287	7
Second Decade Total	**96**	**377**	**24**

[1] *Values for Alt S3 are derived from the SNFPA FEIS for Alternative 2*

Principal Forest Products. The following table summarizes the estimated amounts of potential commercial biomass outputs available for sale by each Alternative by decade. *(Source: SPECTRUM runs)*

	Alt S1	**Alt S2**	**Alt S3** [1]
Estimated potential commercial biomass output, 1000 bone dry tons, first decade	5,005	7,021	660

[1] *Values for Alt S3 are derived from the SNFPA FEIS for Alternative 2*

Grazing/Forage. There are presently 7,165,000 acres of national forest in active grazing allotments. This table illustrates the estimated number of permittees that would be impacted by restrictions for sensitive wildlife species (willow flycatcher, Yosemite toad and great gray owl).

	Alt S1	**Alt S2**	**Alt S3**
Permittees with low impacts	11	7	11
Permittees with medium impacts	17	10	17
Permittees with high impacts	12	9	12
Permittees with very high impacts	7	7	7

Economy. Estimated average annual employment and earnings generated from timber harvested from the Sierra Nevada national forests.

First Decade			
	Alt S1	**Alt S2**	**Alt S3** [1]
Estimated average annual jobs for Loggers, Timber Haulers, and Timber Mill Employees generated from Forest Service commercial logging operations in the Sierra Nevada Region.	957	1894	145
Estimated average annual earnings generated from Forest Service commercial logging, hauling, and sawmilling in the Sierra Nevada Region (thousands $, 1995)	$38,344	$57,159	n/a [2]

[1] *Values for Alt S3 are derived from the SNFPA FEIS for Alternative 2*

[2] *Estimated average annual earnings was not calculated in the FEIS. This values is not available.*

Old Forest Conservation. Alternatives S1 to S3 present a range of approaches to increasing the amount of old forest ecosystems. Important measures of old forest condition are the number of individual large trees, patches of large trees with additional old forest characteristics, and the connectivity or relationship among the trees, patches and larger stands of old forest.

	Alt S1	**Alt S2**	**Alt S3**
Amount of large or old conifer trees	Variable retention (30" and 24" dbh limits); other limits <30" based on land allocations	Protects trees greater than 30" dbh in all land allocations	Variable retention (30" and 24" dbh limits); other limits <30" based on land allocations
Maintenance or development of Old Forest Patches	High from direct actions; potentially lower due to increases in wildfire acres.	Moderate from direct actions; may be offset by decreases in wildfire acres.	High from direct actions; potentially lower due to increases in wildfire acres.
Connectivity of Old Forest trees, patches and stands	Designation of old forest emphasis areas	Designation of old forest emphasis areas; potential for more fragmentation in HFQLG due to group selection units.	Designation of old forest emphasis areas.

Chapter 1: Purpose and Need

1.1. Introduction

This draft Supplemental Environmental Impact Statement (SEIS) responds to new information about selected components of three problem areas identified in the Sierra Nevada region and analyzed in the Final Environmental Impact Statement (FEIS) for the Sierra Nevada Forest Plan Amendment (SNFPA) issued in January 2001. Specifically, the focus of the SEIS is on components within the broad problem areas of: (1) Old Forest Ecosystems and Associated Species, (2) Aquatic, Riparian and Meadow Ecosystems, and (3) Fire and Fuels.

Several alternatives are described in Chapter 2, including a “No Action” alternative that would continue the management direction in the January 2001 Record of Decision (ROD) for the Sierra Nevada Forest Plan Amendment. New information and analysis since the FEIS was completed are described in Chapter Three. The environmental consequences of each alternative are documented in Chapter Four.

The SEIS discloses the effects of proposed amendments to the Land and Resource Management Plans for the Modoc, Lassen, Plumas, Tahoe, Eldorado, Stanislaus, Sequoia, Sierra, Inyo, and Humboldt-Toiyabe National Forests and the Lake Tahoe Basin Management Unit. The management strategies that apply to portions of the Lassen and Modoc National Forests covered by the Record of Decisions for the Northwest Forest Plan are not affected by the changes proposed in this SEIS.

1.2. Background

The SNFPA FEIS and ROD were the result of more than 10 years of regional planning efforts for management of the species and ecosystems of the Sierra Nevada bioregion. More than 200 appeals were received by the Forest Service after the SNFPA decision in January 2001 ROD. Ultimately, the Chief of the Forest Service affirmed the ROD but directed the Pacific Southwest Region to review certain elements of the decision and basis for the SNFPA and the associated EIS, including several other concerns raised in the appeals.

On December 26, 2001 the Under Secretary returned the SNFPA to the Forest Service with his decision not to conduct a discretionary review. The Under Secretary expressed his confidence that the Regional Forester would develop an aggressive plan to respond to the Chief’s appeal decision with an open, cooperative review of the SNFPA.

The Pacific Southwest Regional Forester chartered the Sierra Nevada Forest Plan Amendment Review Team (Team) to evaluate the SNFPA ROD for any needed changes relative to six specific areas. In a December 31, 2001 memo and an action plan, the Regional Forester directed the Team to use an open and public process to identify opportunities to:

1. Pursue more aggressive fuels treatments while still protecting Old Forest conditions and species at risk.
2. Achieve consistency with the National Fire Plan to ensure goals of community protection and forest health are accomplished.
3. Harmonize the decision with the Herger-Feinstein Quincy Library Group Recovery Act to implement the Pilot Project to the fullest extent possible.
4. Reduce the unintended and adverse impacts on grazing permit holders.
5. Reduce the unintended and adverse impacts on recreation users and permit holders.

6. Reduce the unintended and adverse impacts on local communities.

The Team reviewed the SNFPA FEIS and supporting documents and gathered information about each of the above areas to identify specific items that needed to be addressed. To help identify important issues, the Team gathered input from Forests currently implementing the SNFPA and former members of the SNFPA interdisciplinary team, held meetings with interest groups, sponsored field trips, and reviewed work products generated by the Regional Office SNFPA Implementation Team. The Team also reviewed the appeals record and the Chief's appeal decision.

The Team investigated a number of concerns related to the issue areas identified by the Chief and Regional Forester. In the course of conducting the review, new analytical techniques were developed to provide insight into how management direction was implemented on the ground. New information was collected and compiled about species of concern as additional research findings were published, conservation assessments were finalized, and field surveys were completed. Also, as the review was conducted, the Fish and Wildlife Service released listing decisions for two species of concern. The insight and understanding gained through the year-long review is explicitly addressed in this SEIS. The review is documented in "Sierra Nevada Forest Plan Amendment, Management Review and Recommendations," (March 2003) and is incorporated by reference.

1.3. Purpose and Need for Action

The purpose of the proposed action is to adjust existing management direction to better achieve the goals of the SNFPA. The SNFPA Review described above, combined with insight gained from two years of field implementation, highlighted the need for refinements under the following three broad problem areas identified in the SNFPA:

Old Forest Ecosystems and Associated Species

The Sierra Nevada Ecosystems Project (SNEP) report (chartered by Congress and completed in 1996) found that old forest ecosystems were one of the most altered ecosystems in the Sierra Nevada Region and that habitat or populations of some animals associated with old forests had declined. Accordingly, the SNFPA was intended to provide regionally consistent direction for old forest conservation. Specific goals were to:

- Protect, increase, and perpetuate desired conditions of old forest ecosystems and conserve their associated species while meeting people's needs for commodities and outdoor recreation activities.
- Increase the density of large trees, increase structural diversity of vegetation, and improve the continuity and distribution of old forests across the landscape.
- Reverse declining trends in abundance of old forest ecosystems and habitats for species that use old forests (FEIS, Volume 1, Chapter 1, pg. 5-6).

The above needs are still valid and must be addressed in the course of making any changes to the existing direction. However, there is new information to consider about species dependent on old forest ecosystems. For example, new scientific analysis of the status and trend of California spotted owl populations in the four study areas within the Sierra Nevada will inform judgment about the risks of active management to more effectively reduce hazardous fuels. In addition, owl reproductive data for the four Sierra Nevada owl study areas has been collected for the spring 2002 breeding period. This new information shows a pulse in reproduction that was not available to be considered in the FEIS.

Circumstances surrounding the use and availability of owl habitat on private lands have also changed. California Forest Practices Act regulations require private industrial timberlands to be managed in a sustainable manner and there is a need to consider the potential supply of suitable owl habitat on private lands when evaluating the cumulative effect of Forest Service management activities.

Finally, in February 2003, the U.S. Fish and Wildlife Service announced that after reviewing the best available scientific and commercial information available, listing of the California spotted owl as an endangered species was not warranted. This finding and the rationale for it are also important pieces of information to be considered in the SEIS.

California continues to have unusually high levels of fire activity and the scope of the forest health problem is enormous. Decades of fire suppression have often produced overcrowded vegetation in the forests, weakening trees and making them more fire prone and more susceptible to pests, diseases, and displacement by invasive species. Recent fire seasons illustrate the risks from inaction and the number and severity of acres burned in wildfires continues to increase. Using historic fire data and recent trends, the FEIS projected habitat losses at 68,000 acres per year over the next decade. At that rate, old forest habitat is burning up faster than it can be replaced. There is a need to reduce expected habitat losses to a rate that is at or below replacement by treating enough acres with enough intensity to significantly modify fire behavior. The SNFPA Review indicated that adjustments to management direction would improve the Forest Service's ability to accomplish this goal.

Aquatic, Riparian, and Meadow Ecosystems

The above-mentioned SNEP report found aquatic, riparian and meadow ecosystems to be the most degraded of all habitats in the Sierra Nevada, although much of this problem was related to lower elevation dams and diversions. In addition, many aquatic and riparian-dependent species such as willow flycatcher and Yosemite toad were at risk of extirpation. The SNFPA was intended to provide regionally consistent direction to address these problems. Specific goals were to:

- Protect and restore desired conditions of aquatic, riparian and meadow ecosystems in Sierra Nevada national forests.
- Provide for the viability of species associated with those ecosystems.

The above needs are still valid and must be addressed in the course of making any changes to the existing direction. However, there is new information to consider about the population status and distribution of Yosemite toad and willow flycatcher gained from two years of field surveys to protocol. The recently completed conservation assessment for the willow flycatcher includes updated information about the status of the species and possible refinements to managing and restoring suitable habitat. This information supports the need to consider local data and conditions when planning projects in associated habitat.

New information is also available about the likely reductions in grazing activity that will be caused by the existing standards and guidelines for meadows and meadow-associated species. The SEIS will consider changes to management direction that embrace the potential for developing site-specific strategies to allow more economic benefits to be retained while continuing to minimize the risks to sensitive species.

Fire and Fuels

The SNFPA FEIS recognized that wildland fire posed a major threat to life, property, financial resources, and natural resources in the Sierra Nevada. In addition, the continued and rapid growth of the region's human population puts increasing numbers of people "in harm's way" and at risk of loss from wildfires unless hazards are mitigated. The SNFPA was intended to provide a coordinated strategy for addressing the risk of catastrophic wildfires from decades of fire suppression and the resulting build-up of hazardous fuels. Specific goals were to:

- Reduce the wildfire threat to human communities and ecosystems and natural resources.
- Maintain ecosystem functions.
- Decrease the cost of fire suppression.

These goals are still valid and must be addressed in the course of making any changes to the existing direction. However, since the ROD was signed, changed circumstances and new information must be considered in framing management direction to attain these objectives.

The National Fire Plan represents a collaborative approach to wildland fire management that has broad support from the administration, Congress, the Western Governors and many other local and regional groups. In May of 2002, the Secretaries of Agriculture and Interior and the Western Governors developed the Implementation Plan for this collaborative effort. Forest Service units at the state and local level are encouraged to work collaboratively with other agencies to accomplish the desired outcomes. The Regional Forester intends for the Southwest Region to achieve the goals of the National Fire Plan. Thus, there is a desire for the management direction for the Sierra Nevada forests to contribute to the goals and performance measures of the Implementation Plan.

The SNFPA Review identified aspects of the existing management direction that must be refined to achieve this goal.[1] Briefly, fuels treatments must significantly lower wildfire intensity and rate of spread, thus directly contributing to more effective suppression and fewer acres burned. Hazardous fuels must be treated in cost-efficient manner to maximize program effectiveness. Management must actively restore fire-adapted ecosystems by making demonstrated progress in moving acres out of an unnaturally dense condition (i.e. moving acres from condition class 2 or 3 to condition class 1).

The SNFPA Review also recognized the by-products of mechanical thinning as an economic opportunity for local communities and includes measures to assess the degree to which fuels reduction programs are meeting that objective. As important as the inherent economic benefit is that the additional economic value of byproducts would provide the ability to treat more acres of hazardous fuels, thereby contributing to overall program effectiveness.

Based on new information collected and analyzed during the SNFPA Review there is also a need to more fully consider three critical aspects of the fire and fuels strategy in the SNFPA. Selected standards and guidelines must be adjusted to ensure that certain conditions can be met. In particular, fuels treatments must: (1) be strategically placed across the landscape, (2) remove enough material to cause a fire to burn at lower intensities and slower rates of spread in the treatment area compared to untreated areas, and (3) be cost-efficient to maximize the number of acres that can be treated under a limited budget. Recent analysis identified the prescriptive nature of the existing standards and guidelines as a primary barrier to meeting these three elements. The potential for this problem was recognized in the FEIS with a statement that “Modified 8 would have stand level structural requirements that could preclude full implementation of the fuels strategy.” (FEIS, Volume 1, Summary, pg. 29)

The SNFPA Review identified the need to adjust the existing management direction to make it less complicated and costly to implement. To that end, there is a need to make the standards and guidelines utilize a wider array of tools and techniques to meet fuels reduction objectives and better respond to local resource conditions in a cost-effective manner. Finally, there is a need t o reduce the emphasis on prescribed burning for initial treatments in light of public concerns about smoke levels and limits on available burn days.

1 Review Team report pg. 45-51

Implementation of the Herger-Feinstein Quincy Library Group (HFQLG) Forest Recovery Act Pilot Project

Within the Sierra Nevada bioregion, a number of special plans and projects are underway to more fully understand and learn from alternative management strategies. Some of these were explicitly recognized in the ROD and allowed to continue unimpeded by new direction in the SNFPA. Examples include the Upper Pit River Watershed Restoration Project, The Hackamore Ecosystem Restoration Project, the Warner Mountain Rangeland Management Planning Effort, the Modoc/BLM Experimental Stewardship Project, and the Big Valley Sustained Yield Unit. However, the ROD did not make provisions for the HFQLG pilot project to continue in its original form. Instead, it imposed new land allocations, new standards and guidelines for sensitive species, a new fire and fuels strategy, and eliminated the program of group selection.

The Pilot Project was designed and intended to provide information needed to reduce scientific uncertainty regarding the environmental outcomes of certain forest management activities. However, the SNFPA Review found that collectively, the standards and guidelines in the ROD prevent this learning from occurring and compromise the adaptive management strategy that is at the heart of the SNFPA. In addition, the Review found that the goal of commodity production was also compromised by the ROD, which made no provision for regeneration harvest to continue within or outside the HFQLG Pilot Project Area. In light of these findings, there is a need to adjust existing management direction to better reconcile the goals of the HFQLG Pilot Project with those of the SNFPA and its Adaptive Management theme and assumptions.

1.4. Relationship to the Herger-Feinstein Quincy Library Group (HFQLG) Forest Recovery Act

The HFQLG Forest Recovery Act (October 21, 1998) directs the Secretary of Agriculture to establish and implement a pilot project on certain federal lands within the Plumas, Lassen, and Tahoe National Forest. The original legislation authorized the pilot project to continue for a period of five years. Recent legislation extends the Act through September 2009. The Record of Decision implementing the pilot project was signed on August 20, 1999. A court-ordered supplement to the HFQLG FEIS evaluating DFPZ maintenance options is currently underway.

The SNFPA EIS and this SEIS are not intended to fulfill the requirements of Section 401(i) of P.L. 103-354 (HFQLG Act), which calls for certain plan amendments or revisions of the Lassen, Plumas and Tahoe National Forests.

1.5. Proposed Action

The Forest Service proposes to amend the ROD for the SNFPA, which was signed on January 12, 2001. Specifically, the proposed action responds to changed circumstances and new information identified in a year-long review of the SNFPA. The following is a general overview of the proposed action. It is described in more detail as Alternative S2 in Chapter 2.

The proposed action replaces the standards and guidelines in the existing SNFPA fire and fuels strategy with direction that provides the flexibility needed at the local level to effectively modify wildland fire behavior. Opportunities are also provided to allow for by-products to be generated. This will offset the cost of fuels treatment and allow more acres of hazardous fuels to be treated overall. In addition, the basic strategy is broadened to include other management objectives such as reducing stand density for forest health, restoring and maintaining ecosystem structure and composition, and restoring ecosystems after severe wildfires and other large catastrophic disturbance events. The resulting integrated strategy is designed to be aggressive enough to minimize the risks to communities from wildfire in the urban-wildland interface and to adequately address the threats to wildlife from catastrophic wildfires across the broader landscape. This objective is balanced with the need to ensure that wildlife and other resource values are protected today and well into the future.

The proposed action allows the standards and guidelines for willow flycatcher habitat, Yosemite toad habitat, great gray owl protected activity centers, and grazing utilization standards to better reflect the wide array of site conditions encountered in the field and the management opportunities they may provide.

The proposed action clarifies management intent for off-highway vehicles, limits the requirement for limited operating periods to vegetation management activities only and clarifies how several of the riparian standards and guidelines apply to recreation activities, uses and projects. These changes are proposed to more closely align management direction with management intent and to allow local managers to develop mitigation measures for small and varied recreation projects on a project- and site-specific basis.

1.6. Responsible Officials and decision to be made

The Regional Foresters for the Pacific Southwest Region and the Intermountain Region are the responsible officials. The Chief has delegated signing authority to the Regional Forester for the Pacific Southwest Region.

The decision to be made is whether to amend the Land and Resource Management Plans for the Humboldt-Toiyabe, Modoc, Lassen, Plumas, Tahoe, Eldorado, Stanislaus, Sierra, Sequoia, and Inyo National Forests and the Lake Tahoe Basin Management Unit.

1.7. Public Participation

Although no formal public scoping period was held or required for this SEIS, the proposed action is informed by the extensive and open public process used to complete the SNFPA Review. The year-long Review was a transparent and highly collaborative process conducted by local Forest Service employees working with a host of key stakeholders, including elected officials, tribes, interest groups and other government agencies. Insight was obtained from dozens of public meetings, workshops and field trips held with employees, interest groups, scientists, other government agencies, journalists and others. An internet website and a biweekly electronic news brief were developed to keep the public informed throughout the Review. The issues identified in the FEIS (Volume 1, Chapter 1, pp. 12-16) reflect the broad areas of concern, debate and disagreement that also surfaced during the Review.

1.8. Native American Relations

The SNFPA ROD made commitments for meeting trust responsibilities and encouraging American Indian participation in national forest management. It is intended to continue those commitments as part of any decision made regarding management of Sierra Nevada national forests. We will consult with Tribes on this Draft SEIS and on future specific resource management projects.

Chapter 2: Alternatives, including the Proposed Action

Introduction

This chapter describes and compares the alternatives considered in detail. It defines differences in management direction and projected environmental impacts between the alternatives. It also discloses additional alternatives considered but eliminated from detailed study, and provides rationale for their dismissal.

Considering Risk and Uncertainty in the Decision

Uncertainty and risk are central considerations for any decision on the management approach for the Sierra Nevada bioregion. As one reviews the Draft Supplemental EIS, these concepts should be kept in mind. In order to assist the reviewer, a discussion of uncertainty and risk has been included here to increase understanding of their relevance to a decision. The following material was prepared by Lawrence C. Walters, Ph.D., Peter J. Balint, Ph.D., Anand Desai, Ph.D., and Ronald E. Stewart, Ph.D.

A Consideration of Uncertainty and Risk in the Sierra Nevada Case

Regarding uncertainty and risk as they apply to the Sierra Nevada case, we find that:

1. Uncertainty is a neutral analytical property of an event, relationship, phenomenon, or other important consideration that may be reduced through better science, but generally cannot be eliminated.
2. Defining risk is fundamentally an expression of values and power.
3. The important short-term risks facing the Forest Service are related to decision processes, not ecological outcomes.
4. The Sierra Nevada management decision is a wicked problem.

Discussion

1. Uncertainty is a neutral analytical property of an event, relationship, phenomenon, or other important consideration that may be reduced through better science, but generally cannot be eliminated.

In this context, we mean by uncertainty the likelihood of the occurrence of an event, relationship, phenomenon, or other important consideration. This likelihood of occurrence may be unknown, or may have a distribution of possible values, but it is not under the immediate control of Forest Service decision makers. In describing uncertainty as value neutral, we wish to highlight two important points:

a. Uncertainty is used to describe probabilistic events, whether or not it is possible to quantify those probabilities. For example, the distribution of naturally occurring fire events may be calculable and therefore the probability of fire during a specific time interval estimable. The likelihood of important budget changes as a result of shifts in national public policy priorities during the next 50 years may not be estimable. In both cases, however, "uncertain" is the analytical term used to describe the events.

b. Uncertainty does not inherently involve a value position on the part of the analyst or decision maker. The probability of a lightning strike, for example, is independent of attitudes toward fire hazard, owl habitat, or any other value position. In this sense, uncertainty is a neutral concept.

There are three broad categories of uncertainty in the decision context facing the Forest Service: scientific, administrative (or implementation), and stochastic.

To say that something is *scientifically uncertain* within the context of the Sierra Nevada decision problem is to acknowledge that forests are complex systems and that our knowledge of them is incomplete. As a result, no one can state with certainty the long-term outcome of any given management strategy, including maintaining the status quo. Examples of key areas of scientific uncertainty include:

- the acreages of old-growth forest and old-growth forest habitat determined under the various
- alternatives as projected by vegetation models;
- the population of old-growth dependent species associated with these projected acreages and the resulting probabilities of viability as projected by the California Wildlife Habitat Relations
- Model and viability models; and
- the annual or decadal acreages burned and severity of burn as projected by such models as FLAMMAP, SPECTRUM, and FARSITE.

Scientific uncertainty is often expressed as a calculated or estimated confidence interval around a predicted value or outcome.

Administrative or implementation uncertainty refers to the vagaries of managing in a political environment in which public goals and priorities, societal needs and conditions, and organizational capacities change over time. Finally, stochastic uncertainty refers to those events that are largely random, unpredictable, and uncontrollable, such as lightning-caused ignitions or random changes in species populations.

Each of the factors is associated with specific uncertainties. In addition, the assessment of outcomes by stakeholders also involves uncertainties, as stakeholder perceptions, values, and priorities may shift over time.

Obviously, there is much that is uncertain and largely uncontrollable in this decision environment. While it is true that some uncertainties can be reduced over time through better science and organizational learning, many if not most uncertainties cannot be eliminated altogether.

The uncertainty dilemma

In describing and representing the scientific and stochastic uncertainties inherent in the Sierra Nevada management decision, analysts face a dilemma. On one hand, simple and accessible characterizations of the multiple uncertainties are likely to be misleading, biased, or wrong. One example may serve to make this point. Recent graphs generated by the SNFPA Review Team depict likely outcome trajectories of different management strategies over the next 140 years as lines. Objections were raised that such depictions may be misleading because they suggest that these trajectories are or can be known with certainty, or at the very least that depicted differences are real and meaningful. Those objecting argued that confidence intervals should be placed around each line, and that doing so would likely show that depicted differences in expected outcomes are significantly more uncertain than the initial graphs suggest. Whether or not the objection is valid, the point remains that lack of detail was seen to be at least misleading, likely biased, and perhaps even wrong.

But the alternative poses its own challenges. Detailed characterizations of uncertainty are likely to be difficult to understand and present, and consequently may not be useful to the public or to decision makers. There is no scientific or technical solution for this dilemma. The resolution focuses on the decision processes employed. To be effective, such processes must tightly integrate analysis and broader deliberation, and should allow all participants to understand where scientists agree, where they disagree, and where their relative certainty ends (Stern and Fineberg 1996).

2. Defining risk is fundamentally an expression of values and power.

Risk is a concept with a long pedigree in a variety of disciplines, but in virtually all technical discussions, risk is represented as having three components:

- one or more potential stressors (sometimes called hazards);
- a probability that these stressors will occur (often called exposure); and
- the likely adverse effect that will result if the stressors do occur.

It is common to compare risks based on the product of the magnitude of the loss that will occur and the probability of its occurrence. Such calculations are referred to as “expected values.” In one recent example produced by the National Academy of Public Administration (Fairbanks, Gardner et al. 2001), the NAPA panel finds that many federal risk assessment methods consider mostly the magnitude of hazards. The panel argues that it is necessary to develop methods that clearly include all three components of risk:

- Hazard: e.g., an area’s fuel loading and dryness conditions;
- Risk or exposure: e.g., the probability of ignition; and
- Value: e.g., the physical, social, and economic costs of the potential damage.

An important observation regarding the role of value judgments in assessing risk is also made by Slovic (2000) and is incorporated in a recent study by the National Research Council (NRC) (Stern and Fineberg 1996). In any characterization of risk, these studies argue, two critical value judgments are at least implicit. First, there is the judgment that a particular process or outcome merits serious attention. The decision to focus on wildland fire hazards or old-forest owl habitat, rather than, say, the economic vitality of adjacent communities or the potential harms to black oaks, is a value judgment made by key actors. Because of the political power and influence of those key actors, one set of values prevails in characterizing the risks in a given decision. Other actors at different times could have made, and have made, different judgments.

Second, there is the judgment about what constitutes an unacceptable level on the outcome dimension. To say that some number of acres of stand-destroying fires is unacceptable reflects again the values of the decision makers. Between these two judgments, there is much room for analysis in modeling, measuring, and calculating, but these important analytical efforts should not obscure the central observation that focusing on some outcomes and not others, and on some outcome levels and not others, is a reflection of the value judgments and priorities of those making the decision. Again, which perceptions prevail in determining acceptable threshold levels of risk is a function of the influence of key actors. Our point is simply that these choices are neither objective nor purely scientific, nor could they be.

3. The important short-term risks facing the Forest Service are related to decision processes, not ecological outcomes.

The NAPA discussion is useful in helping to characterize the risks facing the Forest Service in the Sierra Nevada, which are somewhat broader than fire management:

- **Long-term risk:** given observed ecosystem conditions, existing external human factors, and future natural events and processes, the probability that any particular adopted management strategy will result in a preponderance of outcomes judged undesirable by the majority of stakeholders over the long term (beyond 10 years). But in addition to long-term risk, the Forest Service faces important short-term risks as well.
- **Short-term risk:** given observed ecosystem conditions, existing external human factors, and future natural events and processes, the probability that any particular adopted management strategy will be seen as undesirable by the majority of stakeholders over the near term (10 years) because
  - it results in a preponderance of undesirable outcomes; or
  - it violates accepted historical precedents; or
  - it violates widely held principles and standards of practice; or
  - it violates broadly held social preferences.

What emerges from this characterization is the observation that short-term risks involve much more than just concern about uncertain outcomes or the products of the decision. While stakeholders are certainly concerned with ecological outcomes, many are willing to accept modest short-term habitat losses if potential long-term gains are great enough (see Findings Section IV for a discussion of this point). Further, in the short run, none of the vegetation models or fire projections shows a significant difference in ecological outcomes. If it is true both that stakeholders are willing to consider short-term tradeoffs, and that alternatives under consideration are indistinguishable in their short-run outcomes, then the focus of short-term risks must shift to concerns with the decision process. Attention must be paid to process, or the decision maker runs the risk of failing even though the likelihood of desirable long-term outcomes is enhanced. And this makes the "risk dilemma" all the more relevant.

The risk dilemma

How people perceive risk depends on

- what they value;
- how the risk is framed; and
- their level of trust in the responsible organization or institution.

It is well known, for example, that there is an inverse relationship between perceived risk and perceived benefit, and the relationship is linked to an individual's general affective evaluation of a hazard. If an activity is "liked" people tend to judge its benefits as high and its risks as low. If the activity is "disliked" the judgments are the opposite—benefits tend to be perceived as low while risks are perceived as high (Slovic 2000).

Further, and perhaps even more important, every way of presenting risk information is a "frame" that can shape the judgments of participants in a risk decision. If the issue is framed in a positive light, people are more likely to dwell on the positive aspects of the decision, and vice versa. One often cited example is the observation that summarizing medical risks in terms of mortality rates yields very different perceptions compared to when the same information is presented in terms of survival rates. If a given treatment is described as having a mortality rate of 10 percent, for example, it is perceived very differently than if the same treatment is said to have a survival rate of 90 percent. The evidence also shows that experts are not immune to these framing effects. The effect is as strong when subjects are physicians as when they are lay people. As the NRC report concludes:

- Numerous research studies have demonstrated that different but logically equivalent ways of summarizing the same risk information can lead to different understandings and different preferences for decisions (Stern and Fineberg 1996, p. 57).

It should be noted that this is not an issue that can be resolved with better science. There is no scientific way to determine that one summary of risk is more accurate or less biased than another when both accurately reflect the data. Consequently, the problem of generating a single unbiased summary of risk information to meet the needs of participants in a risk decision has no purely technical solution.

As with uncertainty, the resolution of this dilemma focuses on the decision processes employed. In this light, it is also important to note a corollary to the affective evaluation principle mentioned above: if participants trust the organization presenting the risk information, they are more likely to accept the characterization. And the level of trust is a byproduct of the decision process. Experience in a variety of settings suggests that such trust is easily damaged and difficult to restore.

4. The Sierra Nevada management decision is a wicked problem.

Clearly, some public problems are more difficult to resolve than others. Renn (1995) suggests that environmental debates operate on three levels, and that ecological risk assessment has *decreasing utility* as an input into policymaking as levels of complexity and conflict increase. For straightforward problems, scientific analysis can serve as a basis for policymaking with little controversy. At a medium level of complexity, public trust in the implementing institutions and their technical expertise is required. At the highest level of complexity and conflict, profound social and cultural values come into play, and stakeholder involvement is essential. In these most complex cases, the processes of defining shared values, common goals, desirable outcomes, and acceptable risks become political. Consequently, technical analyses alone, which do not integrate social values and deliberation, cannot provide an adequate decision-support framework.

To make this point more clearly, it is helpful to consider two dimensions of any decision: the state of necessary knowledge and the level of agreement on guiding values. Given these characteristics of a decision environment, there are four possible scenarios. If the knowledge base underpinning an issue is well understood and generally accepted, and the agreement on values among stakeholders is high, then decision-making is easy and stakeholders may be comfortable with an agency-expert or authoritative strategy.

If agreement on values is low, but the science is well under-stood, then the focus is on dialogue among the stakeholders, guided by the science, to try to understand and resolve the value differences. When the science is uncertain and there are important gaps in the knowledge base, but the stakeholder agreement on values is high, then the focus is on getting the science issues resolved with oversight and engagement by the stakeholders when needed to assure that their values are being reflected in the science and decision-making. But when both the science is uncertain and the agreement on values is low, then the issue becomes a wicked problem, and significant dialogue among scientists, stakeholders, and decision makers is needed.

Some of the key characteristics of wicked problems are (Allen and Gould 1986):

- The definition of the problem is in the "eye of the beholder"; that is, each stakeholder defines the problem differently and therefore there is no single correct formulation of the problem.
- Outcomes are not scientifically predictable.
- The decision maker cannot know when all feasible and desirable solutions have been explored.
- The resources of ecosystems, communities of interest, funds, organizational capabilities, etc.,
- combine with stakeholder demands in idiosyncratic ways; therefore, any solution is likely to be "one-shot" and unique.
- Solutions are generally better or worse, rather than true or false.

It is our firm belief - based on the risks and uncertainties associated with all aspects of the decision framework and the lack of a clear consensus on public values and perceptions of risk - that the Sierra Nevada planning effort is a classic wicked problem. This means that there is no single correct response, only some responses that are better than others, and that the Pacific Southwest Region must cope with the complexities and ambiguities associated with wicked problems.

2.1. Alternatives Considered in Detail

Ten alternatives are considered in detail: the no action alternative (Alternative S1), the proposed action (Alternative S2), partial application of the proposed action (Alternative S3) and seven action alternatives from the FEIS (Alternatives F2-F8). The no action alternative (Alternative S1) continues management in the 11 Sierra Nevada national forests consistent with the Sierra Nevada Forest Plan Amendment (SNFPA) Record of Decision (ROD, January 2001). Alternative S2 proposes specific changes to the SNFPA ROD in response to direction from the Chief of the Forest Service and the Pacific Southwest Regional Forester to:

- Pursue more aggressive fuels treatments while still protecting Old Forest conditions and species at risk.
- Achieve consistency with the National Fire Plan to ensure goals of community protection and forest health are accomplished.
- Harmonize the decision with the Herger-Feinstein Quincy Library Group Recovery Act to implement the Pilot Project to the fullest extent possible.
- Reduce the unintended and adverse impacts on grazing permit holders.
- Reduce the unintended and adverse impacts on recreation users and permit holders.
- Reduce the unintended and adverse impacts on local communities.
- Alternative S3 is a staged implementation of Alternative S2 with the pace of implementation predicated upon the results of adaptive management studies conducted in the four California spotted owl demographic study areas. Alternatives F2 through F8 adopt the fire and fuels reduction strategy and standards and guidelines described under Alternatives 2 through 8, respectively, in the SNFPA FEIS.
- The following section provides a detailed description of Alternative S1 and S2. This is followed by a description of Alternative S3. Finally, Alternatives 2 through 8 of the FEIS are briefly described as Alternatives F2-F8. Readers can refer to the FEIS, Volume 1, Chapter 2, pages 83-164, for a more detailed description of these alternatives.

2.1.1. Common Elements of Alternatives S1 and S2

A. Fire and Fuels Management and Old Forest Ecosystems and Associated Species Conservation

Alternatives S1 and S2 share overarching goals for fire and fuels management that include protecting communities and forests from the impacts of large severe wildland fires, changing condition classes, and meeting ecological goals for re-introducing fire. Both alternatives seek to achieve these goals by reducing hazardous fuels on national forest lands immediately adjacent to communities, working with local communities and agencies to address hazardous fuels conditions in and around communities, and strategically placing area fuels treatments across broad landscapes. Naturally occurring wildland fires are also used under certain conditions to achieve these goals.

Both the community protection and landscape fuels treatments are accomplished over a 20- to 25-year period. Community protection treatments are conducted in wildland urban intermix zones (WUIs), and these treatments are maintained to meet fire behavior standards and guidelines. Strategically placed area treatments (SPLATs) 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.

Overarching goals for old forest ecosystems and associated species conservation are to provide environmental conditions on national forest lands in the Sierra Nevada that would protect, increase, and perpetuate old forest conditions. Both alternatives seek to maintain habitat over time to support viable populations of old forest-associated species well-distributed across Sierra Nevada national forests.

B. Approach for Modifying Wildland Fire Behavior across Broad Landscapes

Both alternatives propose a landscape fuels strategy aimed at modifying fire behavior across broad landscapes to reduce the size and severity of large wildland fires. To accomplish this, managers are directed to strategically locate area fuels treatments.

This strategically placed area treatment (SPLAT) approach is based on the premise that disconnected fuel treatment areas that overlap across the general direction of fire spread are theoretically effective in changing fire spread. The SPLAT approach considers Dr. Mark Finney's research (1999), which indicates that the most effective treatment area shape is one where fire spreads through the treated area slower than it spreads in surrounding untreated areas. Dr. Finney's simulations suggest that fire spread rates can be reduced, even outside treated areas, where a fire is forced to flank around the treated areas where the rate of spread and intensity has been reduced by direct treatment. Dr. Finney's research findings indicate that, given an effective treatment area shape and pattern, only a fraction of the landscape needs to be treated and maintained to produce the desired modifications in wildland fire behavior over the entire landscape.

Both alternatives envision individual treatment areas, which range anywhere from 50 to over 1,000 acres (generally averaging between 100 to 300 acres), strategically located across landscapes to interrupt fire spread, thereby reducing the size and severity of wildland fires. Treated areas should have reduced fuel loadings so that a fire entering a SPLAT will burn at a lower intensity and slower rate of spread than comparable untreated areas. The pattern of SPLATs should be such that a wildland fire would also enter adjacent untreated areas at lower intensities and slower rates of spread. Hence, the SPLATs function as "speed bumps" slowing both the spread and intensity of an oncoming fire, reducing damage to both treated and untreated areas and effectively modifying wildland fire behavior to mitigate the consequences of large, uncharacteristically severe wildland fires.

I. Pattern of Strategically Placed Area Treatments

Bioregional Scale. Approximately 7.5 million acres in the 11 Sierra Nevada national forests are estimated to have high to very high levels of fire hazard and risk. (Refer to the fire hazard and risk map in the

SNFPA DEIS (April 2000) map packet and in the SNFPA FEIS (January 2001), Volume 2, page 256.)) Alternatives S1 and S2 focus the SPLAT strategy in these parts of the Sierra Nevada national forests.

Landscape Scale. Both alternatives envision the SPLAT approach applied across all land allocations outside wildland urban intermix (WUI) defense zones. (Defense zones are more intensively treated to meet objectives for protecting life and property.) WUIs have the highest priority for fuels treatments with WUI threat zones having the highest priority for management to change landscape wildland fire spread and intensity; here the SPLAT strategy is applied across broad landscapes adjacent to defense zones. Managers identify additional areas for conducting fuels treatments once priorities for treating WUIs are met, placing highest priority for fuels treatments in areas where fire hazard and risk is greatest.

SPLAT Pattern Design Criteria. Managers determine the size, location, and orientation of SPLATs across a given landscape in a pattern designed to effectively interrupt the spread of a potential wildland fire. Managers use information about fire history, existing vegetation and fuels conditions, prevailing wind direction, topography, suppression resources, attack times, and access to design an effective SPLAT pattern. The spatial pattern of SPLATs is intended to reduce fire spread rates and reduce fire intensity at the head of the fire.

In designing the pattern of SPLATs across a landscape, managers consider areas that already contribute to wildland fire behavior modification, such as different vegetation patterns, past management activities, burned areas, bodies of water, and barren areas. Managers identify gaps in the landscape pattern where fire could spread at some undesired rate or direction. Treatments (including maintenance treatments and new fuels treatments) are used to fill identified gaps.

II. Treatment Prescriptions for SPLATs

Under both alternatives, fuels treatments in SPLATs are intended to make these areas burn at lower intensities and slower rates of spread during wildfires than comparable untreated areas.

C. Land Allocations

Alternatives S1 and S2 use the following land allocations as part of their strategies for conserving old forest ecosystems and associated species and managing fire and fuels:

- California spotted owl and northern goshawk protected activity centers (PACs),
- California spotted owl home range core areas (HRCAs),
- Wildland urban intermix (WUI),
- Old forest emphasis areas,
- Southern Sierra fisher conservation areas, and
- General forest.

Under both alternatives, the land allocations have the same desired conditions. (The two alternatives use different approaches for directing management within each land allocation, as described under each alternative.) Both alternatives have a priority of land allocations so that management direction for a higher priority land allocation pre-empts direction for another land allocation when two (or more) allocations physically overlap on the ground. The ordering is similar in the two alternatives and described in detail under each alternative.

2.1.2. Alternative S1 (No Action)

A. Theme and Overall Management Approach

The no action alternative (Alternative S1) would continue management in the 11 Sierra Nevada national forests consistent with the Sierra Nevada Forest Plan Amendment (SNFPA) Record of Decision (ROD, January 2001). Alternative S1's approach for conserving old forest ecosystems and associated species and managing fire and fuels responds to concerns that impacts from mechanical fuels treatments may pose greater risks to habitats, particularly in the short-term, than the risks posed by potential wildland fires. As such, Alternative S1 applies a cautious approach for conducting activities in habitats for sensitive species, particularly species associated with old forest ecosystems. Alternative S1 includes standards and guidelines for retaining canopy cover and limiting the sizes of trees that can be removed during fuels treatments and imposing limited operating periods for activities within the vicinity of nest and den sites.. Under Alternative S1, vegetation treatments are focused on fire hazard reduction, maintenance activities, and public health and safety.

The No Action Alternative also provides direction for limiting and, in some cases, eliminating grazing from habitat that is or has been occupied by the Yosemite toad and willow flycatcher. This alternative applies limited operating periods to vegetation management activities in the vicinity of California spotted owl and northern goshawk nest sites and forest carnivore den sites. Limited operating periods may apply where analysis of proposed projects or activities determines that such activities are likely to result in nest or den site disturbance.

B. Approach for Modifying Wildland Fire Behavior across Broad Landscapes

Section 2.1.1 "Common Elements of Alternatives S1 and S2" describes Alternative S1's approach for modifying wildland fire behavior across landscapes. This section describes elements of the fire and fuels management strategy that are unique to Alternative S1.

I. Pattern of Strategically Placed Area Treatments Relative to Protected Activity Centers

Alternative S1 has standards and guidelines that limit the number of California spotted owl and northern goshawk PACs that can be treated across the Sierra Nevada national forests in any year (no more than 5 percent per year) or decade (no more than 10 percent of PACs treated per decade). This direction, combined with standards and guidelines that limit treatment options in PACs to prescribed fire only, results in managers adjusting SPLAT patterns to avoid including parts of PACs within SPLATs.

II. Treatment Prescriptions for SPLATs

Under Alternative S1, managers can use prescribed burning to treat SPLATs in all land allocations. Prescribed burning is the only treatment method available in California spotted owl and northern goshawk PACs outside defense zones (SNFPA ROD, pages A-35 and A-37). Prescribed burning is the treatment method of choice in old forest emphasis areas and California spotted owl home range core areas; mechanical fuels treatments may be used in these land allocations only if fuels objectives cannot be met using prescribed fire (SNFPA ROD, page A-41).

Managers are directed to design mechanical treatments in SPLATs to reduce surface and ladder fuels to achieve a desired outcome for fire intensity (expressed in terms of a 6-foot flame length) if the SPLAT was to burn under 90th percentile fire weather conditions. Managers are directed to remove the material necessary to achieve a 6-foot flame length in the treated area as well as desired ladder fuels conditions (described as live crown base heights in given stand conditions). Standards and guidelines for mechanical fuels treatments specify minimum canopy cover levels that must be retained following mechanical treatments and limit the size of trees and amount of canopy that can be removed, based on either individual stand conditions within the SPLAT or the land allocation in which the SPLAT is located.

C. Land Allocations

Each land allocation under Alternative S1 (described in Section 2.1.1 "Common Elements of Alternatives S1 and S2" above) has a set of management standards and guidelines. The standards and guidelines are intended to guide managers in designing mechanical fuels treatments that accomplish objectives for reducing fuels while ensuring that existing suitable California spotted owl habitat is maintained in treated areas. Hence, the standards and guidelines provide stand-level objectives for mechanical fuels treatments and limit sizes of trees and amounts of canopy cover that can be removed.

Alternative S1's land allocations are placed in a priority ordering so that management standards and guidelines for a higher priority land allocation pre-empt this direction for another land allocation when two (or more) allocations physically overlap on the ground. Land allocation standards and guidelines provide direction for conducting mechanical fuels treatments. Most of the mechanical fuels treatment standards and guidelines are the same for California spotted owl HRCAs, WUI threat zones, old forest emphasis areas, and general forest, effectively establishing the following priority ordering as follows: (1) California spotted owl and northern goshawk PACs, (2) WUI defense zones, and (3) California spotted owl HRCAs, WUI threat zones, old forest emphasis areas, and general forest. This means that when a PAC overlaps with another land allocation, standards and guidelines for PACs supercede the standards and guidelines of the overlapped land allocation.

D. Standards and Guidelines for Vegetative Management

Alternative S1 has standards and guidelines that either specify (1) allowable types or extents of treatments in certain areas or (2) limitations on amounts of material that can be removed through mechanical treatments. These standards and guidelines are designed to: (1) address risks and uncertainties associated with potential effects of mechanical fuels treatments on old forest associated species and their habitats and (2) conserve likely important components of habitat for old forest associated species, such as stands of mid and late seral forests with large trees, structural diversity and complexity, and moderate to high canopy cover.

Standards and guidelines for California spotted owl PACs specify types and extents of treatments. Prescribed burning is the only treatment option for PACs outside defense zones. The extent of treatments in California spotted owl PACs is limited to no more than 5 percent of the PACs per year and 10 percent of the PACs per decade across the bioregion. Standards and guidelines for old forest emphasis areas and California spotted owl home range core areas emphasize using prescribed fire over mechanical treatment options.

Alternative S1 does not place restrictions on the amounts of material removed through prescribed burning. It does, however, have standards and guidelines for mechanical fuels treatments that limit the sizes of trees and amount of canopy cover that can be removed as well as the amount of canopy cover that must be retained. Standards and guidelines for mechanical treatments also limit the area of each stand that can be treated. These standards and guidelines are applied on a stand-by-stand basis, and, for the most part, the stand condition (rather than land allocation) determines which standards and guidelines apply. An individual SPLAT generally encompasses numerous individual stands, requiring each stand to be delineated so that the appropriate standards and guidelines can be applied.

The simplest way to approach the mechanical fuels treatment standards and guidelines is to assume that a general standard and guideline applies in most cases. In general, mechanical treatments in areas outside defense zones are limited to removing trees less than 12 inches dbh and reducing canopy cover in dominant and codominant trees by no more than 10 percent. Table Da displays exceptions to this general standard and guideline for mechanical fuels treatments outside defense zones.

Table Da. Exceptions to the 10 percent canopy cover reduction and 12-inch tree diameter limit standards and guidelines for mechanical fuels treatments outside defense zones.

Stand Condition (Land Allocation)	Standards and Guidelines
CWHR size classes 3, 4, and 5 with canopy cover between 40 and 50 percent (all allocations outside defense zones)	Mechanical treatments may only remove trees less than 6 inches dbh.
CWHR type 4D in old forest emphasis areas and California spotted owl home range core areas where the following conditions are met: ▪ sufficient amount of habitat to meet home range core acreage requisite AND ▪ treatments beyond prescribed burning and removing material less than 12 inches are needed to meet fuels objectives	Mechanical treatments may: (1) remove trees less than 20 inches dbh and **(2)** reduce canopy cover in dominant and codominant trees by no more than 20 percent.
CWHR type 4D in threat zones where the following condition is met: sufficient amount of habitat to meet home range core acreage requisite	Mechanical treatments may: (1) remove trees less than 20 inches dbh and **(2)** reduce canopy cover in dominant and codominant trees by no more than 20 percent.
CWHR types 3S, 3P, 4S, 4P, 5S, 5P in threat zones and general forest CWHR 4D in general forest	Mechanical treatments may: (1) remove trees less than 20 inches dbh and (2) reduce canopy cover in dominant and codominant trees by no more than 20 percent.

E. Herger-Feinstein Quincy Library Group Forest Recovery Act Pilot Project

Under Alternative S1, SNFPA ROD direction applies to the HFQLG Forest Recovery Act pilot project area except for riparian protection. Based on the terms of the HFQLG Act, the Scientific Analysis Team (SAT) guidelines apply to the pilot project until the pilot project has been completed.

F. Standards and Guidelines for Sensitive Species and Meadow Ecosystems

I. Willow Flycatcher

Alternative S1 eliminates or significantly limits grazing within 82 meadows where willow flycatchers have historically been detected. In addition, there is a requirement to survey suitable habitat within a five-mile radius of the 82 meadows be surveyed by 2006. Detection of willow flycatchers in additional locations results in a late-season grazing restriction (after August 31). Late season grazing restrictions apply where required surveys have not been completed in the specified timeframe, until they are conducted and yield no detections.

II. Yosemite Toad

Alternative S1 excludes livestock from habitat (standing water and saturated soils) occupied by Yosemite toads during the breeding and rearing season. Where physical exclusion of livestock is not practical, livestock are to be excluded from the entire meadow. Surveys of suitable habiat within the species historic range are to be completed by 2004. Livestock are automatically excluded in habitat that has not been surveyed in the time allotted until such work is completed.

III. Great Gray Owl

Alternative S1 requires the height of herbaceous vegetation in meadow areas of great gray owl PACS to be maintained 12 inches or greater and covering at least 90 percent of the meadow.

III. Species Associated with Old Forests

Alternative S1 includes standards and guidelines that apply limited operating periods to all new activities in the vicinity of California spotted owl and northern goshawk nest sites and furbearer den sites.

V. Meadow Ecosystems

For season-long grazing, Alternative S1 limits utilization of grass and grass-like plants for meadows in early seral status to 30-percent (or minimum 6-inch stubble height. For meadows in late seral status, utilization is limited to 40-percent (or minimum 4-inch stubble height).

G. Adaptive Management and Monitoring Strategy and Strategic Planning

Alternative S1 would continue the commitment to Adaptive Management and Monitoring as described in the SNFPA ROD and Appendix E of the SNFPA FEIS. A key focus would be using Adaptive Management to “test new and innovative management techniques” using formal Adaptive Management research projects or administrative studies done in conjunction with the Pacific Southwest Research Station or other scientific research institutions. Support would be continued for the Kings River and Black’s Mountain adaptive management research areas, already underway.

Adaptive Management would be jointly executed and managed by the Pacific Southwest Region and the Pacific Southwest Research Station in collaboration with other agencies, governments and interested parties. This would involve development of a formal arrangement with these agencies and parties including chartering a Federal Advisory Committee under the Federal Advisory Committee Act (FACA).

Also included under the auspices of Adaptive Management would be design and implementation of an administrative study in the HFQLG area to examine the effects of management-caused vegetation changes on spotted owl habitat and population dynamics.

Under Alternative S1, monitoring would include establishment of a monitoring team that would orchestrate regional data collection and work in close collaboration with the Pacific Southwest Research Station. A Sierra Nevada wide monitoring and evaluation report would be completed each year. Evaluation of monitoring results would be done each year in collaboration with “appropriate federal and state agencies.” Needed changes in response to monitoring results would occur through forest plan amendments or revisions.

2.1.3. Alternative S2 (Proposed Action, the Preferred Alternative)

A. Theme and Overall Management Approach

The proposed action (Alternative S2) proposes changes to specific elements of the SNFPA ROD, primarily in the strategies for old forest ecosystem and associated species conservation and fire and fuels management. Alternative S2 retains the existing SNFPA ROD's goals for conserving old forest ecosystems and associated species and managing fire and fuels. This alternative uses a more active management approach, where Forest Service managers use thinning, salvage, and prescribed and natural fires to make forests less susceptible to the effects of uncharacteristically severe wildland fires as well as invasive pests and diseases. It also provides mechanisms that allow fuels and forest health treatments to generate revenues through commercial forest products to increase the number of acres that can be treated with available appropriated funds. Alternative S2 responds to concerns that impacts from large, severe wildland fires may pose greater risks to habitats for sensitive species than short-term risks from vegetation and fuels management activities. This alternative's active vegetation and fuels management approach acknowledges the short-term risks of temporarily changing some habitat for California spotted owls and other species with similar habitat needs to mitigate the longer-term risks associated with the impacts of large, severe wildland fires on both wildlife habitats and human communities.

Alternative S2 proposes an integrated vegetation management strategy with objectives for protecting communities and modifying landscape-scale fire behavior to reduce the size and severity of wildland fires, similar to those described in the SNFPA ROD. However, Alternative S2's integrated vegetation management strategy clarifies the intent of the existing SNFPA ROD as it relates to these objectives for fire and fuels management. The integrated vegetation management strategy also includes objectives for enhancing forest health, restoring and maintaining ecosystem structure and composition, and restoring ecosystems after large wildland fires.

Alternative S2 would retain the SNFPA ROD's network of land allocations and their associated desired conditions. Alternative S2 would, however, replace many of the SNFPA ROD standards and guidelines pertaining to old forest ecosystems and associated species conservation and fire and fuels management. Alternative S2's replacement standards and guidelines provide greater flexibility to local managers to design projects that respond to local conditions while meeting the objectives for which the original standards and guidelines were designed.

Alternative S2 would provide for implementation of the Herger-Feinstein Quincy Library Group (HFQLG) Forest Recovery Act Pilot Project, consistent with the HFQLG Forest Recovery Act Record of Decision (August 1999) with the following two exceptions: (1) the mitigation measure of staying out of suitable owl habitat would be dropped and (2) DFPZ completion would be allowed in LSOGs 4 and 5 with direction to avoid altering old forest patches within these land allocations. Upon completion of the pilot project, management activities on the Plumas and Lassen National Forests and the Sierraville Ranger District of the Tahoe National Forest would be guided by the direction under Alternative S2 for the Sierra Nevada national forests.

Alternative S2 also includes standards and guidelines for managing grazing within habitat that is or has been occupied by the Yosemite toad and willow flycatcher. Management direction is designed to adjust local management to respond to highly variable site-specific conditions across the Sierra Nevada bioregion and Modoc Plateau. This Alternative applies limited operating periods to vegetative management activities in the vicinity of California spotted owl and northern goshawk nest sites and furbearer den sites.

B. Approach for Modifying Wildland Fire Behavior across Broad Landscapes

As described in Section 2.1.1 "Common Elements of Alternatives S1 and S2", a key component of Alternative S2's fuels treatment strategy is aimed at modifying fire behavior across broad landscapes to reduce the size and severity of large wildland fires. Alternative S2 explicitly recognizes two criteria that must be met for the strategically located area treatment (SPLAT) approach to effectively modify wildland fire behavior: (1) the pattern of treatment areas on the landscape must interrupt fire spread and (2) treatment prescriptions for each SPLAT must be designed to effectively modify fire behavior. It is important to recognize that during the first 5 years of implementation, 75 percent of fuels treatments under Alternative S2 would be located in the WUI.

I. Pattern of Strategically Placed Area Treatments Relative to Protected Activity Centers

Under Alternative S2, managers are directed to adjust SPLAT patterns to avoid treating PACs to the greatest extent possible. PACs may be re-mapped during project planning to avoid intersections with SPLATs, provided that the re-mapped PAC encompasses habitat of equal quality and protects known nest and important roost sites. When the pattern of SPLATs across a landscape results in intersections with PACs, managers apply criteria to preferentially avoid treating PACs that have the greatest likely contribution to California spotted owl productivity. These criteria are listed below from lowest to highest likely contribution to productivity; hence, PACs meeting the last listed criteria would have the highest priority for avoidance.

- PAC presently unoccupied and historically occupied by territorial singles only (lowest contribution to productivity)
- PACs presently unoccupied and historically occupied by pairs
- PACs presently occupied by territorial singles
- PACs presently occupied by pairs
- PACs currently or historically reproductive

If nesting or foraging habitat in PACs is mechanically treated, the treated acres are replaced by adjacent acres of comparable quality wherever possible.

Alternative S2 has standards and guidelines that limit the number of acres of PACs that can be treated across the Sierra Nevada national forests in any year (no more than 5 percent per year or decade (no more than 10 percent per decade).

II. Fuels Treatment Prescriptions for SPLATs

SPLATs are treated to meet standards for desired surface, ladder, and crown fuel conditions. Site-specific prescriptions are designed to modify fire intensity and spread in SPLATs. Managers consider such variables as the SPLAT's topographic location, slope steepness, predominant wind direction, and the amount and arrangement of surface, ladder, and crown fuels to develop fuels treatment prescriptions. Fuels treatment prescriptions for SPLATs place first priority on reducing surface and ladder fuels. Crown fuels are modified to the extent necessary to reduce the potential for crown fire spread.

III. Incorporating Forest Health and Fire Re-introduction Objectives into SPLAT Treatment Prescriptions

The number, size and spacing between SPLATs for any given landscape is based on developing a strategic layout of treatments that will modify fire behavior for that location. In designing treatment patterns, managers are directed to locate SPLATs to meet other management objectives (such as forest health and the re-introduction of fire) when it is possible to do so without compromising the primary purpose of the treatments.

Fuels treatment objectives have first priority in SPLATs. If a prescription developed for meeting fuels objectives in a SPLAT does not address existing stand conditions associated with an elevated risk for excessive mortality from insects, disease, or both, it can be modified to incorporate objectives for enhancing stand resiliency to mortality from these agents. Forest health prescriptions are envisioned as thinnings in densely stocked stands, where resistance to insects and pathogens has been reduced and could lead to uncharacteristic levels of mortality.

Re-introducing fire is an important objective in old forest emphasis areas and general forest areas. Treatments in and around SPLATs can incorporate this objective. Note that managers can apply prescribed fire treatments both within and outside SPLATs.

C. Opportunities for Leveraging Appropriated Funds to Increase Acres of Fuels Treatments

Alternative S2 provides mechanisms that allow fuels and forest health treatments to generate revenues through commercial forest products to increase the number of acres that can be treated with the available appropriated funds. Where consistent with desired future conditions, treatments within SPLATs can be designed to be economically efficient and meet multiple objectives.

D. Forest Health Treatments

Alternative S2 recognizes that protection against excessive tree mortality associated with inter-tree competition, drought, fire, insects, diseases, and other disturbance agents is needed to attain sustainable and socially desirable forest structures at fine scales of tens or hundreds of acres. As described above, SPLAT patterns and treatment prescriptions in SPLATs are expected to accommodate some objectives for enhancing forest health. Outside of the SPLAT strategy, forest health treatments may be developed and analyzed locally to address site-specific environmental conditions. Alternative S2 does not preclude the ability of local managers to propose and implement forest health treatments. Mechanical thinning treatments for forest health purposes would be consistent with Alternative S2’s forest-wide standards and guidelines for CWHR types 4M, 4D, 5M, 5D, and 6 outside defense zones.

E. Ecosystem Restoration Following Catastrophic Disturbance Events

Alternative S2 directs managers to determine the need for ecosystem restoration projects following large, catastrophic disturbance events (wildfires, drought, insects, disease, windstorm, and other unforeseen events, singly or in combination). Objectives for these restoration projects include managing disturbed areas to address long-term fuels profiles, restore habitat, and recover the value of some of the dead and dying trees. Ecosystem restoration projects can be implemented in all land allocations.

Catastrophic events occur in a relatively short period of time (several months to 5 years). A catastrophic event alters forest conditions beyond the range for which they are being managed. For example, a catastrophic event would render forest patches that had previously provided nesting habitat no longer suitable for this purpose.

Restoration activities after catastrophic events are intended, over time, to restore forest species composition and structure to that which existed prior to the event or to a more desirable condition for a given land allocation. Restoration activities include removal of excess dead wood (through salvage harvest, unmerchantable mechanical removal, prescribed fire, or a combination of these activities) and reforestation (appropriate combinations of site preparation, planting, site preparation for natural regeneration, natural regeneration without site preparation, release, and animal damage control). Restoration activities would be undertaken where predicted forest succession is expected to be outside the desired range of species composition and structure. For example, a forest with five tree species burns and is predicted to become a manzanita- and whitethorn ceanothus-dominated shrubfield over a 30 to 50 year period, eventually succeeded by sparse white fir and incense cedar tree cover with high fuel loads. Tree removal and reforestation would be conducted to reduce predicted future fuel loads, regenerate all five tree species, and begin a successional path predicted to attain a moderately dense tree cover rather than a sparse one. The intent for restoring ecosystems following catastrophic drought, insect, disease, and wind events is similar.

Under Alternative S2, salvage harvest of dead and dying trees may be conducted to recover the value of this material and to support objectives for reducing hazardous fuels, improving forest health, re-introducing fire, speeding recovery of old forest conditions, or a combination of these. Salvage harvest is allowed in all land allocations with some key exceptions. In WUIs, treatments in PACs may remove salvage in support of meeting fuels objectives; outside WUIs, salvage harvests are generally not allowed in PACs that are still actively used. In old forest emphasis areas, smaller areas (less than 10 acres) of dead and dying trees are generally not salvaged.

F. Land Allocations

Each land allocation under Alternative S2 (described in Section 2.1.1 “Common Elements of Alternatives S1 and S2” above) has a set of management intents and vegetation and fuels management objectives. These two elements provide direction to land managers for designing and developing fuels and vegetation management projects that are consistent with Alternative S2’s objectives for actively managing fire and fuels, old forest ecosystems, and California spotted owl habitat. Site-specific project planning is done to ensure that fuels and vegetation management activities are consistent with forest plan direction, which includes the broad direction described in the preceding section; desired conditions, management intents, and objectives described here; and management standards and guidelines described in the next section.

Alternative S2’s land allocations are placed in a priority ordering so that desired conditions, management intents, and management objectives for a higher priority land allocation pre-empt this direction for another land allocation when two (or more) allocations physically overlap on the ground. Alternative S2’s priority ordering of land allocations is as follows: (1) California spotted owl and northern goshawk PACs, (2) WUI defense zones, (3) California spotted owl HRCAs, (4) WUI threat zones, (5) old forest emphasis areas, and (6) general forest. This means that when an HRCA overlaps with a WUI threat zone, managers apply desired conditions, management intents and management objectives for HRCAs in this area. Note, however, that direction for prioritizing fuels treatments in WUIs (defense and threat zones) includes HRCAs that fall within these areas.

Table Fa displays desired conditions, management intent, and objectives for fuels and vegetation management activities for each land allocation.

Table Fa. Integrated Fire/Fuels, Old Forest, and California Spotted Owl Strategy in Alternative S2 Land Allocations, Desired Conditions, Management Intents, and Fuels and Vegetation Management Objectives.

Land Allocation	Desired Conditions	Management Intent	Fuels and Vegetation Management Objectives
PACs in WUIs	At least two tree canopy layers; dominant and co-dominant trees average at least 24 inches dbh; 60 to 70 percent canopy cover; some very large snags (greater than 45 inches dbh); higher than average levels of snags and down woody material.	Maintain PACs so that they continue to provide conditions and habitat that supports successful reproduction of California spotted owls northern goshawks. Avoid vegetation and fuels management activities within PACs to the greatest extent feasible. Portions of PACs in defense zones may require treatment to reduce hazardous fuels in instances where these conditions represent an unacceptable fire threat to communities. An effective SPLAT pattern in threat zones may require treating portions of PACs in these areas to effectively modify wildland fire behavior.	When PACs in the defense zones are treated, ensure that treatments effectively treat surface, ladder, and crown fuels to create defensible space around communities. In threat zones, adjust the SPLAT pattern to avoid treating PACs to the greatest extent possible. However, once the need for a SPLAT within a portion of a PAC is identified, then effectively treat fuels to meet objectives for reducing fire intensity and rate of spread in SPLATs.
PACs outside WUIs	At least two tree canopy layers; dominant and co-dominant trees average at least 24 inches dbh; 60 to 70 percent canopy cover; some very large snags (greater than 45 inches dbh); higher than average levels of snags and down woody material.	Design landscape fuels strategies to minimize the need for fuels treatments within PACs to the greatest extent feasible. Consider protecting PACs by treating around them where possible or by reducing the risk of fire entering the PAC.	Once the landscape pattern of SPLATs has established the need for a SPLAT to intersect with a portion of a PAC, treat the portion of the PAC within the SPLAT to meet fuels objectives. (Prescribed fire is the only treatment method available for treating PACs outside WUIs.)
WUI Defense Zones	Stands are fairly open and dominated primarily by larger, fire tolerant trees. Surface and ladder fuel conditions are such that crown fire ignition is highly unlikely. The openness and discontinuity of crown fuels, both horizontally and vertically, produce a very low probability of sustained crown fire.	Protect communities from wildland fire and prevent the loss of life and property.	Create defensible space near communities and provide a safe and effective area for fire suppression activities. The primary treatment objective is to design economically efficient treatments to reduce hazardous fuels. Vegetation treatments in defense zones may be for forest health and fire re-introduction purposes to the extent that such treatments are compatible with objectives for protecting communities and preventing the loss of life and property.

Land Allocation	Desired Conditions	Management Intent	Fuels and Vegetation Management Objectives
HRCAs	At least two tree canopy layers; dominant and co-dominant trees average at least 24 inches dbh; 50 to 70 percent canopy cover; some very large snags (greater than 45 inches dbh); higher than average levels of snags and down woody material.	Intent of management in HRCAs in priority order: Treat fuels consistent with the universal landscape approach for strategically placing area fuels treatments; Retain existing suitable habitat, recognizing that treatments in SPLATs may modify this habitat to meet fuels objectives; and Accelerate development of currently unsuitable habitat (in inclusions, such as plantations, within HRCAs) into a suitable condition. Arrange SPLAT patterns and develop treatment prescriptions to avoid the highest quality habitat (CWHR types 5M, 5D, and 6) in HRCAs wherever possible.	Primary objective for vegetation treatments is to establish and maintain a pattern of SPLATs that is effective in modifying wildland fire behavior. In areas characterized by high to very high fire hazard and risk, mechanical treatments are confined to SPLATs. Where consistent with desired future conditions, treatment prescriptions for SPLATs in HRCAs are designed to treat fuels in an economically efficient, manner and and to incorporate forest health and fire re-introduction objectives, as appropriate.
WUI Threat Zones	Threat zones are envisioned as part of a broader landscape strategy to modify wildland fire behavior. Strategically placed area treatments in threat zones support treatments in defense zones.	Locate SPLATs and design treatment prescriptions for SPLATs to modify wildland fire behavior consistent with desired conditions for threat zones. Accommodate and incorporate other vegetation management objectives (forest health and re-introducing fire) through the size and arrangement of SPLATs, with the SPLAT pattern designed to meet the primary goal of modifying wildland fire behavior.	The primary objective for treatments in the threat zone is to establish and maintain a pattern of SPLATs that is effective in modifying wildland fire behavior. Treatment prescriptions for SPLATs are designed to be economically efficient and to meet objectives for reducing fire intensity and rate of fire spread. Managers may design SPLAT treatment prescriptions to incorporate objectives for forest health and re-introducing fire.
Old Forest Emphasis Areas	Desired conditions are based on forest type, as described in the SNFPA FEIS, Volume 1, Chapter 2, pages 135 – 141 and Appendix A of the SNFPA Review Team Report. Old forest patch types, as determined by site capability, exist and are maintained on the greatest proportion of acres in old forest emphasis areas as possible. Each landscape has a mixture of open and closed-canopy patches based on the range of site capacities and topography.	Actively manage to protect, maintain, and develop old forest habitat in (1) areas containing the best remaining large blocks or landscape concentrations of old forest and (2) in areas that provide old forest functions (such as connectivity of habitat over a range of elevations to allow migration of wide-ranging old forest associated species). Manage to develop and maintain a range of desired vegetation conditions across old forest emphasis areas. Re-introducing fire is very important. Restoration of historic fire regimes is a high priority. Actively manage to modify wildland fire behavior at landscape scales in old forest emphasis areas as well as to reduce fire hazard in key old forest patches and stands. The goal is to reduce the threat of high severity fire and resulting loss of old forest function at both patch and landscape scales.	The primary objective for vegetation treatments is to establish and maintain a pattern of SPLATs that is effective in modifying wildland fire behavior. Where consistent with desired future conditions, treatment prescriptions for SPLATs in old forest emphasis areas are designed to treat fuels in an economically efficient, manner and and to incorporate forest health and fire re-introduction objectives, as appropriate.

Land Allocation	Desired Conditions	Management Intent	Fuels and Vegetation Management Objectives
General Forest	Desired conditions are based on forest type, as described in the SNFPA FEIS, Volume 1, Chapter 2, pages 135 – 141 and Appendix A of the SNFPA Review Team Report. Old forest patches generally occupy a smaller proportion of the landscape than within old forest emphasis areas. The amount, quality, and connectivity of old forest habitat support replacement rate reproduction for the California spotted owl and other old forest associated species.	Actively manage general forest areas to protect, maintain, and enhance a variety of vegetative conditions. Strategically place area fuels treatments to modify wildland fire behavior. Reduce fire hazard in key areas to reduce the threat of high severity fire. Restoring historic fire regimes is very important.	The primary objective for vegetation treatments is to establish and maintain a pattern of SPLATs that are economically efficient to complete and effective in modifying wildland fire behavior. Managers may design SPLAT treatment prescriptions to incorporate objectives for forest health and re-introducing fire, where appropriate.

G. Fuels and Vegetation Management Standards and Guidelines

Alternative S2 has forest-wide standards and guidelines that specify (1) minimum canopy cover levels and quantities of larger trees that should be retained following mechanical thinning treatments, (2) surface and ladder fuel post-treatment conditions in fuels treatment units, and (3) guidelines for post fire restoration activities, general salvage, and snag and down woody material retention. These standards and guidelines are intended to (1) allow local managers to design projects that meet overall objectives for managing vegetation and fuels while responding to local conditions and (2) conserve likely important components of habitat for old forest associated species, such as stands of mid and late seral forests with large trees, structural diversity and complexity, and moderate to high canopy cover.

Under Alternative S2, standards and guidelines for California spotted owl PACs specify types and extents of treatments. Prescribed burning is the only treatment option for PACs outside WUIs. The extent of treatments in California spotted owl PACs is limited to no more than 5 percent of the PAC acreage per year and 10 percent of the PAC acreage per decade across the bioregion. Outside PACs, managers can use either mechanical thinnings, salvage harvests, prescribed fire, or wildland fire use to conduct vegetation and fuels management.

Alternative S2 does not require managers to retain minimum amounts of material following prescribed burning. It does, however, have standards and guidelines for mechanical fuels treatments that direct managers to design projects to retain larger trees as well as canopy cover. These standards and guidelines are applied across a treatment unit, based on aggregated mature forest stands (CWHR 4M, 4D, 5M, 5D, and 6) within the unit. Table Ga displays Alternative S2's forest-wide standards and guidelines for mechanical thinning treatments in mature forest habitat. Note that these standards and guidelines are applied in all land allocations outside defense zones. The complete set of standards and guidelines for Alternative S2 is provided in Appendix A.

Table Ga. Alternative S2 forest-wide standards and guidelines for mechanical thinning treatments in mature forest habitat (CWHR types 4M, 4D, 5M, 5D, and 6) outside defense zones.*

Intent	Standards and Guidelines
Maintain and develop old forest habitat conditions by leaving the largest trees on site.	Design projects to retain at least 40 percent of the basal area, consisting of the largest trees in each treatment unit.
Ensure recruitment of very large trees across the landscape.	Design projects to retain all live trees 30 inches dbh or larger.
Allow project designers to address and balance the need to provide and develop understory structure as an important old forest habitat component with the need to reduce ladder and crown fuels.	Where available, design projects to retain 5 percent or more of the total post-treatment canopy cover in lower layers composed of trees 6 to 24 inches dbh within the treatment unit.
Maintain high levels of canopy cover whenever it is possible to do so and still meet project objectives.	Where vegetative conditions permit, design projects to retain 50 percent canopy cover after treatment within the treatment unit, except where site-specific project objectives cannot be met (for example, to achieve adequate height to live crown, provide sufficient spacing for equipment operation, minimize re-entry, or design economically efficient treatments). Where 50 percent canopy cover retention cannot be met as described above, design projects to retain a minimum of 40 percent canopy cover within the treatment unit.
Where canopy cover is at or near 40 percent, maintain canopy closure conditions suitable for dispersal and foraging for California spotted owls while also allowing for effective fuels treatments.	Where pre-treatment canopy cover is at or near 40 percent, remove only surface and ladder fuels to achieve project fuels objectives.
Avoid large changes in canopy density.	Design projects to avoid reducing pre-existing canopy cover by more than 30 percent within the treatment unit. Percent is measured in absolute terms (for example, do not reduce 80 percent canopy closure to less than 50 percent.)

* The eastside pine vegetation type has different standards and guidelines than those displayed in this table. For eastside pine (CWHR types 4M, 4D, 5M, 5D and 6), projects are designed to retain 30 percent of the basal area, consisting of the largest trees in each treatment unit. Projects in the eastside pine type have no canopy cover retention standards and guidelines.

H. Herger-Feinstein Quincy Library Group Forest Recovery Act Pilot Project

Under Alternative S2, the Lassen and Plumas National Forests and the Sierraville Ranger District of the Tahoe National Forest would implement the Herger-Feinstein Quincy Library Group (HFQLG) Forest Recovery Act pilot project, consistent with the HFQLG Forest Recovery Act Record of Decision (ROD, August 1999) with the following two exceptions: (1) the mitigation measure to avoid conducting resource management activities (DFPZ construction, group selection, and single tree selection) in suitable owl habitat would be dropped and (2) DFPZ construction could proceed in the Late Successional/Old Growth (LSOG) 4 and 5 land allocation with direction to avoid altering old forest patches within this land allocation.

The HFQLG Forest Recovery Act pilot project is designed to test and demonstrate the effectiveness of certain fuels and vegetation management activities in meeting ecologic, economic, and fuel reduction objectives. Fuels and vegetation management activities include constructing a strategic system of defensible fuels profile zones (DFPZs), group selection, and individual tree selection. A riparian management program is also included in the Pilot Project.

Alternative S2 provides the following direction for the HFQLG Forest Recovery Act pilot project area:

- Apply land allocations within the Lassen and Plumas National forests, and the Sierraville Ranger District of the Tahoe National Forest from the HFQLG Forest Recovery Act ROD and FEIS.

- Apply standards and guidelines for the northern goshawk, fisher, and marten from the HFQLG Forest Recovery Act FEIS.
- Implement the fire and fuels strategy from the HFQLG Forest Recovery Act and FEIS.
- Implement a program of group selection regeneration across an average of 0.57 percent of the landbase per year as required under the HFQLG Forest Recovery Act.

Upon completion of the pilot project, vegetation and fuels management activities on the Plumas and Lassen National Forests and the Sierraville Ranger District of the Tahoe National Forest would be guided by the direction under Alternative S2 for the Sierra Nevada national forests.

Table Ha summarizes direction for fuels and vegetation management activities under implementation of the pilot project. It displays land allocations for the HFQLG pilot project area, objectives for vegetation and fuels management activities in the pilot project area, and standards and guidelines relevant to California spotted owl conservation. These latter standards and guidelines provide the specific direction for California spotted owls.

Table Ha. HFQLG Forest Recovery Act Pilot Project Area under Alternative S2 for the duration of the Pilot Project.
Land Allocations, Fuels and Vegetation Management Objectives, Key Standards and Guidelines relevant to California spotted owl conservation.

Land Allocation	Fuels and Vegetation Management Activities	Standards and Guidelines relevant to California spotted owl conservation
Offbase and Deferred Areas	These areas are not actively managed to achieve fuels or vegetation objectives.	The following activities are not allowed in offbase and deferred areas: DFPZ construction, group selection, individual tree selection, all road building, all timber harvesting activities, and any riparian management that utilizes road construction or timber harvesting.
Late Seral/Old Growth (LSOG) Rank 4 and 5 Polygons	Old forest patches within these areas are not actively managed to achieve fuels or vegetation objectives. DFPZ construction may be conducted outside old forest patches within this land allocation.	Timber harvest and road construction is postponed in old forest patches within this land allocation. Outside old forest patches, managers apply the design standards for DFPZs described below for national forest lands outside the above allocations and available for vegetation and fuels management activities specified in the HFQLG Act.
California Spotted Owl Protected Activity Centers	Prescribed burning may be conducted in PACs to reduce hazardous fuels.	These areas are deferred from HFQLG Forest Recovery Act resource management activities (including DFPZ construction, group selection, and individual tree selection) and timber harvesting.
California Spotted Owl Habitat Areas (SOHAs)	Prescribed burning may be conducted in SOHAs to reduce hazardous fuels.	These areas are deferred from HFQLG Forest Recovery Act resource management activities (including DFPZ construction, group selection, and individual tree selection) and timber harvesting.
National Forest lands outside the above allocations and available for vegetation and fuels management activities specified in the HFQLG Act	DFPZ construction, group selection, and individual tree selection may be conducted consistent with the pilot project's treatment rates for these activities.	Design DFPZ treatments consistent with objectives for DFPZs as described in Appendix J of the HFQLG Forest Recovery Act FEIS (without the mitigation measure) and the California spotted owl interim guidelines. Retain all trees greater than or equal to 30 inches dbh. Design individual tree selection harvests consistent with the California spotted owl interim guidelines.

I. Standards and Guidelines for Sensitive Species and Meadow Ecosystems

I. Willow Flycatcher

Alternative S2 allows late-season grazing only (after August 15) in meadows where willow flycatchers have recently been detected. Managers have the option to extend the grazing period if a meadow-specific management plan has been developed to protect and sustain willow flycatcher habitat. When willow flycatchers are no longer detected at once-occupied sites, Alternative S2 requires managers to assess meadow conditions and take restorative action where necessary.

II. Yosemite Toad

Alternative S2 excludes livestock from habitat (standing water and saturated soils) occupied by Yosemite toads during the breeding and rearing season. Where physical exclusion of livestock is not practical, Alternative S2 requires livestock to be excluded from the entire meadow. Exclusion requirements may be waived if a site-specific management plan has been developed and includes a rigorous monitoring component.

III. Great Gray Owl

Alternative S2 requires meadows within great gray owl PACS to be managed to maintain herbaceous vegetation at a height commensurate with site capability and habitat needs of prey species.

IV. Species Associated with Old Forests

Alternative S2 includes standards and guidelines that apply limited operating periods to vegetative management activities in the vicinity of California spotted owl and northern goshawk nest sites and furbearer den sites.

V. Meadow Ecosystems

For season-long grazing, Alternative S2 limits utilization of grass and grass-like plants for meadows in early seral status to 30-percent (or minimum 6-inch stubble height. For meadows in late seral status, utilization is limited to 40-percent (or minimum 4-inch stubble height). Alternative S2 allows the above utilization standards to be modified to test alternative standards when current practices are maintaining range in good to excellent condition.

J. Adaptive Management and Monitoring Strategy

Alternative S2 would include strong commitment to an Adaptive Management and Monitoring Strategy generally as outlined in the SNFPA ROD and Appendix E of the SNFPA FEIS, with some specific changes in emphasis. In order to maximize efficient use of available resources, monitoring would initially be focused on key issues considered most important and sensitive. These issues would be further defined by developing “thresholds” that would identify the level at which concerns would arise to necessitate more intensive monitoring and formal review of project or landscape effects. Monitoring scope and magnitude would be expanded later as needs and available resources change. Under Alternative S2 standards and guidelines consider local conditions, which reduces the need to change management direction though adaptive management projects. However, an adaptive management project is still possible in Alternative S2.

Additional monitoring provisions are being developed and will be included in the Final SEIS. Included in these provisions will be “thresholds” that will, as part of the Adaptive Management and Monitoring

Strategy, help focus monitoring and help determine when management needs to be adjusted. Examples of possible thresholds are as follows:

- Mechanical treatment of more than 5% of California Spotted Owl Protected Activity Center acres per year or 10% per decade within the same watershed.
- If natural perturbations cause more than 25 % change in old forest condition across all of the old forest emphasis areas in any one sub-region (southern sierra, central sierra, northern-west sierra, northern-east sierra) then the old forest emphasis area system will be evaluated for redesign.

Collection of monitoring information would be coupled with rapid assessment and feedback to make adjustments in management direction, to ensure continued success in moving toward stated goals and to help build confidence in protection of key resource values. Data collection and display would be accomplished in a way that ensures a high level of transparency and availability to partners and stakeholders.

Refinement of the existing Adaptive Management and Monitoring Strategy would be done in collaboration with other agencies and stakeholders. The Monitoring Strategy would provide an opportunity for participation by representatives of other agencies and stakeholders. Alternative S2 Adaptive Management and Monitoring Strategy would also include close cooperation with the Pacific Southwest Research Station to carry out administrative studies and research projects identified as desirable through collaborative implementation of adaptive management.

Although it would retain a focus on general collaboration with other agencies, governments and interested parties, the Adaptive Management and Monitoring Strategy under Alternative S2 would not include establishment of a Federal Advisory Committee nor would it necessarily involve implementation of formal institutional arrangements outlined in the SNFPA ROD.

Alternative S2 would include collaborative strategic planning as a foundation for implementing fuels reduction projects in the wildland-urban influence zones (WUI's). Managers would be encouraged to work with local communities of interest - other agencies, fire safe councils, members of the public - to develop fuels treatment priorities on a multi-ownership, landscape basis.

Alternative S2 would include implementation of a limited number of research projects distributed across the bioregion. These projects would focus on the key issues/questions that drive development of the "thresholds" discussed previously. One such project would be a "paired PAC research study" located within existing owl demographic study areas.

Alternative S2 would include implementation of several focused adaptive management research or administrative study projects designed to test alternative approaches for meeting Desired Conditions and management objectives as recommended in the SNFPA Management Review and Recommendations document.

Work is currently ongoing among the State of California, US Fish and Wildlife Service, Forest Service and others to develop specific guidelines for Adaptive Management, Monitoring and Strategic Planning. It is intended to include these guidelines in the Final SEIS. The guidelines will include overall principles similar to the following:

1. Vegetation management in the wildland urban interface (i.e., the "defense and threat zones") identified in the Sierra Nevada by the Forest Service will be managed through a collaborative adaptive management program that includes communities of interest and of place and is coordinated by the state, the USFS and the USFWS.
2. The wildland urban interface (WUI) as currently defined in the ROD consists of approximately 2.5 million acres in the Sierra Nevada, with 340,000 acres in defense zone immediately adjacent (within ¼ mile) to settled areas and the rest in the threat zone (1 ¼ miles beyond the defense zone).

- These areas provide important habitat (approximately 200,000 acres of California spotted owl protected activity centers) and other ecologically important values, yet they pose real wildfire threats to life and property in nearby communities.
- The wildland urban interface is the focus of the National Fire Plan, the California State Fire Plan and is the area with the greatest degree of consensus on management direction.

1. Lack of understanding of both wildlife habitat needs and future fire regimes has hampered the ability of land management agencies and stakeholders to agree on specific management prescriptions within the WUI even when all parties share the same general objective of balancing wildlife habitat needs with reduction of expected wildfire losses.
   - Continuing delay in addressing the fuels/wildlife conundrum on the ground increases the risks of loss to the State and local communities.
   - Adaptive management allows interests that disagree on specific management direction to test their proposals in a transparent and accountable manner.
   - This approach will potentially streamline effective and locally appropriate sustainable vegetation management in the WUI.
   - Collaborative adaptive management also holds promise for resource management beyond the wildland-urban interface.
   - The Resources Agency and its departments, the USFS and the USFWS will commit staff resources and management support to the development and implementation of collaborative adaptive management of the WUI in the Sierra Nevada.
2. The goal is to treat vegetation that poses a wildfire threat to communities in a manner that allows, where needed, testing and evaluation of different means proposed to balance wildlife habitat needs with reduction of expected losses to wildfire.

The objectives are:

a. To create within 12 months a five-year program of action for the WUI around at least one community in each National Forest. This work will include consideration of a Sierra-wide assessment of values at risk, and expected losses.

b. To fund, implement and monitor the above work in each National Forest and to use monitoring results to adjust the work remaining in the WUI’s.

Comparisons between Alternatives S1 and S2

The following sections highlight key differences between Alternatives S1 and S2.

A. Management Approaches

Degree of Active Management. Alternative S1 takes a cautious approach to using mechanical treatments to actively manage vegetation and fuels to minimize potential risks from these activities on habitats for threatened, endangered, and sensitive species. Hence, Alternative S1 defers more active management (particularly in the form of mechanical fuels treatments), relying on the results of adaptive management studies to provide direction for management approaches as more is learned. Alternative S2 emphasizes a flexible and active management approach. Monitoring and adaptive management under this alternative is focused on making adjustments to active management approaches as more is learned about the effectiveness and impacts of management activities.

Degree of Local Flexibility. Alternative S1 and S2 differ in the degree of flexibility accorded to local managers to tailor management activities to respond to local environmental conditions and to achieve socioeconomic benefits. Alternative S1 generally provides limited flexibility to tailor management activities, whether for mechanical fuels treatment prescriptions, grazing allotment management, or recreational uses, to respond to local conditions. Alternative S2 provides a higher degree of local flexibility allowing local managers to adjust management activities in response to local conditions and, in some cases, to achieve socioeconomic benefits.

Approaches for Balancing Habitat and Fuels Management Objectives. Alternative S1 uses standards and guidelines to limit the intensity of mechanical fuels treatment prescriptions in existing habitats for old forest associated species like the California spotted owl. Alternative S2 provides direction for avoiding key habitats, such as California spotted owl protected activity centers, when designing patterns of fuels treatments across broader landscapes, where possible. However, if these areas require treatment to effectively modify landscape - scale wildland fire behavior, managers are directed to treat them effectively and efficiently to meet fuels and, in some cases, forest health management objectives with the goal of providing longer-term protection for these areas in the event of a wildland fire.

B. Standards and Guidelines

Table Ja displays key differences in standards and guidelines for fuels and vegetation management between Alternatives S1 and S2.

Alternative S1’s standards and guidelines tend to be based on individual stand conditions. Standards and guidelines in this alternative attempt to prescribe treatments necessary to meet objectives for mechanical fuels treatments. Managers have limited flexibility for adjusting mechanical fuels treatment prescriptions under Alternative S1 standards and guidelines. Alternative S2 uses a broader forest-wide approach for its standards and guidelines; however, application of the standards and guidelines is based on aggregated mature forest stand conditions within a treatment unit. The standards and guidelines in Alternative S2 are intended as upper limits for mechanical thinning treatments. Managers can better respond to local conditions when preparing prescriptions to meet objectives under the standards and guidelines in Alternative S2.

Table Ja. Key differences in standards and guidelines for fuels and vegetation management between Alternatives S1 and S2.

Standard and Guideline	Alternative S1	Alternative S2
Goal: standards and guidelines for mechanical fuels and vegetation treatments	*Maintain existing habitat conditions* for California spotted owls and other species with similar habitat needs.	*Minimize impacts on habitat conditions* for California spotted owls and other species with similar habitat needs.
Approach: standards and guidelines for mechanical fuels and vegetation treatments	Standards and guidelines are generally aimed at maintaining consistency across the bioregion while providing treatment prescriptions that local managers apply, based on either the condition of the vegetation or land allocation.	Standards and guidelines provide flexibility by establishing upper limits for designing fuels treatment and vegetation management projects.
Large Tree Retention: forest-wide standards and guidelines	*Westside:* Vegetation and fuels treatments retain all live conifers 30 inches dbh and larger and all montane hardwoods 12 inches dbh and larger. *Eastside:* Vegetation and fuels treatments retain all live conifers 24 inches dbh and larger. Forested stands of large trees with moderate to dense canopy cover (CWHR types 5M, 5D, and 6) that are 1 acre and larger in all land allocations outside defense zones: Mechanical fuels treatments remove trees less than 12 inches dbh. Incidental felling of trees between 12 and 20 inches dbh is allowed for operability.	*Design projects to retain all live trees 30 inches dbh or larger.* *For all but eastside pine vegetation types:* Design mechanical thinning projects in mature forest habitat (CWHR types 4M, 4D, 5M, 5D, and 6) to retain 40 percent of the basal area, consisting of the largest trees, in each treatment unit. *For eastside pine vegetation types:* Design mechanical thinning projects in mature forest habitat to retain 30 percent of the existing basal area, consisting of the largest trees, in each treatment unit.

Standard and Guideline	Alternative S1	Alternative S2
Tree Removal/Retention: allocation-specific standards and guidelines for mechanical treatments	**Defense zones:** *Treatments may remove trees less than 30 inches dbh.* **PACs in defense zones:** Treatments may remove trees up to 20 inches dbh outside the 500-foot radius buffer around the activity center. **Threat Zones:** Only trees less than 6 inches dbh may be removed in stands with between 40 and 50 percent canopy cover. Treatments in forested stands of large trees with moderate to dense canopy cover (CWHR types 5M, 5D, and 6) must be consistent with forest-wide standards and guidelines (12-inch diameter limit). In stands of medium-sized trees (CWHR size class 4) with more than 50 percent canopy cover, trees up to 20 inches may only be removed within 1.5 miles of a California spotted owl activity center if sufficient suitable owl habitat exists to satisfy the habitat requirements of an HCRA. All other stand types may be treated up to a 20-inch diameter limit. **Old Forest Emphasis Areas and HRCAs:** Treatments may remove trees up to 12 inches dbh. Only trees less than 6 inches dbh may be removed in stands with between 40 and 50 percent canopy cover. In stands of medium-sized trees (CWHR size class 4) with more than 50 percent canopy cover, trees up to 20 inches may be removed if fuels objectives cannot be met using prescribed fire or by removing trees less than 12 inches dbh. A 20-inch dbh mechanical treatment may only be applied within 1.5 miles of a California spotted owl activity center if sufficient suitable owl habitat exists to satisfy the habitat requirements of an HCRA. **General Forest:** Only trees less than 6 inches dbh may be removed in stands with between 40 and 50 percent canopy cover. Treatments in forested stands of large trees with moderate to dense canopy cover (CWHR types 5M, 5D, and 6) must be consistent with forest-wide standards and guidelines (12-inch diameter limit). All other stand types may be treated up to a 20-inch diameter limit	*Defense zone: Treatments may remove trees less than 30 inches dbh. For all other land allocations, Alternative S2 does not provide standards and guidelines for retaining trees based on land allocations. The forest-wide standards and guidelines above apply to designing mechanical thinning projects in all land allocations.*

Standard and Guideline	Alternative S1	Alternative S2
Canopy Cover Retention: forest-wide standards and guidelines for mechanical treatments	Outside defense zones: ▪ *For stands between 40 and 50 percent canopy cover:* Remove only trees less than 6 inches dbh. ▪ *For stands between 50 and 59 percent canopy cover:* retain a minimum of 50 percent canopy cover. The above standards and guidelines do not apply to fuels treatments in defense zones.	*For mechanical thinning treatments conducted in mature forested stands of medium to large trees with moderate to dense canopy cover (CWHR types 4M, 4D, 5M, 5D, and 6) in all land allocations (including defense zones):* ▪ *Where vegetative conditions permit, design projects to retain 50 percent canopy cover after treatment within the treatment unit, except where site-specific project objectives cannot be met.* ▪ Where 50 percent retention cannot be met, design projects to retain a minimum of 40 percent canopy cover within the treatment unit. ▪ Where pre-treatment canopy cover is at or near 40 percent, remove only ladder fuels to achieve project objectives. Eastside pine vegetation types do not have a canopy cover retention standard.
Reducing Canopy Cover: standards and guidelines for mechanical treatments	**Defense zones** do not have canopy reduction standards. **Threat zones and General Forest:** Do not reduce canopy cover in dominant and codominant trees by more than 20 percent. In stands larger than 1 acre classified as CWHR types 5M, 5D, and 6), do not reduce canopy cover in dominant and codominant trees by more than 10 percent. In stands with between 40 and 50 percent canopy cover, only trees less than 6 inches dbh may be removed. **Old Forest Emphasis Areas and HRCAs:** Do not reduce canopy cover in dominant and codominant trees by more than 10 percent. In stands with between 40 and 50 percent canopy cover, only trees less than 6 inches dbh may be removed.	**All Allocations:** *Design projects to avoid reducing pre-treatment canopy cover by more than 30 percent within the treatment unit.*

Standard and Guideline	Alternative S1	Alternative S2
Fuels and Vegetation Treatments in California Spotted Owl PACs: standards and guidelines	General approach is to avoid treatments in PACs. **PACs in Defense Zones:** Mechanical treatments that remove trees up to 20 inches dbh and reduce canopy cover in dominant and co-dominant trees are allowed outside the 500-foot activity center buffer. **PACs in all other land allocations:** Prescribed burning is the only treatment option. Limits on vegetation treatments (mechanical and prescribed burning) in PACs are based on <u>numbers</u> of PACs treated (no more than 5 percent per year and 10 percent per decade of PACs in the 11 Sierra Nevada national forests until a formal monitoring and adaptive management approach is developed).	General approach is to avoid treatments in PACs to the greatest extent possible. **PACs in Defense Zones:** Mechanical treatments are allowed outside the 500-foot activity center buffer consistent with forest-wide standards for retaining large trees, basal area, and canopy cover. **PACs in Threat Zones:** Mechanical treatments are allowed where avoidance of all PACs would significantly compromise the overall effectiveness of the landscape fire and fuels strategy. Managers are directed to apply criteria outlined in standards and guidelines to preferentially avoid treatments in PACs that have the highest likely contribution to owl productivity. **PACs outside WUIs:** Prescribed burning is the only treatment option. Limits on vegetation treatments (mechanical and prescribed burning) in PACs are based on <u>acres</u> of PACs treated (no more than 5 percent per year and 10 percent per decade of the <u>acres</u> in PACs in the 11 Sierra Nevada national forests until a formal monitoring and adaptive management approach is developed).
Post-Fire Restoration and Salvage	The SNFPA ROD provides limited direction for post-fire restoration and salvage activities in the following two areas: Forest-wide direction is to not conduct salvage harvest in at least 10 percent of the total area affected by a stand-replacing event. Direction for old forest emphasis areas and HRCAs is to allow removal of dead trees (15 inches dbh or larger) following stand-replacing events to the extent that project analysis recommends removal to benefit landscape conditions for old forest structure and function.	Alternative S2 expands management direction for post-fire restoration activities and general salvage activities. It provides direction for designing post-fire restoration projects to reduce potential soil erosion and loss of soil productivity, protect and maintain critical wildlife habitat, and manage the development of fuel profiles over time. Direction in the proposal allows managers to remove dead and dying trees to recover value and support vegetation management objectives. Standards and guidelines allow salvage in PACs and den sites to attain longer-term objectives for maximizing wildlife habitat and to prevent wildfire from returning to a location. Salvage is permitted in old forest emphasis areas in instances of larger (generally greater than 10 acres), stand-replacing events.

2.1.4. Alternative S3 (Staged Implementation)

A. Theme and Overall Management Approach

Alternative S3 would only implement the proposed action for fuels treatments (Alternative S2) in the Defense Zone for the first five years to protect the communities in the Sierra Nevada from catastrophic wildfire. Four adaptive management studies would be initiated in the four California spotted owl demographic study areas to learn the response of owls to various treatments designed to reduce and/or modify fire behavior. If reliable information results from the adaptive management studies after five years, fuels treatments may be expanded to the Threat Zone under the standards and guidelines set forth under Alternative S2. Management outside the Defense Zone would be guided by the existing SNFPA ROD (Alternative S1) for the first five years and beyond, except in the Threat Zone for the second five years, where Alternative S2 would apply contingent on the results of the adaptive management studies. Under Alternative S3, the HFQLG area would be guided by the same direction as the rest of SNFPA planning area.

2.1.5. Alternatives F2-F8 (SNFPA FEIS Alternatives 2-8)

Alternatives 2 through 8 of the SNFPA FEIS are briefly described here as Alternatives F2-F8. Readers can refer to the SNFPA FEIS, Volume 1, Chapter 2, pages 83-164, for more detailed descriptions of these alternatives.

Alternative F2 (FEIS Alternative 2)

Alternative F2 establishes large reserves where human management is very limited, to maintain and perpetuate old forest, aquatic, riparian, meadow, and hardwood ecosystems. Alternative F2 responds to views that ecosystems should be protected from all but minimal human-caused disturbances and conditions that “nature” delivers are desired.

Alternative F3 (FEIS Alternative 3)

Alternative F3 emphasizes restoration of desired ecosystem conditions and ecological processes through active management determined through landscape analysis, monitoring, and local collaboration. Management activities would promote ecosystem conditions and ecological processes expected within natural ranges of variability under prevailing climates.

Alternative F4 (FEIS Alternative 4)

Alternative F4 emphasizes the development of forest ecosystem conditions that anticipate and are resilient to large-scale, severe disturbances, such as drought and high intensity wildfire, common to the Sierra Nevada. The alternative is consistent with the view that ecosystems should be actively managed to meet ecological goals and socioeconomic expectations. Alternative F4 would have the greatest number of acres available for active management including timber harvest.

Alternative F5 (FEIS Alternative 5)

Alternative F5 limits impacts from active management through range-wide management standards and guidelines. Alternative F5 preserves existing undisturbed areas and restores others to achieve ecological goals. Alternative F5 emphasizes reintroducing fire as a natural process and using fire to reduce fires and fuel accumulations.

Unroaded areas larger than 5,000 acres, ecologically significant unroaded areas between 1,000 and 5,000 acres, and inner zones of riparian areas would be persevered and left to develop under natural processes. Other areas, including old forest emphasis areas and general forest, would be restored under a limited active management approach to increase the amount of, and enhance processes associated with old forest conditions. Alternative F5 limits impacts from management activities by specifying range-wide management standards and guidelines.

Alternative F6 (FEIS Alternative 6)

Alternative F6 integrates desired condition for old forest and hardwood conservation with fires and fuels management. This alternative provides direction for implementing a landscape-scale strategic fuels treatment program in high-risk vegetation types across Sierra Nevada landscapes to: (a) reduce the potential for large severe wildfires, and (b) increase and perpetuation old forest and hardwood ecosystems, providing for the viability of species associated with those ecosystems.

Alternative F7 (FEIS Alternative 7)

Alternative F7 aims to establish and maintain a diversity of forest ages and structures over the landscape in a mosaic approximating patterns that would be expected under natural conditions., that is conditions characterized by current and expected future climates, biota and natural processes. Ecosystems and ecological processes would be actively managed to maintain and restore them to desired conditions. Silvicultural treatments could produce timber and other forest products.

Alternative F7 relies on few land allocations, applying what is commonly termed a “whole forest approach.” Most lands are designated in the “general forest” land allocation where active management is used to move landscapes toward desired conditions. Management is linked to desired conditions for California Wildlife Habitat Relationships (CWHR) stages and old forest condition goals, specific to the manor Sierra Nevada forest types.

Alternative F8 (FEIS Alternative 8)

Alternative F8 emphasizes a cautious approach to treating fuels in sensitive wildlife habitat. New information from research and administrative studies would be developed to reduce uncertainty about the effects of management on sensitive species. Until further guidelines were developed, treatments in suitable California spotted owl habitat would retain specific levels of large trees, canopy cover, canopy layers, snags, and down woody material.

2.2. Alternatives Considered but Eliminated from Detailed Analysis

The National Environmental Policy Act (NEPA) requires federal officials to rigorously explore and evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). The range of alternatives considered in detail is primarily limited by the requirement to fulfill the Purpose and Need for Action.

2.2.1. Set a Smaller Diameter Limit on Tree Removal

Suggestions have been made to set a maximum diameter for tree removal at a point less than 30 inches (20-24 inches, for example). This alternative was eliminated from detailed study because it does not respond to the Purpose and Need and/or New Information and would not materially change post-treatment or desired conditions relative to those expected under the proposed action. Generally speaking, the requirement to retain 40 percent basal area in the largest trees will de facto result in diameter limit of less than 30 inches. Thus, a lower absolute diameter limit would add another hard constraint to project design without significantly affecting post-treatment conditions over most of the landscape. As point of fact, the existing direction includes an array of diameter limits for fuels treatments (12 inches in old forest emphasis areas and California spotted owl home range core areas with some exceptions, 20 inches in general forest and threat zone, 30 inches in the defense zone). The SNFPA Review noted that the diameter limit restrictions significantly reduced the Forest's ability to design and implement cost-efficient fuels treatments while contributing only marginally to habitat requirements, especially given other standards and guidelines for canopy cover retention.[2] Canopy cover standards remain an integral part of the proposed action.

2.2.2. Apply the Standards and Guidelines in the Proposed Action to the HFQLG Act Pilot Project Area, and

2.2.3. Limit Group Selection in the Pilot Project Area to the Area Planned for the Administrative Study

The above two Alternatives (2.2.2. and 2.2.3.) were eliminated from detailed study because they do not respond to the Purpose and Need and/or New Information. Specifically, they do not allow for adequate testing of the suite of activities included in the HFQLG Pilot Project, thereby reducing the knowledge that could be gained from full implementation. The standards and guidelines in the SNFPA were designed for strategically placed area treatments (SPLATS) and were intended to modify fire behavior at a landscape scale. The HFQLG Pilot Project employs a different strategy altogether, relying on a system of defensible fuel profile zones to provide an area where suppression forces can be focused and arrayed to stop an oncoming blaze. The latter strategy requires a somewhat more intensive level of vegetation removal. Coupled with the objective of providing a flow of products to meet community stability objectives, the management focus for the Pilot Project area is somewhat different than that of the larger bioregion. In the context of a bioregional strategy, the Pilot Project represents one of a number of special exceptions to management direction for the broader Sierra Nevada bioregion. As long as the collective effect of multiple management strategies will result in the same desired conditions across multiple landscapes, no additional adjustment is necessary.

2.2.4. Apply the Standards and Guidelines in the Proposed Action only to the Urban-Wildland Interface

Alternative 2.2.4. was eliminated from detailed study because they do not respond to the Purpose and Need and New Information. There is a need to allow for effective and efficient fuels treatments across all land allocations to reduce the risk of catastrophic wildfire to both communities and important wildlife

[2] See for example, pg. 15 and pg. 40 in the SNFPA Review Team Report

habitat. Adopting the proposed changes only in the urban-wildland interface will not address the need to fully implement an aggressive fuels reduction strategy in the wildlands. Moreover, these Alternatives would limit the Region's ability to embrace the goals of the National Fire Plan by preventing significant acreages of vegetation in Condition Class 2 and 3 from being treated.

2.2.5. Include Forest Products as a Primary Management Objective

This Alternative was eliminated from detailed study because it does not respond to the Purpose and Need and New Information. There is a recognized need to provide for economically efficient fuels treatments which will require some commercially viable forest products to be made available as a by-product of fuels treatments. However, with the exception of the HFQLG Pilot Project Area, the widespread production of commercial forest products is outside the scope of this SEIS and the Purpose and Need.

2.2.6. Make Minor Changes to Individual Standards and Guidelines (i.e. drop the requirement to leave part of a treatment unit untreated, increase the diameter limit for certain tree species, make slight adjustments in canopy cover requirements for certain land allocations, etc.)

This Alternative was eliminated from detailed study because it does not respond to the Purpose and Need and New Information. Specifically, changing the metrics in the existing standards and guidelines will not address the fundamental problems associated with the prescriptive nature of the existing management direction (economic inefficiencies, complications with implementation, questionable effectiveness of fuels treatments and inability to treat enough acres with available funds to effectively modify fire behavior or be responsive to the goals of the National Fire Plan). Moreover, the Alternative does not provide local managers the flexibility needed to choose from an array of tools and techniques to better address site-specific conditions.

2.3. Comparison of Alternatives

Environmental consequences of the aspects of the SEIS alternatives that differ from the analysis presented in the SNFPA FEIS are described in detail in Chapter 4 of this Draft SEIS. Environmental consequences for Alternatives F2 through F8 are fully described in the SNFPA FEIS and are not repeated in this SEIS. This section of Chapter 2 compares the alternatives by summarizing their environmental consequences.

Old Forest Ecosystems

All of the alternatives would maintain and enhance old forest conditions across Sierra Nevada landscapes. However, they would have different effects on: (1) amounts and distribution of old forest conditions, (2) potential losses of old forests to wildfire, and (3) old forest ecosystem functions and processes.

Amount and Distribution of Old Forest Conditions. The number of large, old trees would increase under all alternatives. However, Alternatives F4 and F6 would have the greatest likelihood of maintaining large, live trees with a net increase in large trees in both the short and long term. Alternatives F2, F5 and

F8 could provide the greatest amounts of old forest patches with high canopy closure (cover) in the short-term; however, because of restrictive or less effective fuel treatments these increases could be offset by increased future losses to wildfire. Alternative F6 would have increases in old forest patches with high and moderate canopy closure (cover) and the greatest certainty that more old forest patches could be protected from wildfire losses.

Alternatives S1, S2, and S3 initially focus activities primarily in the WUI where less old forest is likely to occur. Alternatives S1 and S3 contain specific management direction for old forest emphasis areas which could provide greater amounts of old forest patches with high canopy closure (cover) in the short-term than Alternative S2; however, because of restrictive or less effective fuel treatments, these increases could be offset by increased future losses to wildfire. Alternative S2 has greater risk to recruitment of old forest conditions in eastside forests than Alternatives S1 or S3 because it raises the retention diameter limit from 24” dbh to 30” dbh. The effects of Alternative S3 would be similar to Alternative S1 in that it initially only applies the changed direction to the defense zone of the WUI and applies the existing direction in the remainder of the areas. Pending the outcome and learnings of the adaptive management studies, it could implement the changed direction to the threat zone of the WUI in the second five years. In that situation, treatments in the WUI would be similar to Alternative S2, and treatments outside the WUI would be similar to Alternative S1.

Potential Losses to Severe Wildland Fires. Predicted acres burned during wildfires decreases in Alternatives F3, F4, F6, and F7; slight increase in Alternative F8 ; greater increases in Alternatives F2 and F5. What is more important to effects on old forests is the probability of future fires in concentrations of existing old forest and the level of mortality associated with the predicted fires. Alternatives F4 and F6 emphasize fuel treatments in a strategic pattern, and watersheds with the highest fire hazard and risk have highest priority for treatment. Therefore, expected losses of old forest from severe wildfire are least for these alternatives. Alternative F8 also use a strategic fuels reduction approach, and watersheds with the highest fire hazard and risk rating have highest priority for treatment. However, fuel treatment levels and rates in Alternative F8 are less than in Alternatives F4 and F6; therefore, the expected reduction in effects is less certain. In particular, the most restrictions on fuel treatments in Alternative F8 would apply in areas likely to contain concentrations of old forest: habitat associated with the California spotted owl and the fisher. Therefore, Alternatives F8 would have a higher likelihood of loss of old forest to high severity fire compared to Alternatives F4, F6, or F7, despite their similarity in overall predicted decreases in wildfire acres burned. Alternative F7 would also likely have a higher loss of old forest to high severity fire than Alternatives F4 or F6 because this alternative does not emphasize treatments in concentrations of old forests represented in old forest emphasis areas (as would occur under Alternatives F4 or F6).

The pattern and location of strategic fuels treatments would be similar in Alternatives S1, S2 and S3, however the treatment intensity and methods would vary, which results in changes in the effectiveness of fuel treatments for changing fire behavior and ultimately for predicted fire size and severity. For many of the same reasons provided in the discussion above for the amount and distribution of old forest conditions, Alternative S2 has the higher likelihood of reducing the potential losses to severe wildfire compared to Alternatives S1 and S3.

Old Forest Ecosystem Functions and Processes. Alternatives F5, F6, and F8 have the greatest emphasis on prescribed burning, and consequently the greatest emphasis on reintroducing fire as a process in old forest ecosystems. Alternatives F5 and F8 have more restrictions on prescribed burning than Alternative F6. Alternative F6 however provides explicit priority for restoring fire as a process in old forests, which is different than any other alternative. Alternative F6 has the greatest planned restoration of fire as a process in old forests. Alternatives F4 and F7 have low to moderate amounts of prescribed burning. However, treatment locations rely more on local discretion, so the extent to which these alternatives would restore fire to old forests is unknown. Alternative F8 has higher levels of prescribed burning; however, restrictions in this alternative's standards and guidelines limit the extent of prescribed burning and therefore the amount of fire restoration in old forests. Alternative F2 has very little prescribed burning, and thus minimal restoration of fire to old forests.

The alternatives with the highest likelihood of connectivity between large blocks dedicated to old forests are listed in order as follows: Alternative F2, F5, F3, F8, and F6. Alternative F4 has moderate-sized blocks dedicated to old forests, but they are widely distributed and more limited in providing connectivity. Alternatives F3, F4, F5, F6, F7, and F8 have provisions for maintaining old forest patches in the general forest that would contribute to connectivity.

Alternatives S1, S2 and S3 emphasize the use of prescribed fire as a treatment method. Alternatives S1 and S3 have a strong preference for the use of prescribed fire as the treatment method in several situations, such as spotted owl and northern goshawk PACs outside of defense zones, however limitations due to smoke management and high existing fuel loadings may hamper some prescribed burn projects. Alternative S2 allows more use of mechanical treatments as an initial treatment with a desire to use prescribed burning as a follow-up treatment but maintains use of prescribed burning as the initial treatment in PACs outside the WUI. Alternative S3 would be intermediate, initially with slightly more mechanical treatment opportunity than Alternative S1 by setting standards and guidelines that allow more mechanical treatment in the defense zone. If adaptive management studies allow, treatments in the threat zone in the second five years would allow more use of mechanical treatments instead of prescribed burning as an initial treatment. Since most treatments in these Alternatives would be focused on the WUI, the potential to directly benefit old forests would be limited. Alternative S2 allows treatments outside the WUI and for forest health outside of the WUI, however, it does not require treatments. The extent that treatments outside of the WUI would occur is predicted to be low.

Alternatives S1 and S3 has prescriptive standards and guidelines for treatments in old forest emphasis areas and for retention of medium and large trees across broad areas resulting in a low to moderate level of uncertainty. Alternative S2 retains the same land allocations and intents for management as Alternative S1 but lacks specific direction in standards and guidelines, which provides for greater uncertainty. Alternative S3 also has low to moderate uncertainty based on the limitations on treatments and dependence upon adaptive management studies prior to expanding treatments to the threat zone.

Aquatic, Riparian, and Meadow Ecosystems

The action alternatives would meet the aquatic management strategy (AMS) goals to varying degrees. Alternatives F2, F5, F6 and F8 would most closely meet the AMS goals because they provide the greatest protection for water quality and riparian, aquatic, and meadow ecosystems. Alternative F4 would provide a reduced level of water quality protection compared to Alternatives F2, F5, F6 and F8 primarily due to the likelihood of high severity wildfire impacts under this alternative. Alternatives F3 and F7 would provide somewhat less protection to riparian areas compared to Alternatives F2, F5, F6 and F8. Alternative F4 would be the least effective of the action alternatives in meeting the AMS goals.

Alternatives S1, S2 and S3 all include the aquatic management strategy goals as a management objective. Alternatives S1 and S3 provides the highest assurance of meeting the AMS goals, primarily due to their limitations on treatment methods and intensities in various land allocations. Alternative S2 could meet the AMS goals to similar levels, however, the assurance at a bioregional level would be less because decisions on project design and treatment methods and intensities are made at the project level. Alternative S3 has slightly more uncertainty than Alternative S1 because it allows more use of mechanical treatments in the defense zone and potentially also in the threat zone. This is not likely to be substantial though since most defense zone treatments are unlikely to contain high amounts of aquatic, riparian, and meadow ecosystems.

Fire and Fuels

Weather, topography and fuels influence the behavior of fires. All alternatives influence fires in the Sierra Nevada through a fire suppression program and modification of fuels and vegetation. Alternatives F3, F4, F6 and F7 would reduce the average annual wildfire acres burned in the first decade after treatments are implemented compared to historical averages over the 27-year period from 1970 through 1996. These alternatives apply the strategically placed fuel treatment approach, but the probability of their effectiveness varies. Alternatives F4, F6, and F7 have landscape structural requirements with flexibility that allows full implementation of the fuels strategy.

Fire effects are more difficult to estimate; however, the alternatives most likely to reduce acres lethally burned each year by wildfire are (in decreasing order): Alternative F4, F3, F6, F7, F8 and F5, and F2 Alternatives F2, F5, and F8 would result in the greatest number of acres burned annually at lethal levels by wildfire.

Alternatives F3, F4, F6, and F7 would enhance conditions for initial wildfire attack efficiency. Alternative F5, F6, and F8 have the greatest emphasis on fire reintroduction. Alternatives F3, F4, F6, F7 and F8 would provide the greatest protection for property within the WUI.

Alternatives S1, S2 and S3 all initially focus treatments within the WUI using a defense zone and a threat zone and a pattern of strategically placed fuel treatments. Alternative S2 has the potential to reduce the average annual wildfire acres burned by allowing local managers to adjust some site-specific prescriptions to result in a greater effectiveness in changing fire behavior than Alternative S1, which is more prescriptive with limited ability for local adjustments. Alternative S3 initially restricts this increased flexibility to the defense zone for the first 5 years. It may be applied to the threat zone in the second five years if adaptive management studies determine that it is an appropriate practice.

Noxious Weeds and Invasive Nonnative Plants

Implementation of an integrated weed management program is common to all alternatives. This program would improve suppression and control of noxious weeds in Sierra Nevada national forests.

Hardwood Ecosystems

Effects of the alternatives on hardwood ecosystems are analyzed in terms of hardwood ecosystem sustainability and biodiversity. Sustainability is a desired condition for hardwood ecosystems, and is affected by the balance between mature tree removal and young tree growth. Hardwood ecosystems support a diversity of plant and animal species; the alternatives differ in how they protect and perpetuate these diverse conditions.

Sustainability in Hardwood Ecosystems

Alternatives F3, F4, F6, and F7 rank highest in their contribution to blue oak and montane hardwood ecosystem sustainability; however, each alternative has different strengths and uncertainties. These alternatives all provide a balance between information gathering and uncertainty while incurring high levels of protection from wildfire. Alternative F4 provides managers with the most flexibility for applying mechanical treatments and has the highest potential for reducing wildfire. However, Alternative F4 has the highest degree of uncertainty because it has fewer requirements for gathering information about hardwoods and their management. Alternatives F6 and F7 provide both fuels treatments and information gathering. Because of the local flexibility built into Alternative F7, it would have more uncertainty than

Alternative F6, though this uncertainty should be balanced against the likelihood that benefits would be increased through local flexibility. The additional reforestation standards in Alternatives F6 and F7 would contribute to sustainability over Alternative F4 by reducing the likelihood that blue oak and montane hardwood stands would be converted to conifer stands. Alternative F3 would use the most cautious approach, providing many opportunities to gather information, but little opportunity to actively manage hardwood ecosystems and provide needed disturbance. Alternative F8 would require a high degree of information gathering and provides moderate protection from wildfire, but management is more limited, particularly in suitable California spotted owl habitat. Alternatives F2 and F3 generally rank low to moderate in contributing to hardwood sustainability due to fewer information-gathering requirements and generally fewer opportunities for conducting treatments.

There are no direct differences between the Alternatives regarding hardwood management. All alternatives follow the same Conservation Strategy for Lower Westside Hardwood Ecosystems and Forest-wide Standards and Guidelines. These include direction to identify opportunities for restoration and enhancement during landscape analysis and project planning.

Biodiversity in Hardwood Ecosystems

Key concerns for montane hardwood ecosystems are lack of late seral conditions, large trees, and open canopy conditions. Blue oak woodlands appear to have sufficient distribution of canopy cover classes, but numbers of medium and large trees are a concern.

Short-Term Effects. Alternative F6 would retain large trees and snags in the short term, and would allow a moderate level of treatment to develop hardwood stands in the long term. Alternatives F2, F3 and F5 would retain large trees and snags in the short term, but would limit treatment and development of hardwood stands in the long term. Alternatives F4 and F7 would not retain large trees and snags to the same degree as the other alternatives in the short term, and would permit treatments over the greatest area to develop hardwood stands in the long term. Alternative F8 would likely retain large trees and snags in the short term, but long-term effects are uncertain.

Long-Term Effects. Alternatives F6 and F7 would provide the highest degree of maintaining long-term biodiversity of hardwood ecosystems. Alternative F4, which has limited large tree retention standards, ranks lower than Alternatives F6, F7, and F8. Alternatives F2, F3, and F5 rank below the other alternatives due to inability of these alternatives to reduce conifer encroachment, which could result in a long-term loss of hardwood communities.

The short-term and long-term effects are similar between Alternatives S1, S2 and S3. All of these alternatives apply the same hardwood conservation strategy and standards and guidelines that direct consideration of hardwood ecosystems in landscape analysis and project planning and protection measures during project implementation. Alternatives S2, S2, and S3 retain large hardwoods and include considerations for hardwood regeneration. Alternative S2 allows the greatest opportunity for improvement in hardwood conditions because it allows the most mechanical treatments and has lower canopy cover retention limits and potentially allows more treatment across the landscape, although the difference may be slight depending upon the emphasis on hardwood ecosystems placed at the project level.

Focal Species

California Spotted Owl

All alternatives show projected increases in quantity and quality of useable habitat available for the California spotted owl across its range. The alternatives are distinguished by differences in the amount of habitat and management of individual owl nest locations and home range areas. Alternative F4 is projected to produce slight declines in high quality California spotted owl habitats, and would not protect all spotted owl nest (or primary roost) stands. Among the remaining alternatives, Alternative F7 is projected to provide lower amounts of useable habitat. Alternatives F2, F3, F5, F6 and F8 protect all California spotted owl nest stands and have the highest projected increase in habitat values. These alternatives should provide positive benefits to California spotted owls to the extent that habitat on national forests limits population numbers. Alternative F2, F5 and F8 limit activities within California spotted owl home ranges to a greater extent than other alternatives, and could provide increased short-term protection. Improved understanding of relationships between habitat patterns at the home range scale and California spotted owl demographics, and application of this knowledge at smaller scales could reduce the risks of implementing any of the alternatives.

Alternative S2 has a higher level of risk and uncertainty for maintaining spotted owl habitat within home ranges than Alternative S1 because it provides less limitations on treatment methods and intensity within PACs and HRCAs. Alternative S3 would be more similar to Alternative S1, except for the PACs within the WUI which would be treated more similar to Alternative S2. It is unknowable at the bioregional scale how the direction to avoid treatments within PACs and HRCAs to the extent possible will affect the spotted owl because the extent of treatments will be determined locally.

The number of spotted owl PACs treated varies between the alternatives because the metric changes between Alternative S1 (limits the number of PACs treated) and Alternative S2 (limits the number of acres of PACs treated). The exact differences can only be determined during project planning and following implementation which would require a rigorous implementation monitoring process maintained at the regional level. For this analysis, a modeling exercise was used to estimate the numbers and acres that might theoretically be affected. Alternative S1 was modeled to treat within 264 PACs which is the limited of 20% over the 2 decades of treatment. This would affect 5% of the total acres of PACs. Alternative S2 was modeled to treat within 37,000 acres of PACs which is 9% of the total acres of PACs and well below the 20% allowed over the 2 decades of treatment. This would affect 48% of the total number of PACs, although most of the treatments would only affect a portion of a PAC. Alternative S3 would affect the least number of PACs and would likely be less than the 5% by number per year and 10% by number per decade.

Northern Goshawk

Alternatives F3, F5, F6 and F8 would provide the greatest contribution to maintaining and enhancing conditions for northern goshawk throughout the Sierra Nevada. These alternatives would protect all northern goshawk territories and all show projected increases in overall amounts of high suitability habitat. Alternatives F4 and F7 would provide less certainty because of the high rates of mechanical treatments – however, would provide greater protection from loss to natural disturbance events.

Alternatives S1, S2 and S3 protect all northern goshawk territories and show projected increases in overall amounts of high suitability habitat. Alternative S2 would provide less certainty because of the slightly higher rates of mechanical treatments compared to Alternative S1– however, as stated above, it would provide greater protection from loss to natural disturbance events.

Willow Flycatcher

The alternatives use different approaches for managing and conserving willow flycatcher habitat and populations. Alternatives F2 and F8 provide the greatest improvement of conditions for willow flycatchers during the breeding season. Given the available data and uncertainties, Alternative F2, which excludes livestock grazing year-round in occupied willow flycatcher habitats, presents the greatest benefits to the species. Of all the action alternatives, Alternative F2 is the most likely to support long-term distribution and abundance of the willow flycatcher in Sierra Nevada national forests. Furthermore, Alternative F2 excludes grazing in meadow habitat within 5 miles of occupied sites, allowing for restoration and potential re-colonization of these sites and the opportunity for willow flycatcher population expansion and recovery.

Alternatives F3, F5 and F6 would provide slightly less improvement of conditions affecting the willow flycatcher than Alternatives F2 and F8. Alternatives F3 and F5 would provide more stringent guidelines than other alternatives regarding general streambank use but weaker protections than Alternatives F2 and F8 specific to willow flycatcher habitat. Alternatives F3, F4, and F7 would provide an equal to slightly greater level of improvement of conditions associated with the willow flycatcher.

Alternatives S1, S2 and S3 apply the same Aquatic Management Strategy and Standards and Guidelines for aquatic, riparian, and meadow ecosystems. Specific Standards and Guidelines for willow flycatchers are developed for these alternatives that strive to accomplish the same objectives. Alternative S2 has slight differences related to grazing where surveys have not been completed and allowing development of a site-specific management plan to address grazing management where occupied willow flycatcher exists. These alternative management strategies are locally determined and are designed to provide sufficient protections for this species. Although the intent of these alternative management strategies is to provide for and protect habitat for the species, there are implementation difficulties that may increase the risk of success at avoiding impacts to willow flycatchers. Some of these risks exist within Alternatives S1 and S3 as well and are due to the difficulty in managing livestock in the forest environment. The levels of surveys required are the same between these alternative. Alternative S2 includes a Standard and Guideline that requires assessment of “unoccupied” habitat to determine if habitat restoration is warranted.

Forest Carnivores

Four forest carnivores of special concern were identified in the notice of intent for the Sierra Nevada Forest Plan Amendment Project: marten, fisher, wolverine, and Sierra Nevada red fox. The marten and fisher are more likely to be directly affected by decisions made from the EIS than the rarer wolverine and Sierra Nevada red fox, which are associated with higher elevations. Consequences to these species were evaluated in terms of: (1) changes in vegetation structure and composition, (2) recreation and roads, and (3) survey requirements and site protection.

Fisher

Alternatives F5 and F8 would have the greatest improvements to fisher persistence and habitat. Both alternatives would provide fisher habitat through their provisions for retaining and recruiting large trees, snags and coarse woody debris; retaining dense forest canopy; and promoting hardwoods on conifer sites.

Alternative F2 would provide habitat protections similar to Alternatives F5 and F8; however, because Alternative F2 relies primarily on fire suppression to manage the threat of severe wildfires, the risk of catastrophic fire would be higher under this alternative.

Alternative F3 would have less beneficial impacts on fishers in terms of dead and down wood and hardwoods on conifer sites than either Alternative F5 or F8. Under Alternative F6, canopy closure in denning areas could be reduced to 40 percent in developed areas within urban wildland intermix zones.

All of the action alternatives would protect fisher den sites from human disturbance; however, none of the alternatives would reduce road-related risks to the same extent as Alternative F5. Alternative F5 would reduce potential recreation-related impacts in close proximity to fisher locations and would reduce the impacts of roads and related human disturbance by reducing road density and protecting unroaded areas.

Alternatives F4 and F7 would overall provide no change or slight increases to fisher environment and population than the other alternatives. Alternative 4 would result in lower fisher abundance and distribution as it would slight decrease the availability of habitat elements important to fishers. Alternative F7 would reduce forest canopy from levels associated with denning habitat to levels associated with travel and foraging, but would have no change from the current situation.

Alternatives S1, S2 and S3 are similar in projected amounts of fisher habitat over time, with differences primarily due to predicted change in habitat reduction from large wildfires. All alternatives would develop a Conservation Assessment that could be used to develop a conservation strategy that would improve management consistency across the species range. This, coupled with ongoing research, should reduce the level of uncertainty regarding proposed treatments.

Marten

While there are slight differences between Alternatives, in general, environmental conditions and population would not be expected to change significantly from the current condition under any of the Alternatives. All alternatives would retain and develop large trees at sufficient levels.

Under Alternatives F5, F6 and F8, new recreational developments (for example ski areas) would be evaluated for compatibility with marten needs when they were proposed in suitable marten habitat. In addition, Alternative F5 would reduce the impact of roads and related human disturbance by protecting unroaded areas.

Alternative F2 provides direction for protecting marten habitat; however, this alternative has an increased risk of catastrophic fire, which could have negative effects on habitat for this species. Compared to Alternatives F5 and F8, Alternative F3 could provide less dead and down wood and hardwoods on conifer sites. Alternative F6 does not protect habitat as well as Alternatives F5 and F8 because it would allow canopy closure in denning areas to be reduced to 40 percent in developed areas within urban wildland intermix zones.

Alternative F4 would only slightly decrease overall environmental conditions and predicted populations compared to the current condition. Alternative F4 could slightly reduce forest canopy cover because it would establish and maintain both defensible fuels profile zones (DFPZs) and strategically placed area fuels treatments (SPLATs). Alternatives F4 and F7 provide less snag protection, which could lead to lower levels of recruitment of coarse woody debris over time. Alternative F4 has the highest level of fuels treatment and could result in less coarse woody debris recruitment. Alternative F7 emphasizes mechanical treatments over prescribed fire, possibly reducing coarse woody debris recruitment.

Alternatives S1, S2 and S3 are similar in terms of overall effect, with slight differences in terms of vegetation composition and structure. Alternative S2 allows more use of mechanical treatment than Alternatives S1 or S3, however, the effects would primarily affect marten at the local scale and would result in little overall affect at the context of the broad planning area.

Sierra Nevada Red Fox

Although the current distribution of the Sierra Nevada red fox in California is uncertain, the species' range appears to have contracted from the continuous distribution described by Grinnell in the 1930s. Of all the alternatives, Alternative F5 would likely lead towards the greatest improvement to environmental conditions and population for Sierra Nevada red fox, because it provides the greatest level of meadow protection, emphasizes reducing road densities across landscapes, and encourages new Sierra Nevada red fox surveys. Alternatives F3 and F5 propose restrictions on recreational activities in unroaded areas. Alternatives F5, F6 and F8 would further evaluate recreational development on the basis of Sierra Nevada red fox detections and the presence of suitable habitat. Alternatives F6 and F8 would not require surveys, and these alternatives place fewer restrictions on recreation and roads. Alternatives F4 and F7 would provide more of the open forest habitat preferred by the Sierra Nevada red fox than Alternative F5; however, these alternatives place fewer restrictions on recreation and would provide moderate reductions in roads. Alternative F2 would prohibit OHV and over snow vehicle (OSV) use in den site buffers; Alternative F2 would not require new surveys for the Sierra Nevada red fox.

Alternatives S1, S2 and S3 are all similar in terms of effects to Sierra Nevada red fox. Alternative S2 clarifies direction to validate sightings of this species by qualified researchers and clarifies the implementation of a limited operating period to better ensure that it is applied when warranted to reduce the potential to breeding individuals. This would likely have little biological effect and was primarily meant to balance social impacts with the potential for adverse biological effects.

Wolverine

Consequences to wolverines are primarily influenced by: (1) recreation and roads and (2) survey requirements and site protection. Based on the combined categories, Alternatives F5 and F8 appear to represent the greatest benefit to wolverine persistence and recovery. Alternative F5 and F3 would restrict recreational activities in unroaded areas. Alternative F5, F6 and F8 would evaluate recreational development on the basis of wolverine detections and the presence of suitable habitat. Alternative F5 would emphasize reducing road densities and would encourage new surveys. Alternative F3 would not provide the same level of benefits as Alternatives F5 and F8 because they would not require surveys, however they would limit activities around verified wolverine sightings.

All Alternatives would increase the suitability of wolverine habitat from the current condition, ranging from 5.4 to 9.1 percent. Alternatives F4 and F7 would have only slight increases. However, this variation does not significantly influence conclusions because none of the alternatives substantially affect the vegetation element of wolverine habitat, either as interpreted from the standards and guidelines or from habitat utility values projected by the California Wildlife Habitat Relationships (CWHR) model. Alternatives F4 and F7 would not encourage surveys, and they would have greater potential for new road development than the other alternatives.

Alternative F2 would have more risks related to the effects of roads and survey requirements than Alternative F5, but would generally provide greater benefits to wolverines than Alternatives F4, and F7.

As with the Sierra Nevada red fox, Alternatives S1, S2 and S3 are similar in effects for this species. Alternative S2 applies the same clarification regarding verification of sightings by qualified researchers and implementation of a limited operating period as described for the Sierra Nevada red fox.

Amphibians

Foothill Yellow-Legged Frog

Alternatives F2 and F5 appear to provide the greatest level of protection to the foothill yellow-legged frog, because they provide the most effective management approaches for this species' persistence and recovery. Alternatives F3, F6, F7, and F8 would provide a slight improvement from the current condition. Alternative F4 would decrease environmental conditions compared with the current condition. Information and research gaps, especially regarding the impacts of livestock grass and shrub utilization standards on the foothill yellow-legged frog, add uncertainty to this assessment.

Alternatives S1, S2 and S3 apply the same Aquatic Management Strategy and Standards and Guidelines for aquatic, riparian, and meadow ecosystems. These alternatives protect populations as they are discovered by designating Critical Aquatic Refuges. The differences in the amounts of mechanical and prescribed burning between the alternatives will likely be tempered by the application of the Aquatic Management Strategy.

Mountain Yellow-Legged Frog

Alternatives F3, F5 and F8, appear to provide the greatest improvements of environmental outcomes for the mountain yellow-legged frog because they provide the most effective management approaches for this species' persistence and recovery. Alternatives F4, F6, and F7 provide less improvement for the mountain yellow-legged frog. All of the action alternatives (Alternatives F2 through F8) provide significantly greater protection to the mountain yellow-legged frog then the current condition.

Alternatives S1, S2 and S3 apply the same Aquatic Management Strategy and Standards and Guidelines for aquatic, riparian, and meadow ecosystems. These alternatives protect populations as they are discovered by designating Critical Aquatic Refuges. The differences in the amounts of mechanical and prescribed burning between the alternatives will likely be tempered by the application of the Aquatic Management Strategy. Some mountain yellow-legged frog populations may overlap with habitat for the Yosemite toad, willow flycatcher or great gray owl. Alternative S2 changes some of the grazing management standards and guidelines related to these species that could potentially indirectly affect the mountain yellow-legged frog. However, these changes require site-specific analysis that would include a biological evaluation that would address all species occurring within the affected area so the implications of this change are minimal.

The U.S. Fish and Wildlife Service has determined that this species is warranted for listing but action towards listing is currently precluded due to other priorities. If this species is formally listed in the future, changes in management direction may be warranted.

Yosemite Toad

Alternative F8 provides the greatest improvement of environmental conditions for the Yosemite toad, because they provide the most effective management approaches for this species' persistence and recovery. Alternatives F2, F3, and F5 provide slightly less improvement, because of lack of specific direction limiting livestock grazing at Yosemite toad sites. Alternative F2 includes provisions for establishing an amphibian reserve system to protect known occupied and suitable unoccupied amphibian habitats (FEIS Appendix D standard and FEIS guideline AM12). Alternatives F3 and F5 would protect known occupied amphibian habitats, based on records over the last 25 years (FEIS Appendix D standard and FEIS guideline AM13). Alternative F4 would provide for improvement from the current condition.

Alternatives S1, S2 and S3 apply the same Aquatic Management Strategy and Standards and Guidelines for aquatic, riparian, and meadow ecosystems. These alternatives protect populations as they are discovered by designating Critical Aquatic Refuges. The differences in the amounts of mechanical and prescribed burning between the alternatives will likely be tempered by the application of the Aquatic Management Strategy. Alternative S2 changes some of the grazing management standards and guidelines related to the Yosemite toad. It allows use of alternative management strategies that are locally determined to provide sufficient protections for this species. Although the intent of these alternative management strategies is to provide for and protect habitat for the species, there are implementation difficulties that may increase the risk of success at avoiding impacts to Yosemite toads. Some of these risks exist within Alternatives S1 and S3 as well and are due to the difficulty in managing livestock in the forest environment.

The U.S. Fish and Wildlife Service has determined that this species is warranted for listing but action towards listing is currently precluded due to other priorities. If this species is formally listed in the future, changes in management direction may be warranted.

Cascades Frog and Northern Leopard Frog

Alternatives F5 and F8, appear to provide the greatest improvement of conditions for the Cascades frogs and northern leopard frogs, because they provide the most effective management approaches for this species' persistence and recovery.

Alternatives S1, S2 and S3 apply the same Aquatic Management Strategy and Standards and Guidelines for aquatic, riparian, and meadow ecosystems. These alternatives protect populations as they are discovered by designating Critical Aquatic Refuges. The differences in the amounts of mechanical and prescribed burning between the alternatives will likely be tempered by the application of the Aquatic Management Strategy. Some populations of these species may overlap with habitat for the Yosemite toad, willow flycatcher or great gray owl. Alternative S2 changes some of the grazing management standards and guidelines related to these species that could potentially indirectly affect these species. However, these changes require site-specific analysis that would include a biological evaluation that would address all species occurring within the affected area so the implications of this change are minimal.

Socio-Economic Concerns

Commercial Forest Products

During the first decade, alternatives F2 to F8 are projected to produce between 21 and 534 million Board Feet (MMBF) of live timber annually from the Sierra Nevada national forests. These estimates include 5 years of timber harvest conducted under the pilot project implementing the Record of Decision for the Herger-Feinstein Quincy Library Group Forest Recovery Act. Upon completion of the pilot project, timber harvests are projected to decline. An assessment of the pilot project would be made following its completion. This assessment could lead to the adoption of similar strategies throughout the Sierra Nevada. However, at this time, any assumption about assessment results would be speculative. In the second decade, timber harvest volumes in Alternatives F4, F6, F7, and F8 would decline further, as the need for fuel treatments would lessen and treatments would produce lower timber volumes than treatments conducted in the first decade.

Alternatives F4 and F7 would produce the most timber volume over the first decade. Alternatives F3 and F6 would produce an intermediate level of timber volume. Alternatives F2, F5, and F8 would produce the least timber volume. Alternatives F4 and F7 would continue to produce the most timber volume during the second decade and Alternatives F2, F3, F5, and F8 would produce the least.

Alternative S2 would produce the most timber volume in the first decade and overall. Alternative S1 would produce an intermediate level of timber volume and Alternative S3 would produce the least timber volume.

Grazing

Grazing use levels

Alternatives F4 and F7 would cause the least reduction in grazing use. Alternatives F2, F5 and F8 would cause the greatest reductions in grazing use. Alternative F3 would cause a reduction that would be higher than Alternatives F4 and F7, but lower than Alternatives F2, F5 and F8. The reduction in grazing use under Alternative F6 would be higher than Alternative F3, but lower than Alternatives F2, F5 and F8.

Acres Available for Grazing

Alternatives F4 and F7 would have more suitable rangeland (acres available for grazing) than Alternatives F2, F3, F5, F6 and F8. Suitable rangeland acres under Alternative F8 would be similar to those for Alternative F5, and more than those provided in Alternative F2. Alternatives F2 and F5 would provide the least amount of suitable rangeland acres for grazing.

Animal Unit Months

All alternatives show a decrease in Animal Unit Months (AUMs) offered by the national forests from allotments in the Sierra Nevada compared to current conditions. Implementation of existing forest plan standards and guidelines over the past 10 years has resulted in reduced numbers of livestock grazing. Other factors that have affected grazing levels include implementation of management requirements for threatened and endangered species and water quality standards.

Alternatives F2, F5 and F8 would establish more conservative standards and guidelines related to grazing activities than the other alternatives. These standards and guidelines would remain in effect until a range analysis could be completed to determine the condition of the range. In many cases, these conservative standards would make it uneconomical for permittees to graze their allotments while waiting for an analysis to be completed. Since it would take many years to complete the analysis on several hundred allotments, it is assumed that many permittees would give up their permits.

Alternatives S1, S2, and S3 were evaluated by estimating the effects on allotment permittees. By employing alternative strategies to protect wildlife species, Alternative S2 is estimated to eliminate impacts on 14 allotment permittees. Alternatives S1 and S3 continue to impact these 14 allotment permitees. Seven permittees would have very high impacts under Alternatives S1, S2, and S3.

Mining

Mining activities would change in the future as ongoing Forest Service management would continue to include proposals for mineral withdrawals and mitigation for natural resource protection.

Alternatives F3, F4, and F7 are similar in that they do not contain proposals for new mineral withdrawals. Alternative F7 has the least Known Mineral Deposit Area (KDMA) acreage and fewest mining claims in restrictive land allocations; Alternative F3 has the most; and Alternative F4 falls between Alternatives F3 and F7 in terms of acreages in KDMAs and numbers of mining claims affected by mining restrictions. Overall, differences between these three alternatives do not appear to be significant. However, impacts from Alternative F3 are less certain because withdrawals and mitigation measures would be based on findings in landscape analyses.

Alternatives F2, F5, F6 and F8 propose new mineral withdrawals. Alternative F2 proposes withdrawals of up to 75 percent of the Sierra Nevada national forests' acreage in KMDAs and 78 percent of the active claims. Alternative F5 proposes withdrawals of up to 45 percent of the Sierra Nevada national forest's acreage in KMDAs and 40 percent of the active claims. Alternatives F6 and F8 propose withdrawals of up to 11 percent of the national forest's acreage in KMDAs and 9 percent of the active claims.

Alternatives F6 and F8 are slightly more restrictive to mining than Alternatives F4 and F7 and likely less restrictive than Alternative F3. Alternatives F2 and F5 would have the greatest impacts to mining due to the large amounts of land and high numbers of active claims affected by potential withdrawals. In addition, the level of constraints in riparian areas under Alternative F5 could withdraw mining operations in these areas.

There is no difference between Alternatives S1, S2 and S3 regarding mining activities. These alternatives would contain the same land allocations and desired conditions. New mineral withdrawals are proposed in these alternatives and are similar to Alternatives F6 and F8.

Roads

Alternative S2 would have different effects from roads than the other alternatives.

Alternatives F2 to F8 and S1 and S3

The forest development road arterial system would remain in its current location in these Alternatives. No arterial roads would be decommissioned. Improving arterial roads would continue to be a priority for road construction funding.

The forest development road collector system would also remain in its current location in these Alternatives. Construction or decommissioning of collector roads would be unlikely. Collector roads would be improved and managed to provide a more stable road surface, primarily using gravel and dust abatement.

The most dramatic change in the forest development road system would be changes in the mileage and conditions of local roads. Some roads would be improved to reduce impacts on adjacent resources, but typically these roads would have lower maintenance priority. It could become impossible to drive on some local roads due to vegetative encroachment. There would be fewer miles, as some local roads would be decommissioned.

There would be fewer miles of unclassified roads. Unclassified roads would be evaluated as they were found. Some unclassified roads (those supporting unauthorized uses) would be decommissioned. Others providing needed access would be added to the forest development road system. In some areas the size of the forest development road system could actually increase as needed roads were added to the system. If these roads were supporting authorized uses, adding them to the forest development road system would not affect existing public access.

Alternative S2

Alternative S2 would allow construction, maintenance and decommissioning of roads as described for Alternative 2 in the FEIS for the HFQLG pilot project. This will result in an increase in the number of miles in the forest development roads and the collector system along with decommissioning other roads. The effects of these activities are described in the FEIS for the Herger-Feinstein Quincy Library Group.

Air Quality

Particulate emissions from prescribed burning would contribute to PM_{10} loading; however, analysis indicates that activities proposed in the SEIS alternatives would not likely create conditions that violated Ambient Air Quality Standards. Alternatives F6, F8, F7, F3 and F4 would likely have short –term noticeable increases in emissions from prescribed burning to reduce forest fuels. These treatments could however lead to long-term reductions in emissions from wildfires. Alternatives to burning, such as mechanical treatments, would be expected to reduce wildfire emissions over the long-term.

Alternative S2 would include prescribed burning on the slightly more acres than Alternative S1, although the primary difference is in follow-up burning which may have reduced emissions over initial burn treatments because they would have lower fuel loading. Alternative S3 would have the least prescribed burning and the highest risk of emissions from future wildfires. All alternatives are very similar in terms of PM_{10} emissions in the first decade.

Remote communities use firewood for household heating. Combined with prescribed burning, this could aggravate the background levels of PM_{10} and $PM_{2.5}$ during winter and early spring.

Short-lived unpleasant odors and reduced visibility (in 15 Class I Areas) could be detected by wilderness visitors and could affect the recreational experience of those trying to seek solitude and escape signs of human activity.

The amount of ozone produced is unknown. Ozone production would not vary among the alternatives because the major sources are located outside national forest boundaries. The amounts of NO_x (precursor to ozone formation) produced per project are small. The highest potential for risk of injury to plants (ponderosa pine and Jeffrey pine) from ozone is in those plant communities already stressed by drought, insect and pathogen attacks, and soil acidification. The alternatives that resulted in less acreage of diseased trees would be able to withstand higher amounts of pollution. It is difficult to quantify the effects of ozone concentration on old forests, hardwood ecosystems, noxious weeds, aquatic and riparian ecosystems, and other flora and fauna with the available research.

Visual Quality

In the first decade, Alternative F4 would have the greatest number of effectively altered acres. Alternatives F2 and F8 would have the fewest acres altered by management activities. Alternatives F3, F5, F6 and F7 would fall between these alternatives in terms of acreage that would be visually apparent due to management activities. Local visual quality could be impaired for a time in alternatives that result in higher levels of lethal wildfire effects (Alternatives F2, F3 and F8).

Alternatives S1, S2 and S3 treat the same areas but with different preferences for methods and intensities. Visual effects are projected to be similar, except where group selection treatments in the HFQLG Pilot Project are conducted in Alternative S2. Alternatives S1 and S3 are more restrictive and would result in less acres with visually apparent treatment. Alternative S2 would reduce the acres with lethal wildfire effects slightly more than Alternative S1 and substantially more than Alternative S3, especially as predicted over time.

Recreation

In general, all of the alternatives could have localized effects on certain types of recreation activities on national forest lands. Alternatives F2, F3, F5, F6 and F8 would cause a slight reduction in the number of recreation visitor days (RVDs). These alternatives favor a trend toward more dispersed, non-motorized recreation, such as hiking and backcountry camping. Alternatives F4 and F7 would maintain the current level of RVDs.

Alternatives S1, S2 and S3 are similar in effects to recreation. Alternatives S2 clarifies direction contained in Alternatives S1 and S3 that explicitly applies some limited operating periods that protect various wildlife species to vegetation treatments and not recreation related activities. The effects of this change are negligible, as recreation activities that require analysis under NEPA or for permit issuance generally require evaluation for effects to wildlife and recommendations for limited operating periods could be adopted as deemed necessary at the project level. Alternatives S1 and S3 include direction that may limit recreational packstock activities in meadows containing or potentially containing willow flycatchers and/or Yosemite toads if required surveys are not completed. These activities may affect outfitter guide services.

Socioeconomic

The level of active management in each alternative directly affects the socioeconomic climate of the Sierra Nevada through county revenues, employment, and income derived from resource extraction, production, and use. Receipts from timber sales on national forest lands can provide revenues to affected counties for roads and schools. Timber harvest from national forest lands provides a flow of products to area industries. Short-term economic effects vary with the level of resource extraction. Alternative F4 would have the greatest direct economic benefit, while Alternative F2 would have the lowest in the short-term. Long-term direct and indirect economic effects could be associated with sustaining ecosystems to benefit the broader California population that may exceed 60 million people by mid-century.

Alternative S2 provides approximately twice the employment (direct, indirect, and induced) related to timber harvest than Alternative S1. Alternative S3 provides substantially fewer employment opportunities.

Summary Table: Comparison of Alternatives

Treatments, outputs, and selected environmental, social and economic consequences are displayed by alternative to allow easy comparison.

Effect on Wildfire. Over the last 30 years the Sierra Nevada has averaged about 43,000 acres of wildfire per year. In the last ten years, the average has risen to about 63,000 acres per year. It will take at least two decades of fuels treatments before we expect significant changes in wildfire. Because we want to reintroduce fire as an ecosystem process, the reduction in fire severity is more important than the reduction in total acres burned by wildfire.

	Alt S1	Alt S2	Alt S3 [1]
Annual acres of wildfire, First decade	64,000	60,000	68,561
Annual acres of wildfire, Fifth decade	63,000	49,000	76,315
Percent change in annual wildfire acres from First decade to Fifth decade	-2%	-22%	+10%

[1] *Values for Alt S3 are derived from the SNFPA FEIS for Alternative 2.*

Effect on Air Quality. Fuels treatments, both mechanical and prescribed fire, can reduce the amount of particulate from wildfires and from prescribed burns. In addition, timing of prescribed burns helps reduce particulate emissions during periods of critical air quality.

	Alt S1	Alt S2	Alt S3 [1]
Annual wildfire PM_{10} emissions (tons), First decade	23,600	22,100	25,300
Annual prescribed fire tons of PM_{10} emissions (tons), First decade	2,200	2,200	3,500
Total annual PM_{10} emissions (tons), First decade	25,800	24,300	28,800

[1] *Values for Alt S3 are derived from the SNFPA FEIS for Alternative 2*

Fuels Treatments. The following tables summarize the estimated fuels treatments to be accomplished by each Alternative. *(Source: SPECTRUM runs)*

	Alt S1	Alt S2	Alt S3 [1]
Total acres of mechanical fuels treatment, all Sierra Nevada National Forests, 20 years	1,566,000	1,596,000	140,000
Total acres of prescribed burn, all Sierra Nevada National Forests, 20 years	676,000	677,000	300,000

[1] *Values for Alt S3 are derived from the SNFPA FEIS for Alternative 2*

Principal Forest Products. Estimated offering. The first decade includes treatments under the HFQLG pilot project. During the six years (1988-1993) preceding the 1993 CASPO Interim Guidelines, the average timber offered for sale (green plus salvage) was 879 million board feet (mmbf) per year; amount sold was 765 mmbf/yr. The average amount of timber offered during the six years since the CASPO Guidelines, 1994-1999, was 372 mmbf/yr.; amount sold was 179 mmbf/yr.

First Decade			
	Alt S1	**Alt S2**	**Alt S3** [1]
Estimated Salvage timber to offer for sale, mmbf/yr, all SNFP National Forests	30	90	17
Estimated green timber to offer for sale, mmbf/yr, all SNFP National Forests	127	358	22
First Decade Total	**157**	**448**	**39**
Second Decade			
Estimated Salvage timber to offer for sale, mmbf/yr, all SNFP National Forests	30	90	17
Estimated green timber to offer for sale, mmbf/yr, all SNFP National Forests	66	287	7
Second Decade Total	**96**	**377**	**24**

[1] *Values for Alt S3 are derived from the SNFPA FEIS for Alternative 2*

Principal Forest Products. The following table summarizes the estimated amounts of potential commercial biomass outputs available for sale by each Alternative by decade. *(Source: SPECTRUM runs)*

	Alt S1	**Alt S2**	**Alt S3** [1]
Estimated potential commercial biomass output, 1000 bone dry tons, first decade	5,005	7,021	660

[1] *Values for Alt S3 are derived from the SNFPA FEIS for Alternative 2*

Grazing/Forage. There are presently 7,165,000 acres of national forest in active grazing allotments. This table illustrates the estimated number of permittees that would be impacted by restrictions for sensitive wildlife species (willow flycatcher, Yosemite toad and great gray owl).

	Alt S1	**Alt S2**	**Alt S3**
Permittees with low impacts	11	7	11
Permittees with medium impacts	17	10	17
Permittees with high impacts	12	9	12
Permittees with very high impacts	7	7	7

Economy. Estimated average annual employment and earnings generated from timber harvested from the Sierra Nevada national forests.

First Decade			
	Alt S1	**Alt S2**	**Alt S3** [1]
Estimated average annual jobs for Loggers, Timber Haulers, and Timber Mill Employees generated from Forest Service commercial logging operations in the Sierra Nevada Region.	957	1894	145
Estimated average annual earnings generated from Forest Service commercial logging, hauling, and sawmilling in the Sierra Nevada Region (thousands $, 1995)	$38,344	$57,159	n/a [2]

[1] *Values for Alt S3 are derived from the SNFPA FEIS for Alternative 2*

[2] *Estimated average annual earnings was not calculated in the FEIS. This values is not available.*

Old Forest Conservation. Alternatives S1 to S3 present a range of approaches to increasing the amount of old forest ecosystems. Important measures of old forest condition are the number of individual large trees, patches of large trees with additional old forest characteristics, and the connectivity or relationship among the trees, patches and larger stands of old forest.

	Alt S1	**Alt S2**	**Alt S3**
Amount of large or old conifer trees	Variable retention (30” and 24” dbh limits); other limits <30” based on land allocations	Protects trees greater than 30” dbh in all land allocations	Variable retention (30” and 24” dbh limits); other limits <30” based on land allocations
Maintenance or development of Old Forest Patches	High from direct actions; potentially lower due to increases in wildfire acres.	Moderate from direct actions; may be offset by decreases in wildfire acres.	High from direct actions; potentially lower due to increases in wildfire acres.
Connectivity of Old Forest trees, patches and stands	Designation of old forest emphasis areas	Designation of old forest emphasis areas; potential for more fragmentation in HFQLG due to group selection units.	Designation of old forest emphasis areas.

Chapter 3: Affected Environment

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Chapter 3: Affected Environment

Introduction

This chapter presents the existing or baseline environment for the Sierra Nevada Forest Plan Amendment. The information provided here supplements the detailed information about the affected environment included in the Sierra Nevada Forest Plan Amendment FEIS (January 2001). This chapter focuses on specific areas where there is new information or analysis relevant to the decision to be made. As such, it addresses environmental conditions that may have changed since the FEIS was completed as well as key findings and new information identified in the *Sierra Nevada Forest Plan Amendment Management Review and Recommendations* (March 2003).

3.1. Physical and Biological Environment

3.1.1. Forest Ecosystem Health

A. Background

Forest and Vegetation Health Concepts, Definitions and Additions to FEIS

In the SNFPA FEIS, there was scarce or scattered reference to ecosystem conditions and consequences related to some key aspects of forest and ecosystem health. While forest and ecosystem health can be ambiguous and variously defined terms, for this SEIS, we are referring to the response of vegetation to climate change, drought, insects and pathogens, and the composition and structure of vegetation relative to the desired conditions specified in the FEIS (USDA 2001, Volume I, Chapter 2, pages 135-143). The desired conditions, particularly related to canopy density and species composition were designed in part to restore conditions that would provide greater resilience to drought, climate change and related potential for severe insect/pathogen mortality events.

Vegetation composition, structure, fire regimes and insect/pathogen related mortality for a given landscape or bioregion are dependent at least partially on prevailing climate. In addition, human influences of vegetation management and manipulation also influence these ecosystem components and processes. Climate characteristics such as temperature and precipitation are not constant but constantly varying. The rate and direction of climate change can vary as well. The magnitude and degree of climate change depend in part on the scale of time period examined. For example, droughts occur when precipitation changes to lower levels on an annual time scale. An overall climatic regime can vary over thousands or millions of years. This analysis focuses on droughts, either as part of current climatic regime or projected future climate regimes.

Droughts have been common in the past in the planning area. Various analyses of tree-ring data suggest that the more recent drought periods (within the last 100 years) are not anomalies when considered in the long-term context of 1,000 years (Fritts and Gordon, 1980, Graumlich, 1991, Fritts et al. 1979). These studies indicate that California has experienced at least six periods of significant precipitation deficit since 1600. In the perspective of a 360-year reconstruction of precipitation, the period since 1890 has been one of moisture surplus. This surplus in combination with fire suppression as well as selective removal of the more drought tolerant pine species since European settlement has resulted in increased forest densities and changed species composition that make forests and other vegetation communities more susceptible to direct and indirectly related drought induced mortality. Vegetation near the limits of species distributions (particularly low levels of precipitation that can be tolerated) is particularly vulnerable to drought (Dale et al. 2001). This is evidenced by the greater concentrations of high mortality events with droughts in the last century in the eastside and lower elevations of the westside in the project area. Further, large portions of the westside mixed conifer zone, particularly on drier portions (ridgetops, upper slopes, south and west-facing aspects) are also vulnerable to high levels of mortality during droughts, particularly where precipitation levels are lower (<40" average annual precipitation). These areas in mixed conifer, although not as dry as the eastside forests, are more productive, so stand densification from fire suppression and consequently competition for scarce water resources, can be elevated (Franklin, pers. comm.). Reports of drought related insect/pathogen mortality in mixed conifer forests of the Stanislaus in 1924 support the notion of greater vulnerability of these drier portions of the mixed conifer forests (Meinecke 1925).

Projections for climate change in the western U.S. include both increases in mean temperature and increases in precipitation (Dale et al. 2001). However, there is also a trend toward greater fluctuations in precipitation and temperature. The fluctuations, particularly toward low precipitation, are more important than mean trends in interpreting potential consequences of future drought. The extensive vegetation mortality currently being experienced in the San Bernardino National Forest as well as large areas of the southwest in Arizona and New Mexico provide a stark example of the potential consequences of several years of drought in dry ecosystems. In these areas, in addition to extensive mortality in conifer-dominated forests, there are entire hillsides of very drought-tolerant manzanita and live oak that are dead or dying.

This supplemental EIS adds information about drought, insect/pathogen related mortality, and composition (particularly with respect to more drought tolerant pine species) to address forest and ecosystem health. In the FEIS, composition of old forest ecosystems was addressed to some degree (USDA 2001, Volume II, Chapter 3, part 3.2, page 150, 157). This section expands the discussion of forest composition, particularly with reference to retention, regeneration, recruitment and restoration of the yellow pines (ponderosa and Jeffrey pine) where they were historically important. Forest density, along with composition is an important factor in determining the degree of vulnerability to severe drought, and insect/pathogen related mortality. Forest density also influences trends in composition, with greater densities favoring perpetuation of shade-intolerant species (e.g. white fir and incense cedar) and lower densities providing more opportunity for regeneration and recruitment of shade-intolerant species (e.g. ponderosa pine). The non-tree, understory component of vegetation can also be influenced by forest or vegetation density as well as the amount of exposed mineral soil surface and direct heat/chemical outputs of fire. Increased shade and reduced mineral soil can lead to reduced vigor, reproduction and survival of understory species that require more light (e.g. *Clarkia, Penstemon* species) and a mineral seedbed. Some understory species may also be directly stimulated to germinate or flower from the heat or chemical outputs of fire. It is unknown how many understory species in the planning area are fire dependent, let alone enhanced by fire. Given the historic role of fire in the montane and lower elevation portions of the project area, it is likely that there are a number of species that are favored or require fire.

Background on Insects/Pathogens and Abiotic Factors

Insects and diseases have the potential to degrade vegetation in a relatively short time. Whether bark beetle outbreak in combination with drought conditions can cause widespread effects of insects and diseases on the vegetation depends on what their impacts (positive and/or negative) are on ecosystem structure and function and specific management goals and objectives. Management activities that promote tree health and vigor reduce the susceptibility to successful bark beetle attack and also reduce the potential damage from other insects and diseases.

Historically, the most significant widespread, weather-related effect on the vegetation in the Sierra Nevada has been conifer mortality associated with severe moisture stress and bark and engraver beetles. Conifer mortality tends to increase whenever annual precipitation is less than about 80% of normal. Wide fluctuations in annual precipitation are a common occurrence in California and recurrent droughts have been a long-standing feature of the Sierra Nevada climate (Ferrell 1996). In this century, moderate to extreme (on the Palmer Drought Index scale) drought periods in California occurred between 1897-1900, 1923-1925, 1930-1934, 1946-1949, 1958-1962, 1975-1977 and the latest, between 1987-1994.

The key insect pests and pathogens affecting Sierra Nevada forests usually function as members of biotic complexes in which the members are highly interactive. In California's Mediterranean climate, drought is probably the most important predisposing factor to these complexes. (Ferrel 1996). But overly dense stands, fire, logging, urbanization, air pollution, snow breakage, windthrow, and flooding can also weaken trees and predispose, or cause them to become susceptible, to pathogens and insects. Like biotic complexes, environmental factors can be highly interactive.

In the initial years of a drought, a large proportion of the dead trees have some combination of insects and pathogens. As the drought eases, the proportion of dead trees with multiple biotic agents decreases. As this proportion of multiple agents declines, bark beetles become the dominant organisms involved in tree mortality. This occurs because the early mortality is focused on trees weakened as a result of pathogens; in essence removing trees with existing debilitations. After many of these weakened trees are killed, drought and increased insect populations continue to kill trees that are relatively healthy.

Insects

Bark beetles have the largest impact, with sporadic outbreaks causing widespread mortality in virtually all major conifers and forest types. The bark beetles associated with tree mortality include (1) western pine beetle, *Dendroctunus brevicomis*, in ponderosa pine, (2) Jeffrey pine beetle, *Dendroctonus jeffreyi*, in Jeffrey pine, (3) mountain pine beetle, *Dendroctonus ponderosae*, in lodgepole pine, sugar pine and ponderosa pine and (4) fir engraver, Scolytus ventralis, in red fir and white fir. Red turpentine beetle, *Dendroctonus valens*, often found in association with other pine bark beetles, is commonly seen after prescribed fire, and can contribute to mortality.

Pine engravers such as *Ips paraconfusus* and *Ips pini* periodically infest green pine slash. Host material can be created through wind events, snow breakage or harvesting activities. Residual trees can be attacked simultaneously when pine engravers are infesting the slash or later by emergent populations that have developed in the slash. Attacks to pine trees can result in top kill and/or whole tree mortality. In the warmest part of the summer, Ips beetles can complete their lifecycle in 35-40 days. All the above insects are native to the Sierra Nevada, play a diverse role in forest ecosystem dynamics and have evolved in conjunction with the vegetation.

Mortality related to pine bark and fir engraver beetles occurs primarily in small groups or as single trees scattered over several hundred acres. Successful attacks by the pine bark beetles (western, mountain and Jeffrey pine beetles) result in tree mortality. Successful attacks by the fir engraver (in red and white fir) can result in top-kill, branch kill, patch kills along the bole and/or whole tree mortality. In general, mortality occurs in overstocked stands, however during periods of protracted drought, mortality may be expected to occur throughout various stocking levels.

In part because of the biology and host selection behavior of bark and engraver beetles, the condition or vigor of the host tree is critical as to whether attack by beetles will be successful or unsuccessful. Conifer hosts growing under healthy, vigorous conditions are best able to resist attack through their evolved defense mechanisms. Trees that have been weakened by some factor or agent, including drought, diseases, physical injury, lightening, fire, and between-tree competition due to overstocking, are more likely to be successfully attacked. Consequently, regulation of stocking and species composition through vegetation management in combination with the reduction of other predisposing factors, would allow trees to grow as healthy and vigorously as possible and prevent/reduce chances of successful attacks by bark and engraver beetle and subsequent mortality.

Douglas fir tussock moth (DFTM), *Orgyia pseudotsugata*, is also found in mixed conifer/white fir stands in the Sierra Nevada. Historically, this defoliator has gone into an outbreak about once every 10 years somewhere within the mixed conifer/white fir type in the Southern Cascade and Sierra Nevada ranges. Repeated defoliation by DFTM can cause white fir mortality.

Direct Suppression (tree removal)

Direct suppression of Jeffrey pine beetle infestations in Jeffrey pine by removing infested trees prior to beetle emergence has greatly reduced the number of trees killed in areas where it has been implemented on a site specific basis, specifically on the Truckee RD, Tahoe NF, the Lake Tahoe Basin Management Unit and in Lassen Volcanic National Park. Immediate implementation of infested tree removal activities prior to beetle emergence has resulted in fewer trees attacked the following year and therefore, the maintenance of a Jeffrey pine component in the stand. Conclusions from monitoring studies in outbreaks where no action was taken indicate that trees will continue to die from the original infestation until either hosts are not available or trees are less susceptible to successful attacks due to an increase in growth and vigor or return to normal precipitation levels.

Fire Damaged Trees

Low to moderate intensity fire can damage some residual trees to the extent that they become more susceptible to bark beetle attacks. Trees that sustain cambial and/or foliar damage may be at increased risk to bark and/or engraver beetle attack that would persist until the trees recover their vigor. Red turpentine beetles, *Dendroctonus valens*, are commonly found attacking conifers in areas that have burned by either prescribed fire or wildfire.

Forest fires of sufficient intensity or residence time to injure cambium and foliage of pine trees make certain trees more attractive to the bark and/or engraver beetles. Many trees that have been only moderately injured by the fire and are capable of recovering may be attacked and killed by beetles after a fire. Fire-injured trees often cause a concentration of beetles within a burned area that lasts for one or two season following a fire. While fire injured trees can attract bark beetles in considerable numbers they do not always afford favorable breeding conditions for new broods. Some of the factors involved in post-fire bark beetle attacks are: level of stress of trees prior to the fire (i.e. drought-stressed), bark beetle populations levels prior to the fire, fire season occurrence, and timing of salvage operations. Fires that result in cambium damage can also create open entry courts for pathogens.

Pathogens and Abiotic Conditions in the Sierra Nevada

White Pine Blister Rust (caused by *Cronartium ribicola*) – A non-native fungus that affects white pines (sugar, western white, whitebark, limber, foxtail) and its alternative host, *Ribes*. The principal effect is mortality of trees that become infected. Smaller trees die rapidly. Mature trees may survive infection, although with sufficient infections, the tree can be predisposed to bark beetle attack.

Dwarf Mistletoes (*Arceuthobium* spp.) – Dwarf mistletoes are parasitic seed plants that attack members of the Pinaceae family. They are relatively host specific and require a living host for survival. These agents cause a reduction in the rate of growth of a tree, the development of deformities (cankers, witches brooms), and increase the susceptibility of trees to bark beetle attack and mortality. Dwarf mistletoes commonly interact with other factors, including stocking, precipitation, and insects, to affect their host.

Black Stain Root Disease (caused by *Leptographium wagneri*) – locally important mortality. Infected trees are often attacked by bark beetles. This disease is spread through root-feeding beetles that carry the spores of the pathogen, and through root contact with infected trees.

Annosus Root Disease (caused by *Heterobasidion annosum*) – extensively distributed pathogen responsible for high levels of mortality, especially during periods of drought stress when it can weaken trees sufficiently so that successful beetle attacks result in mortality (1987 Forest Pest Conditions, CFPC). Adverse effects include mortality, reduction of vegetative cover, and creation of hazard trees. Two strains are present, one that infects true firs, giant sequoia, spruce, and hemlock, and one that infects pines, incense cedar, western juniper and hardwoods. The strain in true fir results in root and heartwood rot, while the strain in pine often causes mortality through girdling. Spread of the disease is through airborne spores or through root-to-root contact between infected and uninfected trees. Impacts increase with multiple logging entries, generally as a result of residual tree damage or stumps, allowing spore entry.

Sudden Oak Death (caused by *Phytophthora ramorum*) – This pathogen has caused localized intensive mortality in tanoaks and coast live oaks within the Coast Range. However, this recently discovered disease is not yet a Sierran forest problem. Host species are found in the Sierra Nevada: Douglas-fir, black oak, bigleaf maple, madrone, tanoak and California laurel. Neither the method of spread of the pathogen, its requirements for successful infection, nor the conditions conducive to tree mortality are clearly understood. For these reasons, its potential impacts in the Sierra Nevada are unknown and the 2002 surveys for signs and symptoms will continue in 2003.

Air Pollution (Ozone injury) – In studies in Southern California on similar forest species, damage results in chlorotic, sparse foliage and reduced exudation of defensive resin in response to bark beetle attack, and therefore an increased risk to bark beetles (Ferrell 1996).

Vegetation Density, Composition, Insects/Pathogens and Vegetation Management

Active vegetation management, including thinning through hand treatments, mechanical removal or burning are important means of restoring and maintaining forest health, particularly in eastside pine and westside ponderosa pine and mixed conifer forests. Vegetation management can effectively be used to reduce vegetation density, modify species composition; thereby indirectly reducing drought and insect/pathogen mortality and restoring desired conditions. Vegetation management can also be used to directly affect composition and insect/pathogen mortality through reforestation and selective removal of infected trees.

The type of vegetation management that is most effective and appropriate is highly dependent upon the specific management objectives and site conditions. Although both mechanical thinning and prescribed fire can reduce forest density, both of these vegetation management activities have negative as well as positive consequences. Prescribed burning can be relatively inexpensive to implement but can cause air quality degradation and may not always achieve desired structural or compositional objectives. For example, there are situations when the desired thinning is of trees with sufficient bark thickness that only very hot fires can kill them. In this case, a “hot” prescribed fire may damage desirable trees or consume substantial amounts of duff and down logs. In another example, dense understory trees may form a “ladder” to adjacent valuable, large or old trees that may experience extensive crown mortality as the prescribed fire burns through the understory and torches live crowns. Further, burning in situations where there are large, old pines that have a large accumulation of duff and bark slough at the base can result in increased likelihood of cambial damage and potential mortality - although these effects can sometimes be mitigated with firing patterns and other fire behavior modifications. On the other hand, mechanical treatments can result in increased incidence of pathogens and insects through creation of host sites on stumps or in slash - although these effects can also often be mitigated with management practices. Mechanical treatments can cause soil compaction. Both mechanical and fire treatments can expose mineral soil which provides a seedbed for natural tree reproduction and opportunity for herbaceous and shrub growth. There are also different economic and social differences between the two types of vegetation management treatments. On steeper slopes, it may be economically impractical to conduct extensive mechanical thinning. There can be economic benefits to mechanical thinning on less steep ground that can provide a means to treat or restore areas elsewhere.

Conditions vary by with the ecosystem or forest type as well. In general, most of the eastside forests are in a state where mechanical treatment is an important first step in forest health restoration. Dense thickets of pine are difficult to burn and achieve all of the desired structural conditions. In addition, soil nutrient processes are more sensitive and fires intense enough to decrease density may result in unwanted losses of soil productivity. In more productive westside forests, the tradeoffs are different and depend more upon the site-specific stand structure. In upper montane, red fir forests, the changes in forest structure and composition since European settlement have been less severe and therefore, the need to conduct restoration management for forest health less important.

Stands that are managed at or below their site capacity will result in reduced mortality of large diameter trees and an increase in mid-diameter trees available to grow into large diameter classes. Selecting for some diversity of residual tree species during thinning is desired as bark beetles are fairly host-specific and diversity should guarantee that some trees would remain alive during elevated stress periods. Removing competing vegetation from plantations will reduce the susceptibility to various insects that often cause damage to regeneration.

Regeneration

Both alternatives emphasize protecting, increasing and perpetuating old forest ecosystems and associated species. Vegetation management activities are designed to increase the density of large trees, increase structural diversity of vegetation, restore the historic species composition and improve the continuity and distribution of old forest. Therefore most recruitment of new regeneration into stands will be under varying densities of overstory trees, except where stand replacing fire or insect outbreaks cause larger openings.

In general, under residual trees, soil moisture and light are less available to young seedlings than in openings. This generally reduces growth rates of all conifer species but has the greatest adverse impacts on growth and survival of shade intolerant species such as ponderosa pine and black oak. Under residual trees, the environmental regime of relatively cool soil surface temperatures and short intervals of overhead light favor the more tolerant species, allowing white fir, incense cedar, sugar pine and Douglas-fir to become dominant. On a high site, mixed conifer stand in northern California, managed under a single tree selection regime (high level of residual trees), Lilieholm (1990) observed that while the best growing seedlings included all species of the mixed conifer forest type, intolerant pines (were) virtually absent from the small and large sapling classes and white fir and Douglas-fir comprised over 85% of the large sapling class.

Residual overstory trees affect the seedling environment by casting shade which moderates temperature extremes. Summer temperatures may be reduced by as much as 10 degrees F and winter extremes may be warmer by a similar amount (Geiger 1966). However, other than occasional sunflecks, the sun shines in the openings only when directly overhead. Sun loving (shade intolerant) species like ponderosa pine and black oak may establish under shade, but typically do not grow as well as more shade tolerant species. Hence heavier shade from residual trees in untreated and lightly thinned areas will tend to favor survival and growth of more tolerant species over ponderosa and sugar pine.

Despite moderating some microsite conditions, residual trees use water, competing strongly with seedlings for this limiting resource. On a good site in northern California Ziemer (1968) measured soil moisture around an isolated 28 inch diameter sugar pine and found that soil moisture depletion extended outward a distance of slightly over 20 feet from the base of the tree and somewhat deeper than 15 feet under the tree. After thinning or other harvest that creates openings between trees, existing roots of bordering trees expand rapidly and capture additional resources. Ziemer (1964) found that roots of bordering trees extended new roots about 10 feet into newly created openings and about 30 feet into 5-year old openings. Clearly root competition from residual overstory trees reduces availability of moisture for young seedlings, adversely affecting survival and growth.

Residual trees may also favor populations of damaging seedling predators, insects and pathogens. Black tailed deer, known to feed on young natural or planted conifers may be more numerous close to hiding cover provided by residual trees. Pocket gopher populations are often highest in thinned stands where the open the canopy allows development of forbs in the understory. Pocket gophers are capable of decimating entire crops of young confer seedlings and have also been observed to damage much larger trees. Dwarf mistletoe (*Arceuthobium* spp.) readily spreads from residual trees onto young seedlings and saplings in the understory. Cooler, moist conditions under residual trees may also favor western gall rust and white pine blister rust, diseases that kill or stunt young conifers.

B. Existing Conditions

Three different factors were used to display existing forest and vegetation health conditions: (1) vegetation density and composition; (2) insects, pathogens and related mortality levels; and (3) forest regeneration.

1. Vegetation Density and Composition and Interactions with Drought, Insect/Pathogens and Fire.

Current conditions of vegetation density, composition and the influence on response to drought, insects/pathogens and fire vary with ecosystem and vegetation type in the project area (Table 3.1.1.a). Relative to historic patterns, the current conditions of these elements of vegetation health are the most altered in eastside and westside montane ecosystems and vegetation types. Due to a combination of past settlement activities, harvest and fire suppression, and climate change, there is a decrease in the pine component and increase in forest densities. This has resulted in increased vulnerability to drought related insect/pathogen mortality and high severity fire. The degree of change in westside mixed conifer also varies with aspect and position in the landscape.

On the Eldorado National Forest, reconstructions of changes in forest composition indicate large changes in the dry sites, once pine dominated and now increasingly fir and cedar dominated but fewer changes on the more mesic sites (Fites-Kaufman 1997). On forests on north and east aspects, composition has apparently changed less, with Douglas-fir and white fir having always been more common.

In eastside mixed conifer forests in the Lake Tahoe basin, changes in composition and density have been substantial (Barbour et al, 2002). Stem density in the understory has increased, comprised primarily of increases in white fir. In the southern Sierra Nevada, the degree of change varies with precipitation level and site productivity. Jeffrey pine forests on the drier and lower productivity sites have undergone density increases, but not as great as more productive sites with higher precipitation (Minich et al. 1995).

Table 3.1.1a. The degree of change from historic (pre-1850) to existing conditions (post 1950) for major characteristics of forest vegetation, fire and insect/drought disturbances by major landscape zone (eastside, transition and westside) and forest type (i.e. yellow pine, mixed conifer, white fire, red fir, aspen and foothill woodlands) for the Plumas and Lassen National Forests. Four different degrees of change are used: 1) little or none, 2) low, 3) moderate, and 4) high. These are conceptual categories, based upon a synthesis of the quantitative and qualitative measures described in Fites et al. 1996. They represent the relative change in each characteristic for each landscape zone/forest type from historic to existing conditions.

Degree of Change from Historic Conditions

Landscape Zone /Forest Type	Dominant Tree Species	Typical Stand Structure	Landscape Patterns of Forest Structure	Drought /Insect Related Tree Mortality	Fire Regime	Fire Severity /Fire Effects
Eastside-yellow pine	Low to high	High	Moderate to high	Moderate to high	High	High
Eastside-mixed conifer (white fir-yellow pine)	Low to high	Moderate to high	High	Moderate to high	High	High
Eastside-white fir (>6,000' elevation)	Low	Low to moderate	Low to moderate	Moderate to high	Moderate to high	Moderate to high
Eastside-aspen	High	High	High	Little or none	Moderate to high	Moderate to high
Transition & Westside-yellow pine/dry mixed conifer	Moderate to high1	High	High	Moderate	High	High
Transition-Douglas fir/dry mixed conifer	Moderate to high	High	High	Moderate	High	High
Transition-moist mixed conifer	Low to moderate	Moderate to high	Moderate to high	Moderate to high	Moderate to high	High
Transition & Westside -red fir	Little or none/low	Low	Low to moderate	Low	Low to moderate	Low to moderate
Transition-white fir (>6,000' elevation)	Low	Low to moderate	Low to moderate	Moderate to high	Moderate to high	Moderate to high
Westside-moist mixed conifer	Low to moderate	Moderate	Moderate	Moderate	Moderate to high	High

1 Low where it existed historically on moist sites, high where it has expanded due to white fir expansion in historically eastside pine forests.

2. Insects, Pathogens and Relation Mortality Levels

Insects

As a result of the protracted dry period in the late 1980's and the early 1990's, many stands throughout the Sierra Nevada sustained above background levels of bark beetle-related mortality. An estimated 2 billion board feet of timber died. The most severe mortality was confined to the east side forests, typically in areas that normally receive less than 40 inches of precipitation annually. Factors that contributed to the high levels of mortality in these areas included the following;

- white fir is much more prevalent at lower elevations currently than likely existed prior to European settlement,
- red and white fir are present in areas which under normal conditions receive precipitation that is near the lower limit for these species and
- stocking levels are higher than some sites can maintain through protracted dry periods.

These conditions do not lend themselves well to withstanding the frequent occurrence of below normal precipitation periods experienced in California. Some trees have developed in areas where even the normal annual precipitation is less than what is needed to sustain the species over a normal lifetime. When normal or above normal precipitation is not received, species growing in these areas become drought stressed which is exacerbated by overstocked growing conditions. Trees that are growing in areas that receive less than their optimal limit of precipitation are more susceptible to insects, pathogens and weather-related disturbances.

After the drought in the mid 1970's, mortality totaled about 13.4 million trees with a commercial volume of 9.6 billion board feet (combined mortality 1975-1979 on 6.3 million acres of commercial forest land in 12 National Forests in northern California). The majority of this mortality was in the westside mixed conifer forests (52% of trees killed and 66% of the volume) that made up about 40% of the landbase analyzed. Distribution of mortality over site quality did not show a pattern in terms of trees per acre, however, in terms of volume, the higher site qualities had much higher volume of dead trees. Mortality rates during this period (1975-1979) represented a 15-20 times increase in the background (non-drought) levels of mortality. In the early part of the drought, mortality was concentrated in the low elevation ponderosa pine type; as the drought progressed, mortality increased in the mid-to-upper elevation mixed conifer and fir types. Much of the mortality was concentrated in large, high volume pine trees.

Blister Rust

Blister rust is prevalent throughout many of the sugar pine and high elevation white pine stands of the Sierra Nevada. This disease is likely affecting the size class distribution of sugar pine and limiting regeneration in areas with high probability of infection. Ecological damage has the potential to be severe on high elevation species, including whitebark and limber pines. An active white pine blister rust resistance-breeding program is in place in California primarily focusing on sugar pine. Genetically resistant sugar pines have been identified on the National Forests. The proportion of sugar pine resistant to the rust is low, and ranges from about 1% in the Modoc to about 8% in the Sequoia. Seed from these trees can provide a source of genetically resistance sugar pine seedlings if planting is allowed.

Dwarf Mistletoe

Recent treatments typically involved removing infected overstory trees and regenerating sites with non-hosts (made possible because of the species selectivity of the various mistletoes). Estimates are that a quarter of the ponderosa pines on the West coast are infested, and that 30% of the white fir in California is infested Partial cutting, including retention of overstory, and uneven-aged management generally intensifies the parasite in residual trees.

Black Stain Root Disease

The disease is being found with increased frequency in eastside pine stands on the Modoc and Lassen, usually associated with thinning or soil disturbance and compaction. Westside mixed conifer stands on the Almanor Ranger District have damaging levels of the root disease.

Annosus Root Disease

Current estimates indicate that 4% of the true fir is infected (1987 Forest Pest Conditions, CFPC). It is widespread within eastside pine. This pathogen results in a growth loss estimated at 19 million cubic feet.

Air Pollution (Ozone injury)

The first report of ozone injury to pines in the Sierra Nevada was in 1971. Since 1971, surveys based on foliar symptoms (chlorotic mottle) have documented that ozone injury is present throughout the Sierra Nevada with a gradient of increasing injury from north to south. As yet, no pronounced increases in tree mortality or bark beetle populations have been attributed to ozone injury in the Sierra Nevada.

3. Forest Regeneration

On unmanaged landscapes conifers establish through natural seeding, usually from freshly fallen seed from nearby trees. In general, confers common to the Sierra Nevada do not sprout following top-kill and do not emerge from a persistent seed bank accumulated in the soil. Conifers are also commonly replanted on managed landscapes following regeneration timber harvest or other disturbance such as stand replacing wildfire or insect mortality.

Conifer seed crops are highly irregular and unpredictable. Several years commonly pass between crops, with essentially no seed produced for several years. In a given year, some species may produce a seed crop while others do not. Numerous factors affect successful seeding, germination, survival and establishment including:

- Proximity to seed source (distance, topographic location)
- Adequate seed crop
- Location of seed source relative to prevailing winds
- Seedbed type and condition (mineral soil, organic matter)
- Microsite conditions
- Seed predators, insects and disease (damping-off)
- Available soil moisture

Once seedlings are established (including planted seedlings), their persistence in the environment is not assured. Additional challenges facing the seedlings include:

- Competition (inter and intra-specific)
- Adequate sunlight for growth (needs vary by species)
- Air and soil temperatures
- Predators (deer, pocket gophers)
- Insects and disease
- Adequate moisture
- Physical hazards (trampling, crushing, burying, fire)

Assuming that seed sources are locally available from a mix of conifer species (or that a mix of species is planted) differential effects of the above factors through time on the population of established seedlings will determine the ultimate composition of seedlings and saplings recruitment into the stand.

3.1.2. Fire and Fuels

National Fire Plan and Comprehensive Strategy

To respond to the wildland fires in 2000, the President requested, and Secretaries of the Interior and Agriculture submitted *Managing the Impact of Wildfires on Communities and the Environment, A Report to the president In Response to the Wildfires of 2000* (September 8, 2000). This report and budget request, along with congressional direction for substantial new appropriations for wildland fire management for Fiscal Year 2001 and 2002, and the resulting action plans and agency strategies have collectively become known as the National Fire Plan. It has broad support with the present (and previous) administration, the Congress, the Western Governors, and many other local and regional groups.

The National Fire Plan includes a discussion of national priority setting, funding allocations and accomplishment and accountability mechanisms. The Plan serves as a clearinghouse with links to other bi-partisan Federal, State, Tribal and local fire management policies and funding initiatives. In August of 2001, a companion document *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment, 10-Year Comprehensive Strategy* (Comprehensive Strategy) was developed by the Secretaries of Agriculture and Interior, and State Governors. This document defined the core principles and goals of the Comprehensive Strategy. In May of 2002, the Secretaries and Governors developed the Implementation Plan for the Comprehensive Strategy. This is the latest and most specific National Fire Plan document available. This piece of the National Fire Plan had not been completed at the time the ROD was signed (January 2001).

The National Fire Plan has evolved over the last two years from the USDA Forest Service's original "Cohesive Strategy" to the finalization of the 10-Year Comprehensive Strategy Implementation Plan described above. The ability of the forests to implement an effective landscape level hazardous fuels reduction strategy is fundamental to contribute to effective implementation of this plan. The Regional Forester has decided to adopt performance measures outlined in the plan with can be used to evaluate successful outcomes. Federal, state, tribal and local governments have endorsed the four goals of the Comprehensive Strategy. Forest Service units at the state and local level are working collaboratively with other agencies to accomplish the associated implementation outcomes by specific dates.

Goal One - Improve Fire Prevention and Suppression, Implementation Outcome - Losses of life are eliminated, and firefighter injuries and damage to communities and the environment from severe, unplanned and unwanted wildland fires are reduced.

One of the measures of success (performance measure) in attaining this goal is the number of high severity acres burned by unplanned and unwanted wildland fires. While this performance measure strongly relates to developing and maintaining an efficient and well-trained suppression organization with improved prevention programs, it is also inextricably linked to implementing a successful strategy to reduce hazardous fuels across the landscape. Successful performance is influenced by the ability to reduce hazardous fuels to significantly lower wildfire intensity and rate of spread, thus directly contributing to more effective suppression efforts, and fewer acres burned.

Goal Two - Reduce Hazardous Fuels, Implementation Outcome - Hazardous fuels are treated, using appropriate tools, to reduce the risk of unplanned and unwanted wildland fire to communities and to the environment. The number of acres treated, and the number of acres treated per million dollars gross investment in targeted areas are two performance measures for goal two.

Goal Three - Restore Fire-adapted Ecosystems, Implementation Outcome - Fire adapted ecosystems are restored, rehabilitated and maintained, using appropriate tools, in a manner that will provide sustainable environmental, social and economic benefits.

Performance measures for this goal include the number of acres moved to a better condition class, that were identified as high priority in total, and as a percent of total acres treated. Progress in the accomplishment of this goal is a key component of the Regional Forester's performance.

Condition classes 2 and 3 are the targets for treatment. Condition class 2 is composed of lands where fire regimes have been altered from their historic ranges creating a moderate risk of losing key ecosystem components as a result of wildfire. The vegetative composition, structure and diversity of lands in condition class 3 have been significantly altered due to missing multiple fire return intervals. These lands "verge on the greatest risk of ecological collapse."

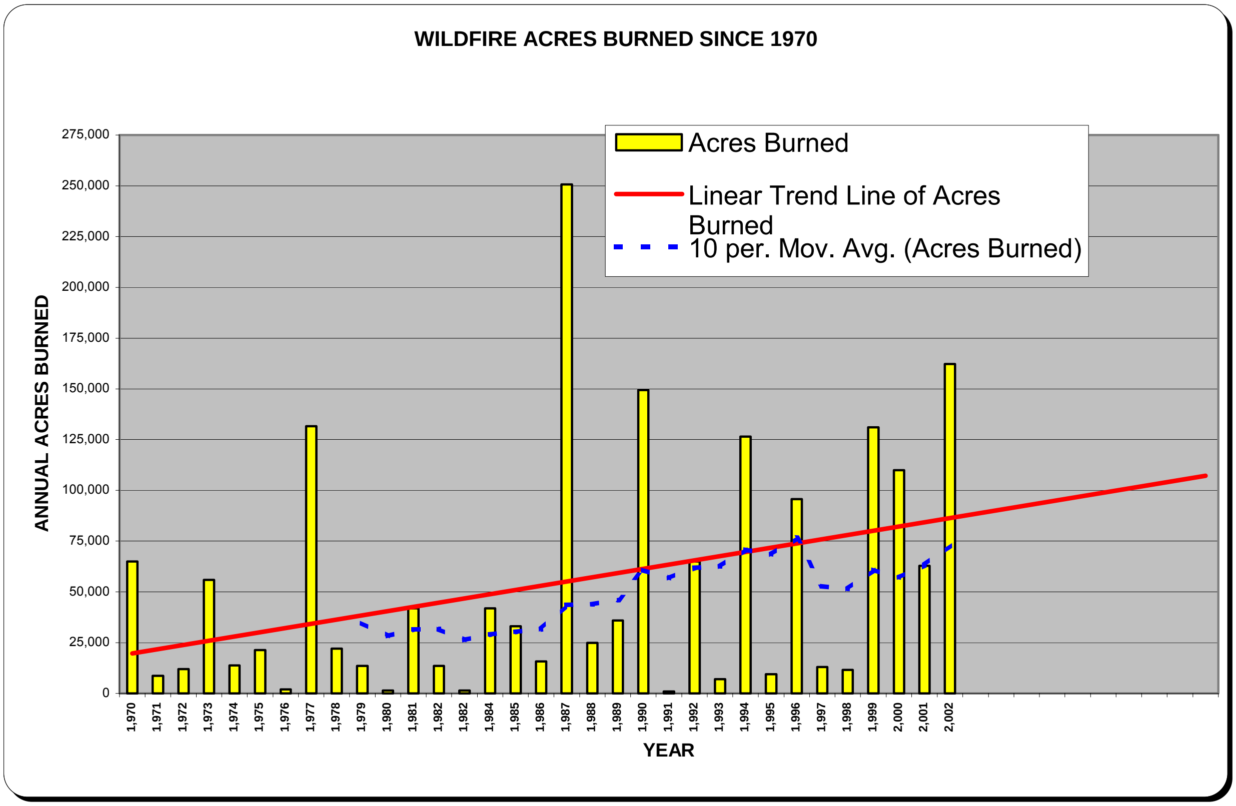
The current estimate of acres in condition class 2 and 3 across the 11 Sierra Nevada National Forests is over 7 million acres. Of this amount, about 3 million acres are estimated to be in condition class 3.

Goal Four - Promote Community Assistance, Implementation Outcome - Communities at risk have an increased capacity to prevent losses from wildland fire and the potential to seek economic opportunities resulting from treatments and services. One performance measure is the percent of acres treated to reduce hazardous fuels by mechanical means with by-products utilized. The current direction performs poorly relative to this measure.

Wildfire Acres Burned

Figure 3.1.2a shows the wildfire acres burned by year from 1970 to 2002. The figure includes the 10-year running average of wildfire acres burned from 1970 to 2002. The 10-year running average line begins in 1979 and tends to stay flat until 1986 when it begins to rise until 1996 where it drops for 2 years then rises through 2002. Seven extreme years, (1977, 1987, 1990, 1994, 1999, 2000 and 2002) with acreages greater than 100,000, dominate the figure. The linear trend line slopes upward from 1970 to beyond 2002, starting near 24,000 acres in 1970 and passing through about 80,000 acres in 2002. This trend line suggests that more acres are burning now than in the past and that this trend is likely to continue in the absence of some intervention. Since the ROD was signed, 2 of the 3 years have continued to have more acres burned than the trend line might suggest and all three years have exceeded the mean of 43,000 acres annually.

Figure 3.1.2a. This figure displays the historical record of acres burned by wildfires for each year in the Sierra Nevada since 1970.



Wildland Urban Intermix (WUI)

The following Table 3.1.2a displays the most current acreage of the locally determined wildland urban intermix by forest. These acreages are used in both alternatives. The total acreage in the wildland urban intermix is currently 2,420,674 with 319,204 acres in the defense zone and 2,101,470 acres in the threat zone. The current status of the WUI identification is a mix of mapping based on rigid rules of distance around communities of concern, some local idealized mapping of distances around collaboratively determined areas of concern and some mapping using fire behavior predictions to determine the most appropriate areas for treatment to protect collaboratively determined areas of concern.

Table 3.1.2a. Wildland Urban Intermix Acres (defense/threat zones) by Forest.

Forest Name	Urban Core	Defense Zone	Defense %	Threat Zone	Threat %	WUI	Outside WUI	Total
Eldorado	133	19,048	8%	213,530	92%	232,578	365,859	**598,437**
Inyo	3,083	19,293	9%	194,957	91%	214,250	1,711,553	**1,925,803**
Lassen		17,859	11%	143,825	89%	161,684	987,796	**1,149,480**
LTBMU	1,958	17,205	44%	21,692	56%	38,897	78,298	**117,195**
Modoc	164	1,586	1%	167,350	99%	168,936	1,507,528	**1,676,464**
Plumas	3,472	39,537	13%	266,298	87%	305,835	896,706	**1,202,541**
Sequoia	2,634	36,704	10%	343,050	90%	379,754	731,590	**1,111,344**
Sierra	5,996	45,967	14%	278,611	86%	324,578	995,353	**1,319,931**
Stanislaus	2,639	53,683	28%	141,305	72%	194,988	702,385	**897,373**
Tahoe	1,691	44,730	14%	263,949	86%	308,679	516,401	**825,080**
Toiyabe		23,593	26%	66,902	74%	90,495	549,189	**639,684**
Total	**21,799**	**319,204**		**2,101,470**		**2,420,674**	**9,042,658**	**11,463,332**

Figure 3.1.2b. Defense Zone/Threat Zone by Forest.

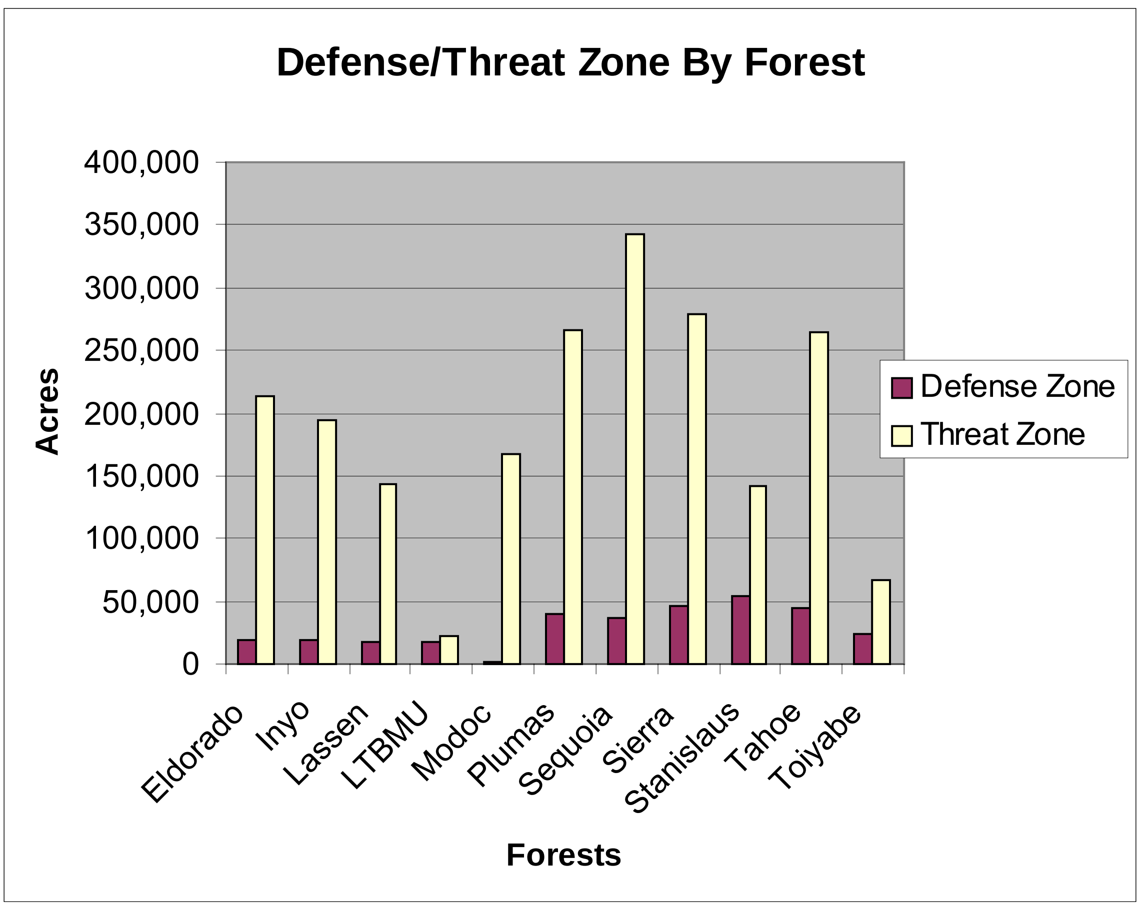


Figure 3.1.2c. WUI and Non-WUI acres by Forest.

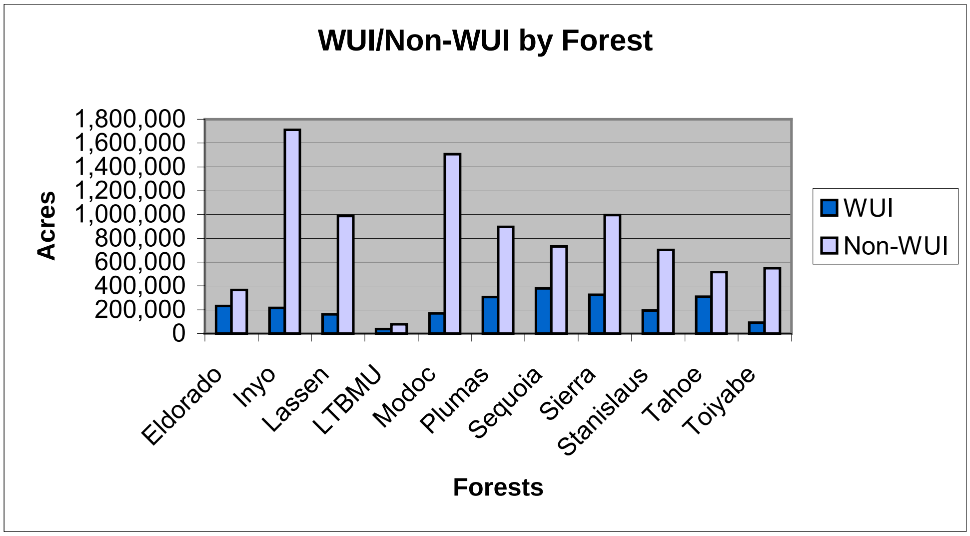


Table 3.1.2b displays the breakdown of WUI and non-WUI acres by Condition Class and Hazard Rank by Forest.

Table 3.1.2b. Crosswalk between Condition Class - Hazard Rank - and WUI defined by Forests.

			Condition Class				
National Forest		**Hazard Risk**	**1**	**2**	**3**	**Urban, Agri, misc**	**Total**
Eldorado	Inside WUI	1-Moderate	23,349	77,127	12,301	2,441	115,218
		2-High	18,189	15,321	14,278	1,863	49,651
		3-Very	4,569	7,342	40,291	381	52,582
		(blank)	1,730	1,366	183	11,849	15,128
	Inside WUI Total		47,837	101,155	67,052	16,534	232,578
	Outside WUI	1-Moderate	41,966	118,213	14,923	5,619	180,721
		2-High	17,848	21,590	20,399	3,964	63,800
		3-Very	8,893	10,082	55,858	1,161	75,995
		(blank)	7,010	2,965	393	34,975	45,344
	Outside WUI Total		75,718	152,850	91,572	45,719	365,859
Eldorado Total			**123,555**	**254,005**	**158,624**	**62,253**	**598,437**
Inyo	Inside WUI	1-Moderate	10,490	20,011	8,078	2,004	40,582
		2-High	21,511	14,036	75,446	3,059	114,052
		3-Very	3,284	1,394	8,859	722	14,258
		(blank)	18,229	3,973	1,021	22,136	45,359
	Inside WUI Total		53,513	39,413	93,403	27,920	214,250
	Outside WUI	1-Moderate	202,419	297,075	195,060	18,385	712,939
		2-High	150,892	45,037	285,525	13,860	495,315
		3-Very	12,778	5,762	34,264	2,689	55,492
		(blank)	176,060	27,728	4,791	239,228	447,807
	Outside WUI Total		542,149	375,603	519,640	274,161	1,711,553

National Forest		Hazard Risk	Condition Class 1	2	3	Urban, Agri, misc	Total
Inyo Total			**595,662**	**415,016**	**613,044**	**302,081**	**1,925,804**
Lassen	Inside WUI	1-Moderate	2,422	18,088	2,506	324	23,339
		2-High	23,912	12,985	33,438	264	70,600
		3-Very	3,351	4,418	57,912	381	66,061
		(blank)	289	250	185	959	1,683
	Inside WUI Total		29,974	35,741	94,041	1,927	161,684
	Outside WUI	1-Moderate	16,022	162,361	24,980	934	204,297
		2-High	110,817	71,648	205,478	1,989	389,932
		3-Very	20,811	53,837	297,836	2,441	374,926
		(blank)	2,706	998	1,310	13,628	18,642
	Outside WUI Total		150,356	288,844	529,604	18,993	987,796
Lassen Total			**180,330**	**324,585**	**623,645**	**20,920**	**1,149,480**
LTBMU	Inside WUI	1-Moderate	1,058	2,931	358	96	4,443
		2-High	4,413	6,529	8,041	484	19,467
		3-Very	474	939	12,479	62	13,954
		(blank)	388	250	111	284	1,033
	Inside WUI Total		6,333	10,648	20,989	927	38,897
	Outside WUI	1-Moderate	9,388	11,651	190	558	21,787
		2-High	6,748	14,157	6,543	247	27,696
		3-Very	1,305	1,678	9,252	44	12,279
		(blank)	11,023	1,809	161	3,543	16,536
	Outside WUI Total		28,464	29,294	16,146	4,394	78,298
LTBMU Total			**34,797**	**39,942**	**37,135**	**5,320**	**117,195**
Modoc	Inside WUI	1-Moderate	1,480	18,076	6,650	15	26,220
		2-High	6,348	29,163	77,127	509	113,147
		3-Very	314	1,757	26,344	89	28,504
		(blank)	205	44	284	531	1,065
	Inside WUI Total		8,347	49,041	110,404	1,144	168,936
	Outside WUI	1-Moderate	39,579	128,361	56,095	1,438	225,474
		2-High	44,751	343,049	663,204	9,617	1,060,621
		3-Very	4,445	20,616	140,250	726	166,038
		(blank)	5,085	2,718	4,001	43,592	55,396
	Outside WUI Total		93,861	494,745	863,549	55,374	1,507,528
Modoc Total			**102,208**	**543,785**	**973,954**	**56,518**	**1,676,464**
Plumas	Inside WUI	1-Moderate	4,838	13,354	7,598	442	26,233
		2-High	18,832	35,820	111,192	1,268	167,112
		3-Very	4,606	6,726	80,470	993	92,795
		(blank)	9,894	3,094	2,839	3,867	19,694
	Inside WUI Total		38,170	58,994	202,100	6,571	305,835
	Outside WUI	1-Moderate	20,932	74,534	36,799	1,152	133,417
		2-High	51,190	86,171	253,893	3,267	394,521

National Forest		Hazard Risk	Condition Class 1	2	3	Urban, Agri, misc	Total
		3-Very	19,536	30,137	267,793	2,160	319,626
		(blank)	21,100	8,567	6,608	12,867	49,142
	Outside WUI Total		112,759	199,409	565,093	19,445	896,706
Plumas Total			**150,930**	**258,403**	**767,193**	**26,015**	**1,202,541**
Sequoia	Inside WUI	1-Moderate	9,064	35,736	5,397	467	50,664
		2-High	41,533	72,170	33,448	546	147,697
		3-Very	31,461	33,453	108,356	509	173,779
		(blank)	1,665	2,081	190	3,677	7,613
	Inside WUI Total		83,724	143,440	147,391	5,199	379,754
	Outside WUI	1-Moderate	36,102	67,887	5,696	1,814	111,499
		2-High	88,194	129,859	72,469	3,267	293,789
		3-Very	30,505	72,681	172,840	1,591	277,618
		(blank)	3,899	3,936	672	40,177	48,685
	Outside WUI Total		158,701	274,364	251,677	46,849	731,590
Sequoia Total			**242,425**	**417,803**	**399,068**	**52,048**	**1,111,344**
Sierra	Inside WUI	1-Moderate	12,924	25,494	3,697	682	42,796
		2-High	26,712	94,508	52,821	1,483	175,524
		3-Very	5,053	21,617	64,907	479	92,057
		(blank)	2,034	7,050	798	4,319	14,201
	Inside WUI Total		46,723	148,668	122,223	6,963	324,578
	Outside WUI	1-Moderate	205,735	102,013	8,802	11,592	328,141
		2-High	63,491	139,395	94,587	7,265	304,738
		3-Very	13,984	36,653	92,158	1,443	144,238
		(blank)	38,499	18,943	1,707	159,086	218,236
	Outside WUI Total		321,709	297,003	197,254	179,386	995,353
Sierra Total			**368,432**	**445,672**	**319,478**	**186,350**	**1,319,931**
Stanislaus	Inside WUI	1-Moderate	5,866	39,707	8,070	415	54,059
		2-High	30,797	14,265	22,590	304	67,956
		3-Very	18,412	7,337	45,524	331	71,604
		(blank)	363	166	109	731	1,369
	Inside WUI Total		55,438	61,475	76,294	1,782	194,988
	Outside WUI	1-Moderate	62,364	227,713	15,755	17,527	323,360
		2-High	60,422	26,979	40,634	5,197	133,232
		3-Very	26,492	12,237	85,570	1,011	125,310
		(blank)	13,828	9,640	593	96,423	120,484
	Outside WUI Total		163,107	276,568	142,553	120,157	702,385
Stanislaus Total			**218,545**	**338,043**	**218,846**	**121,939**	**897,373**
Tahoe	Inside WUI	1-Moderate	21,879	82,753	18,039	3,025	125,695
		2-High	9,079	9,845	30,725	1,426	51,074
		3-Very	8,414	10,171	101,239	1,297	121,121
		(blank)	4,337	1,964	1,006	3,482	10,789
	Inside WUI Total		43,708	104,733	151,009	9,229	308,679

National Forest		Hazard Risk	Condition Class 1	2	3	Urban, Agri, misc	Total
	Outside WUI	1-Moderate	79,113	182,381	35,470	9,840	306,804
		2-High	14,626	12,706	28,565	1,927	57,825
		3-Very	9,353	12,728	87,399	1,646	111,126
		(blank)	12,439	5,594	1,908	20,705	40,646
	Outside WUI Total		115,532	213,410	153,341	34,118	516,401
Tahoe Total			**159,240**	**318,143**	**304,350**	**43,347**	**825,080**
Toiyabe	Inside WUI	1-Moderate	6,108	21,113	19,398	7,233	53,852
		2-High	6,689	3,566	12,363	2,436	25,054
		3-Very	2,103	778	5,508	1,905	10,294
		(blank)	348	74	42	830	1,295
	Inside WUI Total		15,249	25,531	37,310	12,405	90,495
	Outside WUI	1-Moderate	25,136	76,464	54,235	30,342	186,177
		2-High	44,981	61,425	96,907	46,728	250,041
		3-Very	12,533	9,694	29,742	23,275	75,244
		(blank)	12,709	1,480	914	22,625	37,728
	Outside WUI Total		95,358	149,064	181,798	122,970	549,189
Toiyabe Total			**110,607**	**174,595**	**219,108**	**135,374**	**639,684**

Fire Intensity

Fire intensity effects in forested vegetation are described in three categories: lethal, mixed-lethal, and non-lethal. In non-lethal fires, only the youngest and smallest trees that are least fire-tolerant are killed. As fires burn with increasing intensity, different burn patterns emerge on the landscape, leading to a mosaic of different mortality levels (mixed-lethal fires). Where tree species are fire-adapted or are larger and more resilient to fire, less mortality occurs; other areas may experience higher levels of tree mortality. Lethal fires are those that are stand replacing events, where most or all of the vegetation is killed.

Wildland fire intensity varies, influenced by fuels, fuel moisture, winds, topography, time of day, and the direction of fire spread. Fires burning through the night may back down a long slope and then run up the opposing slope the following day. These conditions lead to the mosaic patterns of mortality often found on wildfires in the Sierra Nevada. The seasonality of the fire also influences mortality: fires that burn during the growing period can adverse effects to new growth, late season fires, when live fuel moistures are lowest and even large dead fuels contribute to spread, lethal mortality tends to be more extensive. Late season fires usually occur between September and November and vary from year to year.

Table 3.1.2c. Fire intensity by Lethal, Mixed-Lethal, and Non-Lethal by percentages for selected vegetation types found in the Sierra Nevada. Based on burned acres per decade between the years 1974 and 1998, derived from the Large Fire Analysis (Hermit 1996, Stephens 1999).

	Ponderosa Pine	Eastside Pine	Mixed Conifer	White Fir	Pinion Juniper	Black Oak	Live Oak	Blue Oak	Chaparral Shrub
Lethal	38%	42%	45%	49%	8%	5%	10%	1%	95%
Mix-Lethal	31%	37%	21%	18%	83%	85%	60%	4%	4%
Non-lethal	30%	26%	34%	33%	9%	10%	40%	95%	1%

3.2. Species of the Sierra Nevada

3.2.1. Endangered, Threatened, and Proposed Species

3.2.1.1. California Red-Legged Frog (*Rana aurora*)

The information below was extracted and summarized from the following reference: USDI Fish and Wildlife Service. 2002. Recovery Plan for the California Red-Legged Frog (*Rana aurora draytonii*). U.S. Fish and Wildlife Service, Portland, OR. 173 pages. Detailed references can be found in that document. This section updates and supplements the information found in FEIS Volume 3, Chapter 4, Part 4.3, pp. 27-28.

Habitat Requirements: Adult California red-legged Frogs require dense, shrubby, or emergent riparian vegetation close to deep (greater than 2.3 feet), still or slow-moving waters. Cool water temperatures are also required. Historically, these frogs were found in the Central Valley of California where intermittent streams that included some area with water at least 2.3 feet deep, had largely intact emergent or shoreline vegetation, lacked introduced bullfrogs, and tended to have native rather than introduced fish. Dense vegetation close to the water and shading of moderately deep water appeared to be the most important habitat characteristics

During dry periods, the California red-legged frog rarely is encountered far from water. During periods of wet weather, starting with the first rains of fall, some individuals may make overland excursions through upland habitats. Most of these overland movements occur at night. Evidence from marked and radio-tagged frogs on the San Luis Obispo County coast suggest that frog movement, via upland habitats, of about 1.6 kilometers (1 mile) are possible over the course of a wet season. Frogs have been observed to make long-distance movements that are straight-line, point to point migrations rather than using corridors for moving in between habitats. The manner in which California red-legged use upland habitats is not well understood; the amount of time California red-legged frogs spend in upland habitats, patterns of use, and whether there is differential use of uplands by juveniles, subadults, and adults is being studied.

Current Range and Distribution

Presently, this species is known to occur in about 238 streams or drainages in 23 counties of central and southern California. In the Sierra Nevada, it is thought to occur from Shasta to Mariposa counties at elevations from sea level to 5,000 feet elevation. Recent surveys indicate that the California red-legged frog is extremely rare or virtually extirpated in the Sierra Nevada foothills.

Based on limited survey data, national forests within this species' range have estimated the current population to be between 50-200 individuals. Population trend information for the past ten year period is virtually unknown due to the lack of detections and species specific surveys.

The California red-legged frog potentially occurs on the following national forests within the planning area: Lassen, Plumas, Eldorado, and Tahoe. Staff on all of these national forests have been surveying for California red-legged frog with only the Plumas National Forest, Feather River District having positive identifications totalling two new populations. Other national forests within the Sierra Nevada surveying for this species include the Sequoia and Sierra National Forests.

Status

The California red-legged frog was proposed for listing as endangered on February 2, 1994, with no critical habitat proposed. The final listing of the species as threatened was on May 23, 1996. It has been extirpated from 75 percent of its former range. A revised Draft Recovery Plan for the California red-legged frog is presently in review stage. Central Valley populations of the red-legged frog are currently extinct, and only 3 areas in the remainder of the State currently support over 350 adults. Critical habitat was proposed on September 11, 2000 (65 **FR** 54892) with the Final Rule made on March 13, 2001(66 FR 14625-14674). The Homeowners Association of Northern California and Others file suit in the 9th Court regarding the Final Rule. A settlement agreement was reached and modification in the designated critical habitat was made.

3.2.1.2. Least Bell's Vireo (*Vireo bellii pusillus*)

The information below was extracted and summarized from the following reference: USDI Fish and Wildlife Service. 1986. Draft Recovery Plan for the Least Bell's Vireo (*Vireo bellii pusillus*). U.S. Fish and Wildlife Service, Portland, OR. Detailed references can be found in that document. This section supplements the information found in FEIS Volume 3, Chapter 4, Part 4.3. This species was not documented in the FEIS. However, in early surveys for the 2003 breeding season, responses from singing males have been detected on a number of occasions within the planning area, along the South Fork Kern River (T. Benson, pers. comm.)

Life History

Breeding Biology: Least Bell's vireos arrive on the southern California breeding grounds in mid-March to early April, with males arriving in advance of females by several days. Observations of banded birds suggest that returning adult breeders may arrive earlier than first-year birds by a few weeks. Least Bell's vireo are generally present on the breeding grounds until late September, although they may begin departing by late July. Stragglers have been noted in October and November, and occasionally individuals overwinter in California.

Predation is a major cause of nest failure in areas where brown-headed cowbird nest parasitism is infrequent or has been reduced by cowbird trapping programs. Most predation occurs during the egg stage. Predators likely include western scrub-jays (*Aphelocoma californica*), Cooper's hawks (*Accipter cooperii*), gopher snakes (*Pituophis melanoleucus*) and other snake species, raccoons (*Procyon lotor*), opossums (*Didelphis virginiana*), coyotes (*Canis latrans*), long-tailed weasels, dusky-footed woodrat (*Neotoma fuscipes*), deer mice (*Peromyscus maniculatus*), rats (*Rattus* spp.), and domestic cats (*Felis domesticus*) (Franzreb 1989). Other sources of nest failure are human disturbance (trampling of nest or nest site; clearing of vegetation), ant infestations, rainstorms, and unknown factors.

Least Bell's vireo pairs may attempt as many as five nests in a breeding season, although most fledge young from only one or two nests. The likelihood of renesting depends on the time of season, the pair's previous reproductive effort, the success of previous efforts, and other factors. Few nests are initiated after mid-July.

Productivity is a measure of reproductive performance that represents the total production of offspring over all nesting attempts within a season, and is expressed on a per pair basis. The annual average number of fledglings produced per pair has ranged from 0.9 to 4.5, with long-term averages ranging between 1.8 to 3.2.

An even more encompassing measure of productivity is the number of fledglings produced per egg laid. This measure combines the effort of egg production with the probability of hatching and fledging young from those eggs and hence incorporates the number of nesting attempts made by pairs. Annual averages have ranged from 0.31 to 0.85 fledglings per egg at the various sites with long-term averages of 0.37 to 0.75 fledgling per egg, reflecting the differential intensity of pressures such as egg predation, nestling predation, cowbird parasitism, and other sources of nest failure at those sites.

Life History, Demographics, and Dispersal: The least Bell's vireo is a subtropical migrant, traveling some two thousand miles annually between breeding and wintering grounds. Preliminary results of studies of color-banded birds indicate that least Bell's vireo have a life span ranging to 7 years. A large proportion of the population dies before reaching the age of 1 year, as is typical of small migratory passerines.

The earliest studies of color-banded least Bell's vireos suggested that they were strongly site tenacious; once birds selected a breeding site, they returned to it year after year. Not only do least Bell's vireo return to the same drainage, they return to the same territory and even the same nest tree or shrub, a remarkable feat considering the terrain covered during the course of migration. More recent data obtained at several additional breeding sights suggest that site tenacity in least Bell's vireo may not be as strong as previously believed. Many banded birds are seen for the first time as 2-year olds and sometimes older, indicating that they have changed breeding locations during their first few years. The factors promoting a switch in breeding location are not known at this time. Habitat loss, lack of success in obtaining a mate, or even failure to return to the breeding grounds may be possible causes.

Habitat Relationships

Least Bell's vireos are obligate riparian breeders, typically inhabiting structurally diverse woodlands along watercourses. They occur in a number of riparian habitat types, including cottonwood-willow woodlands/forests, oak woodlands, and mule fat scrub. Several investigators have attempted to identify the habitat requirements of the least Bell's vireo by comparing characteristics of occupied and unoccupied sites and have converged on two features that appear to be essential: (1) the presence of dense cover within 1-2 meters (3-6 feet) of the ground, where nests are typically placed and (2) a dense, stratified canopy for foraging. Although least Bell's vireos typically nest in willow-dominated areas, plant species composition does not appear to be as important a determinant of nesting site selection as habitat structure.

Although least Bell's vireos are tied to riparian habitat for nesting, they have been observed extending their activities into adjacent upland habitats. Least Bell's vireos along the edges of riparian corridors maintain territories that incorporate both habitat types. One study found that least Bell's vireos along the Sweetwater River in San Diego County traveled 3-61 meters (9-183 feet) from the riparian edge to reach upland areas. Upland habitat was used primarily by foraging adults and adults foraging with fledglings; however, 35 percent of the pairs whose territories included nonriparian habitat placed at least one nest there. Researchers speculated that upland vegetation, in particular laurel sumac (*Malosma laurina*) and elderberry may have provided important supplemental food resources for birds in marginal habitat. Use of upland vegetation has also been observed early in the spring when floodwaters inundates adjacent riparian habitat. Under such conditions, least Bell's vireos may nest exclusively in the nonriparian habitat.

Little is known about the least Bell's vireo's wintering habitat requirements. It is known that least Bell's vireos are not exclusively dependent on riparian habitat on the winter grounds.

Historical and Current Distribution

Historically, the least Bell's vireo was widespread and abundant, ranging form interior northern California near Red Bluff (Tehama County), south through the Sacramento-San Joaquin Valleys and Sierra Nevada foothills, in the Coast Ranges from Santa Clara County south to approximately San Fernando, Baja California, Mexico. Populations also were found in the Owens Valley, Death Valley, and at scattered oases and canyons throughout the Mojave Desert.

In the decades following 1940, extensive habitat loss coupled with brood parasitism by the brown-headed cowbird decimated least Bell's vireo populations rangewide, and the decline has been well documented. By the early 1980's, the least Bell's vireo had been extirpated from the Sacramento and San Joaquin Valleys, once the center of its breeding range. Breeding populations in northern Baja California apparently underwent similar declines during the same period. By the time the least Bell's vireo was federally listed in 1984, the statewide population was estimated at 300 pairs, with the majority concentrated in San Diego County.

Since the least Bell's vireo was federally listed in 1986 and intensive cowbird removal programs initiated, the species has undergone an increase almost as dramatic as its decline. While a few populations surviving the decline have generally stabilized is size (e.g. Sweetwater, San Diego and Santa Ynez River populations), most have undergone tremendous growth. For example, available census data indicate that the least Bell's vireo population in southern California increased from an estimated 300 pairs in 1986 to an estimated 1346 in 1996.

In addition to population size increases, observations also indicate that least Bell's vireos are also expanding their range and recolonizing site unoccupied for years or decades. Expansion is occurring both eastward in San Diego County as birds become reestablished is the more inland reaches of the coastal valleys and northward as birds disperse into Riverside and Ventura Counties. As populations continue to grow and least Bell's vireos disperse northward, it is anticipated they could reestablish in the central and northern portions of their historical breeding range.

Risk Factors

There are two main risk factors influencing least Bell's vireo populations. Grinnell and Miller (1944) considered the least Bell's vireo still "common, even locally abundant under favorable conditions of habitat." However, they noted that in the "last fifteen years a noticeable decline has occurred in parts of southern California and in the Sacramento-San Joaquin Valley." That decline has been reported to have continued for four more decades, the combined result of habitat loss and degradation and nest parasitism by the brown-headed cowbird.

3.2.2. Forest Service Sensitive Species

3.2.2.1. Fisher (*Martes pennanti*)

This section updates and supplements the information found in the FEIS in Volume 3, Chapter 4, Part 4.3, pp. 2-6.

Scientific literature pertinent to management of Pacific fisher was reviewed to ensure that the best available information was used in determining effects of the proposed revisions in standards and guidelines for the Sierra Forest Plan Amendment (SNFPA).

The SNFPA described the Desired Future Condition for the Southern Sierra Fisher Conservation area (SSFCA) (ROD pg 8) as …"Within each watershed, a minimum of 50% of the mature forested area is at least foraging quality fisher habitat [presumed to be 40% canopy closure or better] and at least an additional 20% is resting or denning quality habitat [presumed to be 60% canopy closure]." Forest Carnivore Den sites (ROD pg 10) desired condition included …at least two large (>40"dbh) conifers/ac. and one or more oaks (> 20" dbh). Canopy closure exceeds 80%." The guidelines for the Southern Sierra Fisher Conservation Area (ROD, Appendix A, A-45) direct the Forests to retain 60 % of each planning watershed in CWHR size class 4 or greater and canopy cover greater or equal to 60 percent. There was also a discrepancy in the description of the Southern Fisher Conservation Area described as 3,500' (ROD pg 4) and 4,500' (ROD A-45).

Ongoing research by various scientists has either clarified a number of lingering questions regarding the uncertainty of fisher habitat characteristics or brought forth new information on the biology of the species.

Zielinski et. al, (in prep), found fisher home ranges selected for higher canopy closure than the surrounding area and averaged 66% in canopy closure greater than 60% (range 53% - 84 total, 40-71% for males and 61-81% for females) but percent of the landscape in 60% canopy closure at the watershed scale was less. Analysis for the Giant Sequoia National Monument indicate only one watershed out of 46 meets the 60% canopy closure guideline despite a relatively high density of fisher in areas surveyed. This is also true of the Kern Plateau, which is considerably drier and more open. Mazzoni *et. al* (2002) as cited in the forest carnivore working group notes noted fisher home ranges in the Kings River Demonstration Project averaged 43% of the area with 60% canopy cover and 47% of the area when hardwoods were added to the calculation of cover class. Self & Kerns (2002) indicated that fisher in NW California selected areas with canopy closure greater than 60% for rest sites over 60% of the time but that the study area had only 50% of the area in canopy closure greater than 40%. Self and Kerns (2002) noted that rest sites were selected for high canopy closure (generally > 60%) but they were often .1-2 acre clumps within a stand classified as P (25-40% canopy closure).

Truex (presentation to TWS) noted that models based on canopy closure, large trees and other habitat elements accurately described use of habitat by the Tule River subpopulation. Habitat use by fisher on the Sierra National Forest was significantly below predicted levels based on habitat modeling. Since initial survey efforts in the early 1990's met with little success while more current survey efforts have shown greater success, there is some speculation that the Sequoia population is dispersing northward. This is somewhat supported by lower success or detection rates despite suitable habitat along a northward gradient through the sierra National Forest. Habitat modeling on the Kern Plateau underestimated population density in an area with drier, more open habitat. Self and Kerns also showed greater habitat use that would be predicted in open habitats where legacy elements and patches of dense habitat provided suitable rest sites.

There is a fair range in percentage of the landscape in dense canopy closure where occupancy by fisher is still supported. The southern Sierra site appears to have the highest density/ smallest female home range. This may be an indicator of higher quality habitat and as such present conditions reflecting a better long term objective or goal but as acknowledged in Zielinski et al (in prep) the majority of the stands were in small to intermediate trees (CWHR size class 4, 11-24" dbh) with a high vulnerability to stand replacing fire. As such, managing for high densities of small to medium trees at mid slope is likely to be a prescription for disaster, both for fisher and surrounding communities, due to high susceptibility to stand replacing wildfire. Both Zielinski et al (in prep) and Self and Kerns (2002) noted a high use of stands in the intermediate size class (CWHR 4), but in each study, the trees actually used were among the largest available. As such, management for stands of larger trees or highly variable stands with clumps of denser vegetation focused around large trees, may provide lower vulnerability to stand replacing fire while meeting fisher habitat needs over the long term.

Zielinski et al (in prep) noted fisher in the Tule River Study site at 3,200' and Mazzoni (2002) noted fisher in the Kings River Demo Project down to 3,600' but habitat at that elevation varies considerably north to south, by aspect and landform. For the most part the woodland and forest communities frequented by fisher on the Sequoia begin at an elevation of approximately 4,000-5,000 feet, rising north to south. Fisher have been documented in chaparral but at a very low rate compared to woodland and forest. They also have been documented in red fir above 8,000 feet.

3.2.2.2. Marten (*Martes Americana*)

The marten was addressed in the SNFPA FEIS in Chapter 3, Part 4, pp 19-35. A literature survey was conducted to determine whether new information regarding the species, either directly or indirectly, has evolved since the FEIS was completed. Several articles have been published and are described below. This new information deals with recreational activities, fuels reduction, and prey items.

Recreational activities. Recreational effects on marten were addressed in the SNFPA FEIS Chapter 3, Part 4, page 26. Although specific effects of recreational activities on marten have not been conducted, it could be inferred that similar responses could be elicited under similar conditions regardless of species being considered. Over the past decade, methods for non-evasive measurement of glucocorticoid (GC) stress levels in urine and feces have been widely developed to investigate stress physiology in the wild

(Wasser et al. 1988, 1997; Creel et al. 1991, 1996; Monfort et al. 1997; Palme et al. 1998). There is a large body of research on captive mammals that shows large prolonged GC elevations typically reduce survival and reproduction (Munck et al. 1984; Sapolsky 1992). Creel et al. (2001) tested for associations between snowmobile activities and fecal GC levels in f populations of elk and wolves in a variety of National Park locations. It was found that for wolves, comparisons among populations and years showed that fecal GC levels were higher in areas and times of heavy snowmobile use. For elk, day-to-day variation in fecal GC level paralleled variation in the number of snowmobiles. There was no evidence that the current level of snowmobile use was affecting the population dynamics of either species in the test locations. Continuous and/or fluctuating levels of GC could be recognized for martens in area of high recreational use, especially during the breeding season.

Fuels reduction. Habitat risk factors are discussed in the SNFPA FEIS in Chapter 3, Part 4, page 23. The FEIS addresses the significance of both down woody material and crown closure as habitat components for marten. Both of these components also play a significant role in providing habitat for marten prey. Both the reduction in down woody material and crown can have an influence on the distribution and abundance of prey items. Bull and Blumton (1999) tested the effects of three different fuels reduction treatments on small mammals populations in lodgepole pine (*Pinus contorta*) and mixed-conifer stands in northeastern Oregon. A variety of treatments were tested. The harvest activities in lodgepole pine and mixed-conifer stands resulted in fewer post-harvest numbers of red-backed voles and snowshoe hares and an increased number of chipmunks. They found less of a decline in the number of snowshoe hares, no decline in squirrels, and an increase in red-backed voles in the island treatment compared to scattered treatments.

The lack of decline in squirrel detections in the island treatment and in the mixed conifer harvest suggested that those treatments continued to provide suitable habitat for this species. The island treatments retained inlands of logs that provided subnivean structures essential for squirrel survival in winter. The mixed-conifer treatment retained large diameter trees, which could continue to provide a food source for squirrel.

It appeared that the mixed-conifer stands were no longer suitable for snowshoe hares after harvesting. The island treatment that resulted in less of a decline in hares probably provided better habitat than the scattered treatment because the islands contained undisturbed pockets of regeneration as well as logs. In addition, it would be unlikely that marten would venture into the mixed-conifer stands because of reduced canopy closure and stem density. Radio collared martens in the area avoided all harvested stands and stands with less than 50 percent canopy closure.

The declines in red-backed voles, red squirrels, and snowshoe hares in the harvest stands would be detrimental to marten because these species are primary prey items for martens in the Sierra Nevada.

3.2.2.3. California Spotted Owl

New information has evolved since the writing of the SNFPA FEIS affected environment for this species (Volume 3, Chapter 3.4, pp 69 – 112). This information includes Franklin et al. 2003 (*Population Dynamics of the California Spotted Owl: A Meta-Analysis*), baseline GIS overview of number of PACs burned and amount of PAC acres burned, an assessment of fire effects on PACs since 1993, the southern California drought related mortality, corrections for PAC numbers, and the FWS 12 Month Findings for a Petition to List the California Spotted Owl (*Strix occidentalis occidentalis*) (FR Volume 68, No. 31, 7589-7608), and contribution of private timberland to owl habitat.

Population Trends: Demographic studies (5) within the range of the California Spotted Owl have been ongoing for a number of years. One of the primary objectives of these studies is to monitor fluctuations or rate of change (lambda) in owl populations. There has been considerable debate over the most appropriate measure of the finite rate of population change in spotted owl populations. Historically, spotted owl researchers have estimated the rate of change using a Leslie Projection Matrix that is based on estimates of age- or stage-specific survival and fecundity (Caswell 1989, Franklin et al. 1996a). This method was the best available at the time for estimating rates of population change. Nevertheless, a debate on rates of population change using lambda has centered on 2 issues; unknown rates of juvenile emigration from the study areas and potential bias in estimates of juvenile survival (Stein pers. comm. 2002).

In 2001 PSW brought together a cross-section of 16 scientists to develop and present results of a meta-analysis using data gathered from 5 California Spotted Owl population studies in an effort to assess status and trends of California Spotted Owl populations. This group decided to use a different approach to estimate changes in owl numbers within the study areas, a recently developed analytical technique to estimate lambda directly from the capture-recapture data (Pradel 1996, Nichols and Hines 2002). Table 3.2.2.3a compares the results of lambda utilizing the original Projection Matrix and the more recent capture-recapture method.

Table 3.2.2.3a. Comparison of Lambda (λ) Utilizing two methods, Projections Matrix and Capture-Recapture

Study Area	Years	Projection Matrix			Capture-Recapture		
		λ	SE	95% CI	λ	SE	95% CI
Eldorado	1986-1998	0.930	~	~	1.042	0.047	0.950-1.133
Lassen	1990-1998	0.923	~	0.888-0.958	0.985	0.026	0.934-1.036
San Bernadino	1986-1998		~	~	0.978	0.025	0.929-1.026
Sierra	1987-1998	0.898	~	~	0.961	0.024	0.915-1.008
Sequoia/Kings	1988-1998	0.940	~	~	0.984	0.047	0.892-1.076

As displayed in the table above, there are varying differences in Lambda between study areas and between analysis methods. It must be noted that in general both methods show a declining trend in populations. The capture-recapture method indicates that the rate of decline may not be as great as originally predicted using the projection matrix method. However, the capture-recapture methodology is not statistically different than $\lambda = 1$.

A great deal of uncertainty regarding range wide population trends still resides in the meta-analysis. The group did not know if the results of the meta-analysis were representative of owl demographics trends throughout the Sierra Nevada. If at the inception of these studies, habitat management on the study areas was different than the surrounding areas or changed as a result of the study location (i.e. study areas were preferentially protected from management activities) than general inference beyond the study areas cannot be made (Franklin et al. 2003).

Fire Effects on PACs: Concerns continues to arise regarding the actually urgency (Volume 2, Chapter 3.5, pp. 238 – 260) or necessity of fuels treatment to protect resources including California Spotted Owl habitat. Two GIS exercises were conducted during the review period to determine the number of PAC acres burned from 1970 – 2001 and the number of PACs burned in the same timeframe. Table 3.2.2.3b exhibits the number of PAC acres burned during this same time period. (The actual relationship between fire and PACs is presently being analyzed and will be presented in the FEIS).

Table 3.2.2.3b. PAC Acres Burned.

Total acres burned from 1970 - 2001	**1,588,900 ac**
PAC acres burned 1970 – 1993	82,209 ac
PAC acres burned 1993 – 2001	30,000 ac
Total PAC acres	**601,350 ac**
% PAC acres burned 1970 – 1993	13.7 %
% PAC acres burned 1993 – 2001	5.0 %
% PAC acres burned 1970 – 2001	18.0 %
Total Acres w/in PACs having multiple burns (subset of 30,000 ac and 82,209 ac.)	**3,825 ac**

Since 1970, approximately 112,209 acres have burned within PACs randomly across the Sierra Nevada bioregion. Of those acres, 3,825 have experienced two burns. The resulting change in vegetation composition and structure is unknown. The effects from fire within PACs since 1993 is presently under investigation and will be presented in the Final SEIS.

Table 3.2.2.3c illustrates the number PACs influenced by fire since 1970. It is assumed that each of these PACs experience some change in vegetation composition and/or structure.

Table 3.2.2.3c. PAC influenced by fire.

Total number of PACs	1,350
PACs influence by fire 1970 – 1993	501
PACs influence by fire 1993 – 2001	103
PACs influenced by fire 1970 – 2001	573
PACs not influenced by fire 1970 - 2001	733
% of PACs influenced by fire 1970 - 2001	42.5%
PAC experiencing multiple burned	28

As illustrated above, 573 (42.5%) of the PACs within the Sierra Nevada bioregion have experienced some level of fire since 1970. Twenty-eight of those have experienced fire at least twice.

A number of conflagrations have occurred over the past 3 or 4 years to include the Buck Incident (1999) Plumas National Forest, Storrie Incident (2000) on the Lassen and Plumas National Forests, the Manter Incident (2001) and McNally Incident (2002) on the Sequoia National Forest, the Star Incident (2001) on the Eldorado and Tahoe National Forests, and the Gap Incident (2001) on the Tahoe National Forest. Each of these fires influenced one or more PACs, the magnitude of which will not be fully understood for many years. However, most of these fires did lead to total or partial lose of PACs. Over this period of time 47 PACs have experienced fire. This would suggest that the rate of PACs being effected in on the rise. Of the total PACs effects, it appears that 18 could be considered lost. Table 3.2.2.3d identifies those PAC having significant acres burned to be considered lost.

Table 3.2.2.3d. PACs experiencing significant acreage loss.

Forest Name	Incident Name	PAC id	Total PAC acres	Acres changed to non-NRF	PAC Status
Plumas	Bucks	PL264	284	284	Unknown
	Bucks	PL188	323	200	Pair in 02
	Storrie	N1	344	264	Unknown
	Storrie	PL098	302	280	Unknown
	Pendola	YU016	358	30	Pair (89-90), Singles (99)
	Stream	PL073	414	352	Pair (95), Singles (02)
	Stream	PL106	404	391	Singles
	Stream	PL126	520	456	Young (92) Singles (02)
Tahoe	Pandola	YU001	303	200	0
	Star	PC026	318	266	Pair
	Star	PC027	322	98	Pair
	Star	PC028	342	108	Adult male
	Star	PC034	307	128	Pair
	Star	PC072	362	1	Pair,2yng
	Star	PCO78	308	54	0
Eldorado	Star	PC055	300	289	Unknown
	Star	PC075	300	272	Pair, 2yng (97)
Sequoia	Manter	TU060	277	235	Unknown
	McNally	TU112	364	352	Unknown
	McNally	TU053	325	290	Unknown
	McNally	TU054	300	238	Unknown
	McNally	TU176	354	354	Unknown
	McNally	TU178	368	323	Unknown
	Highway	FR144	301	300	Unknown

Some of the PACs identified above have replacement acres within their surrounding Home Range Core Areas. Others have little to no options for replacement and will be removed from the system. There have been an average of 4.5 PACs lost or severely modify per year since 1998. This equates to an annual loss of approximately 0.34 percent per year.

Fuels Treatments. In 2002, approximately 9,200 acres of mechanical treatments and 7,900 acres of prescribed fire treatments were conducted in the WUI. None of the treated acres were located in PACs. Projections for 2003 indicate that approximately 35,400 acres of mechanical and prescribed fire treatments are planned in WUIs.

Southern California Drought Related Mortality: Southern California forests in the San Bernadino, Riverside, and San Diego counties are experiencing the worst drought in more than 450 years (Loe pers. Comm.). As a result, the spotted owl populations in these areas may be at a significant risk. The big cone Douglas fir and mixed conifer types stress by drought, combined with overstocked conditions, pollution, mistletoe, root disease, and bark beetle infestations are experiencing mortalities of > 40 percent in some areas (Loe pers. comm.). As larger, older trees and the associated canopy layers are lost due to mortality, the effects to spotted owl nesting and prey habitat will likely continue. The San Jacinto Mountains are experiencing especially high mortality. In October of 2002, it was estimated that 66,000 acres across all vegetation typed was affected. The total acreage effect to date is in excess of 354,000 acres. In April 2003 an estimated 175,000 acres of pine and mixed conifer have been affected, much of which is considered as spotted owl habitat. The high level of mortality being experienced in this area lies in what is considered as the "heart" of the spotted owl population in Southern California. The San Bernadino National Forest is attempting to remove the hazardous fuels as rapidly as possible and will continue to do so over an unknown period of time. Seventy known activities centers are presently being monitored to determine the affects of this drought and subsequent fuels treatments (Loe, pers. comm.).

Corrections to PAC numbers: The FEIS considered 1,310 PACs for analysis (FEIS Chapter 3, Part 4.4, page 84). Subsequent to the ROD, the Sierra Nevada national forests have been directed to evaluate spotted owl sighting data and apply the criteria for establishing PACs outlined in the ROD (Appendix A-33). For the Draft SEIS, updated maps for PACs were received from several forests (Lassen, Plumas, Eldorado, Tahoe, and Toiyabe) resulting in 1,321 PACs included in the current analysis.

Also, there is little specific number information on HRCAs in the FEIS. There are 1,320 HRCAs included in this analysis. Describing the average HRCA size is not meaningful because sizes are variable across the bioregion and some are smaller than the required acreage due to land ownership patterns.

FWS 12-Month Findings for a Petition to List the California Spotted Owl (*Strix occidentalis occidentalis*) (FR Volume 68, No. 31, 7589-7608): After the FWS reviewed the best available science and commercial information available, the FWS found that the petitioned action is not warranted. The Finding statement acknowledged the SNFPA ROD and its associated California Spotted Owl strategy as management direction being implemented across the Sierra Nevada's. The Findings did recognize two factors, "The first is a management review of the SNFPA (USFS 2002b) and the second is planning for implementation of an Administrative Study on the Lassen and Plumas National Forest that would evaluate the effects of extensive fuels treatment on the California spotted owl (67 FR 72136)……we will monitor the development of management direction, offer scientific assistance, and review the effects at a later date, if necessary." (FWS 68 FR 7604)

3.2.2.4. Willow Flycatcher (*Extimus trailii adastus* and *brewsterii*)

This section updates and supplements the information found in FEIS, Volume 3, Chapter 3, Part 4.4, pp. 143-161.

Although the willow flycatcher population in the Sierra Nevada is known to have dramatically declined after 1940, the current direction and magnitude of the demographic trend are uncertain (Serena 1982, Stafford and Valentine 1985, Flett and Sanders 1987, Harris et al. 1987, 1988, Valentine et al. 1988, Sanders and Flett 1989, H. Bombay pers. comm.). However, if available and preliminary nesting site re-occupancy data as well as central Sierra Nevada nest success and fecundity rates are used as a metric for population trend, it appears that the willow flycatcher population in the Sierra has continued to seriously decline during the past two decades (Morrison et al. 2000).

Recent Surveys

Although there are many uncertainties regarding willow flycatcher distribution, abundance, and demographic data in the Sierra Nevada bioregion, monitoring of willow flycatcher populations and habitat conditions on National Forests in the planning area has increased significantly since the Sierra Nevada Framework Project ROD was approved in 2001. As a result of the survey requirements directed under the ROD, Forests have worked diligently to complete the necessary surveys. The Forest Service conducted willow flycatcher survey training workshops in 2001 and 2002 for biologists and technicians charged with conducting these surveys. Over 50 employees were trained during these 2 days workshops to conduct willow flycatcher surveys to protocol. The survey workshop will be held annually to train new employees and refresh the skills of previously trained employees conducting the surveys.

Surveys conducted in 2001 and 2002 resulted in all of the 82 (now 81) originally specified known willow flycatcher sites (under the SNFP ROD) being surveyed to protocol. In addition to surveying the 82 known sites, many Forests have completed the surveys for the most of the emphasis habitats as identified by the

ROD. As of January 2003, 5 of the 11 National Forests in the SNFPA planning area reported that all of the willow flycatcher emphasis habitat meadows had been identified and mapped, while the other 5 Forests reported that this process was well under way (Stefani 2003). Surveys to protocol of these areas have been completed for 133 meadows of the 496 potential emphasis habitat meadows identified under the ROD. Results of these surveys have documented 11 new willow flycatcher territories. The remaining areas are currently being evaluated to determine if suitable habitat exists in order to warrant protocol surveys (Stefani 2003).

Recent data available from the demographic and monitoring study in the north central Sierra is not encouraging with regards to willow flycatcher population trends. The total number of territories at 15 monitoring sites in the north central Sierra declined from 62 in 1998 to 45 in 2001. Data from 2002 shows an even more alarming trend with the number of territories documented at these same 15 sites down to 37 territories (Bombay and Morrison 2003). Perrazo Meadows on the Tahoe National Forest has been consistently surveyed since 1997. The number of territories at Perazzo Meadows has declined from a high of 12 in 1997 to a current low of only 2 in 2002 (Bombay and Morrison 2003).

Consistent survey efforts on the Sierra and Stanislaus National Forests in the past several years show a lack of willow flycatcher occurrence at a number of well-documented breeding areas in the central and southern Sierra Nevada. In addition, three years of surveys on the Sequoia National Forest have failed to re-confirm occupancy of willow flycatchers.

Brood parasitism

The impact of brown-headed cowbirds varies within the Sierra Nevada bioregion. Long term research shows that brown-headed cowbirds impact willow flycatcher populations outside the planning area (Sedgwick and Iko 1999, Whitfield 1990, Whitfield and Enos 1996, Whitfield and Sogge 1999). Although brown-headed cowbirds have impacted less than 7 percent of observed willow flycatcher nests in the Sierra Nevada between 1997-2000, their influence could become greater if willow flycatcher populations decrease, brown-headed cowbird populations increase, or both occur (Whitfield and Sogge 1999, Smith 1999, Morrison et al. 2000, H. Bombay pers. comm.). Given that mountain communities are expanding in many areas, and brown-headed cowbirds are highly associated with human disturbance, brown-headed cowbirds are likely to increase in at least some portions of the bioregion (Verner and Ritter 1983).

In the Lake Tahoe Basin in 1998 through 2000, high cowbird abundance translated into 8 of 18 nests (44 percent) being parasitized (Morrison et al. 2000). Smith (1999 in Stefani et al. 2001) in a review of recent cowbird studies suggests that management actions to control cowbirds may not be warranted unless the parasitism rate is at least 60 percent, however he lists criteria that might suggest using a lower rate, including: restricted habitat, isolated population, and population in prolonged decline. This indicates that the few remaining breeding locations within the Tahoe Basin may benefit from cowbird management if the current parasitism rate remains consistent or increases (Whitfield and Sogge 1999, Whitfield et al. 1999). Nonetheless, high brown-headed cowbird density and high private land ownership in the area could make control difficult and limit its effectiveness (Citta and Mills 1999 in Stefani et al. 2001, Hall and Rothstein 1999, Smith 1999, Whitfield and Sogge 1999, H. Bombay pers. comm.). Brown-headed cowbird trapping programs and livestock facilities removal or relocations will need to be evaluated based on risk levels and effectiveness, prior to implementation (Verner and Rothstein 1988, Smith 1999, Whitfield and Sogge 1999, Whitfield et al. 1999).

In 13 documented cases of brown-headed cowbird brood parasitism of willow flycatcher nests for which dates are known in the central Sierra Nevada, parasitism events occurred from approximately June 17 to August 4 (mean = July 4, SD = 12 days) (Sanders and Flett 1989, H. Bombay pers comm.). These parasitism dates correspond to willow flycatcher incubation initiation dates between June 15 and August 1 (Stafford and Valentine 1985, Sanders and Flett 1989, H. Bombay pers comm.). Regional information on cowbird egg laying dates and willow flycatcher incubation initiation dates will need to be compiled as some regions and elevations of the Sierra Nevada may have different dates. In the Dinkey Creek area of

Sierra National Forest, Verner and Ritter (1983) found that cowbirds seldom frequented pack stations prior to the arrival of pack animals. Thus, delaying access to livestock and pack stock facilities in relation to estimated dates of brood parasitism might eliminate or alleviate this threat in some areas of the Sierra Nevada.

Bombay and Morrison (2003) reported an increase in cowbird parasitism in 2000 (6 events) and 2001 (5 events). The reason for this increase is not completely known, however, it is suspected that it could be partially due to the slightly earlier nesting onset for willow flycatchers documented during those two years. This would have resulted in a greater overlap in timing of breeding with brown-headed cowbirds (Verner and Rothstein, 1988.)

3.2.2.5. Great Gray Owl (*Strix nebulosa*)

In the SNFPA FEIS, the great gray owl was grouped with eight other diurnal and nocturnal raptors for the affected environment and effects analysis. More specific information for this species is included to supplement the information found in FEIS Volume 3, Chapter 3, part 4.2, pp. 40-42.

Life history

Note: General biological information specific to the great gray owl in the Sierra Nevada can be found in *Survey protocol for the great gray owl in the Sierra Nevada of California* (Beck and Winter 2000). Key information from that document is summarized in the following sections.

Breeding: The breeding density of this bird seems limited by both prey and nest site availability. In general, it favors the abandoned nest of other birds of prey, but in California, it prefers the tops of broken trees or nest cavities in trees in close proximity to montane meadows. In other parts of it's range, it has nested on artificial platforms. Although well studied in Scandinavia, less is known about this species in North America, and the limited research specific to the Sierra Nevada is focused on the Yosemite National Park and Stanislaus NF area.

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

The incubation period is about 30 days and a typical clutch is 2-3 eggs, although usually only 1-2 chicks survive (Beck and Winter 2000) the 26-28 days to fledging (Bull and Duncan 1993). After leaving the nest, young owls readily climb leaning trees and roost off the ground. They are capable of flight 7-14 days after leaving the nest (Franklin 1988). Females stay near the fledged young to protect them and the male continues to bring prey. In Oregon, after 2-6 weeks, females abandon the young, however, males provide care by continuing to feed the young for up to 3 months (Bull and Henjum 1990). Juveniles start hunting on their own at about 3 months. The young are independent by late summer and disperse in fall and winter. Maximum distance radio-tagged juveniles disperse from the natal site in their first year ranged from 7.5 to 32 km in Oregon (Bull et al. 1988) and up to 753 km in Canada (Duncan 1992). Most remain near the natal sites. It is unknown if these juvenile dispersal behaviors are representative of Sierra Nevada populations.

Individuals can be long lived. In Oregon, the probability of a juvenile surviving its first year is 0.53, its first two years 0.31 (Bull et al. 1989). Oeming (1964) reports a 9 year old bird in the wild. A female banded as an adult was recaptured 13 years later.

In general, great gray owls tend to be monogamous. In boreal forest regions, the pair bond is not maintained over the winter. However, individuals may nest with the same mate in subsequent years if prey populations remain high (Duncan 1992). In Oregon, Idaho, and California, pairs probably remain together as along as both live, but either sex will re-mate if its mate disappears.

Diet: The diet of the great gray owl may vary locally but consists primarily of small mammals, predominantly rodents. All available literature indicates that great gray owls in the western United States overwhelmingly select only two prey taxa: voles (*Microtus* spp.) and pocket gophers (*Thomomys* spp.). Voles prefer meadows with dense herbaceous vegetative cover (Zeiner et al. 1990). A four-inch stubble height at the end of the growing season provides suitable cover for voles (Beck 1985). Gophers are predominantly subterranean. Great gray owls catch these mammals by breaking through their tunnels. Compaction of meadow soils may reduce the suitability of the area for gophers. During the winter, great gray owls have been observed plunging through the snow to capture prey.

Mortality: Collision with motor vehicles has been identified as being a major mortality factor in some areas. In addition, shooting is still common in many areas (Nero and Copeland 1981) although these have not been identified as significant threats in the Sierra Nevada (Beck and Winter 2000). Predation of eggs and young by other raptor species, especially Great Horned owls, may be common. Impalement on barbed wire and electrocution on transmission line has been reported.

Habitat relationships

Summer: Elevation ranges in California show a north-south gradation with higher elevation ranges in the southern Sierra than in the northern Sierra as shown in Table 3.2.2.5a. (from Beck and Winter 2000).

Table 3.2.2.5a. Great gray owl elevation zones in the Sierra Nevada.

Region	Low Elevation	Middle Elevation	High Elevation
Northern Sierra	2,000 to 3,000 feet	3,000 to 5,000 feet	Above 5,000 feet
Central Sierra	2,500 to 4,000 feet	4,000 to 6,000 feet	Above 6,000 feet
Southern Sierra	3,500 to 5,000 feet	5,000 to 7,000 feet	Above 7,000 feet

These elevation zones approximate the differences in nesting chronology and are used primarily to define survey timing. The Lassen, Plumas and Tahoe NFs are considered the Northern Sierra, the Central Sierra includes the Eldorado and Stanislaus NFs, and the Southern Sierra includes the Sierra and Sequoia NFs. The Modoc, Inyo, Lake Tahoe Basin and Humboldt-Toiyabe NFs, and the east side areas of the Lassen, Plumas and Tahoe NFs.

This species typically forages in meadows and other open early-stage habitats supporting small mammals. It nests and roosts in nearby dense (greater than 40% canopy closure) coniferous forest at elevations between 2,500 and 8,000 feet. Nest sites in Yosemite NP and on the Stanislaus NF were in large trees (greater than 30” dbh) in stands that had canopy cover over 70 percent (Greene 1995). Forest age did not seem to matter, provided suitable nest sites are available. Nest sites have been documented in broken-topped conifer and black oak snags, abandoned hawk nests, and artificial nest structures. In California, nests are generally located within 840 feet of the forest edge, averaging 500 feet (Winter 2000). The CWHR classes which correspond to suitable breeding and roosting habitat are 4M, 4D, 5M, 5D, and 6. Perennial grasses and sedges provide the dominant forage area cover in meadows (Hayward 1994; USDA Forest Service 2001). Nests with persistent occupancy in the Yosemite area were generally associated with meadows greater than 25 acres in size (Winter 1986) but smaller meadows (down to 10 acres) have been known to support infrequent nesting (USDA 2000). Only a portion (13-20%) of great gray owls territories appear to breed in a given year (Winter 1999b). This species shows a high fidelity to nest sites, which are often reused for several years (Bull et al. 1988, Franklin 1988, Duncan 1992).

Foraging habitat in the Sierra Nevada is generally open meadows and grasslands in close association with forests where trees along the edge are used for hunting perches. Burns and other types of openings (including those created by timber harvest) serve as foraging habitat when the openings are in early successional stages (Hayward 1994, Greene 1995). Greene (1995) found that plots located in sites occupied by great gray owls were greater in plant cover, vegetation height, and soil moisture than sites not occupied by owls. Canopy closure was the only variable of three measured (canopy closure, number of snags greater than 60 cm. [24 inches] dbh, and number of snags less than 60 cm. dbh) significantly larger at occupied sites compared to unoccupied sites.

Winter: In some winters, when its prey is scarce, individuals from northern populations wander south to the northern U.S. and southern Canada, often in considerable numbers. These winter migrations are not believed to extend to the Sierra Nevada. In the Sierra Nevada, the winter range is generally the same as the breeding habitat, except individuals are known to move to lower elevations with thinner snow cover in Yosemite National Park (Winter 2000). Habitat conditions are thought to be similar to those used during the summer.

Historical and Current Distribution

The great gray owl is a Holarctic species. It is evenly distributed and variable throughout its range. Godfrey (1986) gives it range as from near tree line in northern Yukon, northwest and central Mackenzie (Lockhart River and Great Slave Lake), north Sasdatchewan, Manitoba, north Ontario south through southern Yukon and interior British Columbia, north and central Alberta, , Manitoba and cental Ontario. In the U.S. its ranges includes Alaska, Washington, northern Idaho, western Montana south through the Cascades and Sierra Nevada ranges to east-central California, west-central Nevada, and northwest Wyoming. The southern populations in the western U.S. are considered relatively stable, breed every year and stay in the same general area throughout the year, although as previously stated, studies in Yosemite NP showed breeding to be somewhat sporadic (Winter 1999b). The northern populations and those at the southern edge of the range in eastern Canada are considered less stable. The Sierra Nevada populations are the most southerly in the world for this species.

There is no data available to distinguish their historical range relative to their current range.

Status

The great gray owl is on the Region 5 Sensitive Species list. It is known or suspected to occur on the Eldorado, Inyo, Lassen, Modoc, Plumas, Sequoia, Sierra, Stanislaus, Tahoe, and Lake Tahoe Basin Management Unit. It was classified as an endangered species by the State of California and was placed on the California Endangered species list in October 1980.

Throughout the species range, density differs greatly from area to area. These differences are probably influenced by food supply and/or nest site availability. The highest nesting density in Oregon was 0.74 pairs/km2 and 1.72 pairs/km2 (Bull and Henjum 1990); 1.88 pairs/km2 in Manitoba and Minnesota (Duncan 1987); 0.66 pairs/km2 in California (Winter 1986).

Risk factors

A number of factors influencing population levels have been identified. Overall, food supply is likely the critical factor regulating numbers especially in scarce-prey years when many individuals may fail to breed.

Factors identified in Beck and Winter (2000) include: (1) an apparent decline in occupied habitat over the last 100 years; (2) the species is dependent on dense forests with large snags and on meadows in medium to high seral condition; (3) these habitats have been reduced in many areas due to forest and range management practices. They indicate that both green tree and salvage harvest activities can eliminate potential nest trees, and grazing practices remove cover necessary for prey species and can also degrade meadow sites, lowering water tables and reducing productivity for grass-forb habitat. In addition, they note that prescribed burning can remove potential nest snags and downed woody material needed for small mammal habitat.

While strychnine poisoning of pocket gophers typically does not occur within meadows, it may reduce a key prey item where it occurs in open canopied areas near meadows with adjacent suitable habitat. There are some additional risks from secondary poisoning, although the risk is likely low.

3.2.2.6. Foothill Yellow-Legged Frog (*Rana boylii*)

The information below was extracted and summarized from the following reference: USDA Forest Service. unpublished. Draft Conservation Assessment for the Foothill Yellow-Legged Frog (*Rana boylii*). USDA Forest Service, Pacific Southwest Region, Vallejo, CA. This section updates and supplements the information found in FEIS Volume 3, Chapter 3, Part 4.4, pp. 207-208. Detailed references can be found in that document.

Habitat Requirements

The foothill yellow-legged frog has been found primarily within shallow channels with riffles that have at least cobble-sized. Streams and rivers with this species include those with both permanent and intermittent flows, low gradient and high gradient greater than 4 percent, alluvial and bedrock channels. The species is also occasionally found in other in riparian habitats including moderately vegetated backwaters, isolated pools and slow moving rivers with mud substrates.

The ability to withstand and recover from disturbance is crucial for any organism living in the highly variable environment of a river. The life history strategy of the Foothill yellow-legged frog has been shaped by the wet winters and dry summers typical of the Mediterranean climate in the Sierra Nevada. To avoid disturbance of its most vulnerable life stages (eggs and larvae) breeding is timed late enough in the spring to avoid extreme discharge fluctuation. However breeding must occur early enough to allow tadpoles sufficient time to metamorphose, and juveniles time to grow, before the onset of the next wet season. Breeding sites are not continuously distributed along the streams and rivers occupied by this species as the frogs select channels with particular morphological traits. Understanding that the frogs are concentrated in both time and space during breeding, is critical to their conservation. The potential loss of adults and recruits due to any number of risk factors (e.g. dam releases, all terrain vehicles, mining, grazing, etc.) during breeding would be much worse than losses caused by the same activities at times of the year when frogs and tadpoles are more widely dispersed.

Previous literature reports breeding to occur from late March through May, with egg deposition for any single population being concentrated to a two-week period. More recent reports indicate that breeding activity can be spread over several weeks in the Coast Range and up to 31 days in the Sierra. Duration of the breeding season appears to be determined by weather. In cold rainy springs the breeding season is longer than in dry warm springs.

Egg masses usually contain about 900 eggs, but the number of eggs can range from 100 to over 1,000 per mass. For survival to hatching, eggs must remain inundated and attached to substrates despite falling and/or rising water levels. In wide shallow channels, stage height and near bank velocities are less sensitive to changes in discharge than in deeper more confined channels. Breeding sites with greater than average success to hatching have significantly greater width:depth ratios than channels where hatching success is low.

In the coast range, adults are frequently seen when congregated at breeding sites in April, May, and June. Later in the summer adults are scarcely observed along the main stems of larger rivers (the Trinity and Eel Rivers). This may indicate movement into the vegetation, movement into tributaries, or reduced diurnal activity.

Status

The Foothill yellow-legged frog is listed as a sensitive species on the Region 5 Regional Forester's Sensitive Species List. In addition, the frog is a California Species of Special Concern. Jennings and Hayes recommend endangered status in southern and central California south of the Salinas River, Monterey County, and threatened status in the "west slope drainages of the Sierra Nevada and southern Cascade Mountains east of the Sacramento-San Joaquin River axis." In the Coast Ranges north of the Salinas River the Foothill yellow-legged frog stills occurs in significant numbers in some coastal drainages but is also at risk due to anthropogenic and environmental threats.

Risk Factors

For a summary of risk factors, reference the SNFPA Chapter 3, Part 4.4, pp. 207-211.

3.2.2.7. Mountain Yellow-Legged Frog (*Rana muscosa*)

The information below was compiled and summarized from the following reference: USDA Forest Service. unpublished. Draft Conservation Assessment and Strategy for the Mountain Yellow-Legged Frog (*Rana muscosa*). USDA Forest Service, Pacific Southwest Region, Vallejo, CA. This section updates and supplements the information found in FEIS Volume 3, Chapter 3, Part 4.4, pp. 213-214. Detailed references can be found in that document.

Biology

In the 12-Month Finding for a Petition to list (USDI FWS 2003) the mountain yellow-legged frog, the U.S. Fish and Wildlife Service concluded that the Sierra Nevada population of the mountain yellow-legged frog is discrete from the southern California population, on the basis of their geographic separation, differences in vocalization, differences between their habitats, and apparent genetic differences. They also concluded that the Sierra Nevada population of the mountain yellow-legged frog is significant because the loss of the species from the Sierra Nevada would result in a significant reduction in the species' range and its population numbers, and would constitute the loss of a genetically discrete population that differs markedly from the southern California population of mountain yellow-legged frogs. The US Fish and Wildlife Service consider the Sierra Nevada mountain yellow-legged frog to be a distinct population segment.

Habitat Requirements

Mountain yellow-legged frogs in the Sierra Nevada live in high mountain lakes, ponds, tarns, and streams - largely in areas that were glaciated as recently as 10,000 years ago. This species is usually associated with montane riparian habitats in lodgepole pine, yellow pine, sugar pine, white fir, whitebark pine, and wet meadow vegetation types.

Alpine lakes used by mountain yellow-legged frogs usually have margins that are grassy or muddy, but they are not limited to this habitat. Mountain yellow-legged frogs extensively utilize deep water ponds (greater than 2.5 meters [greater than 8.2 feet]) that have open shorelines and lack introduced fishes. Adults are typically found sitting on rocks along the shoreline, usually where there is little or no vegetation. Both larvae and adults prefer open shorelines that gently slope up to shallow waters of 5 to 8 centimeters (2 to 3 inches) deep. Shallow water likely provides a refuge from predation if fishes occur in adjacent deeper water. Mountain yellow-legged frogs also use stream habitats, especially in the northern part of their range.

Some of the highest observed densities of frogs have been found both at creek junctions with irregular banks and a variety of water depths, and in open areas on the edges of glaciated lakes. Mountain yellow-legged frog populations seem to be most successful where predatory fishes are absent.

In the Sierra Nevada, adult frogs apparently hibernate during the coldest winter months probably because they can tolerate only limited dehydration. Larvae and adults generally overwinter under ice. Both adults and larvae have been found to overwinter (up to 9 months) in the bottoms of lakes (at least 1.7 meters (5.6 feet) deep, and preferably at least 2.5 meters (8.2 feet) deep), or in rocky streams. In some instances, frogs have been found to overwinter in bedrock crevices which allows them to survive in shallower water bodies that freeze to the bottom in winter. This activity may also be in response to the presence of introduced fishes that cannot survive in ponds that completely freeze.

Mountain yellow-legged frogs emerge from overwintering sites immediately following snowmelt. Adults sometimes travel over snow to reach preferred breeding sites early in the season. Breeding activity begins early in the spring and can range from April at lower elevations to June and July in higher elevations. The timing of the onset of breeding depends on the amount of snowfall and subsequent ice-out dates of ponds, lakes, and streams. In years with particularly cold winters, high elevation frog populations may only be active for approximately 90 days during the warmest part of the summer.

Life history characteristics, such as overwintering under frozen lakes and multi-year larval development, make the mountain yellow-legged frog susceptible to large-scale die-offs. In lakes less than 4 meters (less than 13 feet) deep, overwintering frogs may die apparently due to oxygen depletion, while larvae are able to survive. Conversely, in dry years larvae are lost to desiccation in the late summer or fall.

Because many of the remaining populations of Sierra Nevada mountain yellow-legged frog are small isolated remnants, they are vulnerable to random natural events that could quickly extirpate them. It is widely recognized that, in general, small populations are more vulnerable to extinction than large ones identified four major factors that predispose small populations to extinction: (1) environmental variation and natural catastrophes, such as unusually harsh weather, fires, or other unpredictable environmental phenomena; (2) chance variation in age and sex ratios or other population parameters (demographic stochastisity); (3) genetic deterioration resulting in inbreeding depression and genetic drift (random changes in gene frequencies); and (4) disruption of metapopulation dynamics (the extinction-colonization balance among interconnected populations is disrupted).

Historic and Current Range and Distribution

The mountain yellow-legged frog was once extremely abundant in aquatic ecosystems of the Sierra Nevada. It was distributed nearly continuously in high elevation water bodies in the Sierra Nevada Mountains of California and Nevada, from southern Plumas County to southern Tulare County at elevations mostly above 1,820 meters (6,000 feet). The historic range of the Sierra Nevada mountain yellow-legged frog encompasses 10 National Forests (Lassen, Plumas, Tahoe, Lake Tahoe Basin Management Unit, Eldorado, Stanislaus, Toiyabe, Inyo, Sierra and Sequoia) and 3 National Parks (Yosemite, Sequoia and Kings Canyon).

Since about 1970, mountain yellow-legged frog numbers and populations have undergone a precipitous decline throughout the Sierra Nevada. Further declines continue to be documented. Mountain yellow-legged frogs have disappeared from between 70 and 90 percent of their historic localities. Remaining populations are widely scattered and consist of few breeding adults.

Numerous factors, separately and in combination, have contributed to the species' decline. Introduction of non-native fishes, pesticides, ultraviolet radiation, pathogens, acidification from atmospheric deposition, nitrate deposition, livestock grazing, recreational activities, and drought have all been identified as potential factors impacting this species and its habitat. Because many of the remaining populations of Sierra Nevada mountain yellow-legged frog are small isolated remnants, they are vulnerable to random natural events that could quickly extirpate them. It is widely recognized that, in general, small populations are more vulnerable to extinction than large ones.

The distribution of the Sierra Nevada mountain yellow-legged frog is restricted primarily to publicly managed lands at high elevations, including streams, lakes, ponds, and meadow wetlands located on national forests, including wilderness and non-wilderness on the forests, and national parks. Approximately 210 known mountain yellow-legged frog populations (or populations within metapopulations) exist on the national forests within the Sierra Nevada, though not all of these populations may be reproducing successfully.

Overall, U.S. Fish and Wildlife Service estimates that 22 percent of the remaining mountain yellow-legged frog sites within the Sierra Nevada are found within the national forests (including those with and those without evidence of successful reproduction), while 78 percent are found within the national parks (including those with and those without evidence of successful reproduction). These percentages represent the number of sites within the national forests and the national parks of the Sierra Nevada; they do not represent the number of individuals present at each site. The methods for measuring the numbers of populations and metapopulations in the national forests and the national parks have not been standardized and, therefore caution should be used when comparing national forests numbers to national park numbers.

In 1999, a team of agency managers and researchers agreed that a mountain yellow-legged frog conservation assessment and strategy was needed to provide for the protection and conservation of this species. The Forest Service Pacific Southwest Region Ecosystem Conservation Director and the State Director of the California Department of Fish and Game approved preparation of a mountain yellow-legged frog conservation assessment and strategy. In 2000, a working group of biologists from the Forest Service, National Park Service, USDI Fish and Wildlife Service, and California Department of Fish and Game and research scientists was established to complete this effort.

Status

On February 8, 2000, the Center for Biological Diversity and the Pacific Rivers Council petitioned the Fish and Wildlife Service to list the Sierra Nevada population segment of mountain yellow-legged frog as an endangered species. The Fish and Wildlife Service (FWS) published a 90-Day Finding warranting the listing under the Endangered Species Act, ESA. On October 12, 2000, the FWS announced a 90-day finding on the petition to list the mountain yellow-legged frog as endangered (Federal Register, Vol. 65, No. 198). FWS found that the petition presents substantial information indicating that listing the species may be warranted. The FWS twelve-month petition finding was completed on January 16, 2003, it concluded that the petitioned action is warranted, but precluded by higher priority actions to amend the Lists of Endangered and Threatened Wildlife and Plants. Upon publication of this 12-month petition finding, this species will be added to the FWS candidate species list. A 2081 permit is required to handle or possess the mountain yellow-legged frog at any time.

The mountain yellow-legged frog is listed as Sensitive on the Region Five Regional Forester’s Sensitive Species List (USDA Forest Service 1998). It is a State Species of Special Concern.

Risk Factors

A summary of risk factors can be found in SNFPA Chapter 3, Part 4.4, pp. 213 -215.

3.2.2.8. Yosemite Toad (*Bufo canorus*)

The information below was extracted and summarized from the following reference: USDA Forest Service. unpublished. Draft Conservation Assessment for the Yosemite toad (*Bufo canorous*). USDA Forest Service, Pacific Southwest Region, Vallejo, CA. Detailed references can be found in that document. This section updates and supplements the information found in FEIS Volume 3, Chapter 3, part 4.4, pp. 218-219.

Habitat Requirements

The Yosemite toad has been found in a wide variety of high montane and subalpine lentic habitats including wet meadows, lakes, and small ponds, as well as shallow spring channels, side channels and sloughs. The species is most commonly found in shallow, warm water areas including wet meadows, small permanent and ephemeral ponds, and flooded, shallow, grassy areas and meadows adjacent to lakes. Some evidence indicates that toad populations may have been more abundant in lake environments than they are currently. Meadow habitats are often surrounded by lodge pole (*Pinus contorta*) or whitebark (*P. albicaula*) pines. Toads are more likely to be found in areas with thicker meadow vegetation or patches of low willows (*Salix* spp.).

Suitable breeding sites generally are found in shallow water at the edges of meadows, seasonally flooded pools of water within meadows, or in slow-flowing shallow spring channels, and runoff streams. Tadpoles also have been observed in shallow ponds and shallow areas of lakes. Short emergent sedges, few-flowered spike rushes, and other rushes often dominate breeding sites. In one study, breeding ponds were usually less than 12 inches deep. Persistence of water and warmer temperatures conducive to tadpole development contribute to successful recruitment. Researchers have found that toads preferred shallow breeding sites and tadpoles preferred warm shallow margins during the day. Thus, water depth and temperature appear to be important limiting factors in the survival of eggs and tadpoles.

The Yosemite toad is an explosive breeder, laying eggs at snowmelt over a short period of time. They emerge from winter hibernation as soon as snow melt pools form near their overwintering sites. Observed emergence times range from early May to mid June and breeding begins soon after emergence.

Metamorphs overwinter their first year in their natal meadow and appear to move upland mid-summer of their second year. In meadows, metamorphs and yearlings appear to be associated with willows and long sedges and grasses. Metamorphs can routinely be found throughout the summer months in moist and wet meadow areas, particularly where they meet the mudflat margins of their breeding areas.

After breeding, adults feed in meadow habitat or move into other aquatic habitat away from meadows such as headwater springs. Most studies have considered the toad to be diurnal but a recent telemetry study found them to be active at night.

One study found that adults have high site fidelity. Adults bred at the same ponds and, after breeding, tended to use the same one or two locations for daytime refuge. Some subadults moved from rearing ponds to different sites for breeding.

Overwintering habitat is poorly understood, but it is generally assumed that Yosemite toads overwinter in rodent burrows.

Historic and Current Range and Distribution

Yosemite toads are known from 292 sites throughout their historic range, 229 of which have been confirmed occupied since 1990. Known Yosemite toad locations by area is based on the most comprehensive dataset on Yosemite toad localities available, which was collected by the U.S. Forest Service (USFS) for use in their conservation assessment of the species (as required by the Sierra Nevada Forest Plan Amendment. This data set was compiled by the USFS and comes from various sources, including University of California and California State University researchers, the California Academy of Science, the National Park Service (NPS), the U.S. Geologic Survey, the California Department of Fish and Game (CDFG), and the California Natural Diversity Data Base.

The historic and current acreage of Yosemite toad habitat (wet meadows, shallow breeding waters, and moist uplands) within the historic range of Yosemite toads is unknown, although these habitats have been degraded and may be decreasing in area as a result of conifer encroachment and livestock grazing. The vast majority of land within the range of the Yosemite toad is federally owned, with 649,079 hectares (ha) (1,603,903 ac (ac)) (99 percent of the range) on USFS, National Parks, and Bureau of Land Management lands. Much of this land is within designated wilderness lands. The remaining land within the species' range is a mix of State, local government, and private lands.

It is impossible to fully determine the extent to which Yosemite toads have declined, because baseline data on the number and size of historic populations are few. The following studies reassess the current status of historically documented populations and give the most insight into the species' decline.

Jennings and Hayes reviewed the current status of Yosemite toads using museum records of historic and recent sightings, published data, and unpublished data and field notes from biologists working with the species. They mapped 55 historically documented general localities throughout the range of the species where the toad had been present (based on 144 specific sites), and found that Yosemite toads are now absent from 29 of those localities, a decline of over 50 percent.

In 1990, David Martin surveyed 75 sites throughout the range of the Yosemite toad for which there are historic records of the species' presence, and found that 47 percent of those sites showed no evidence of any life stage of the species (Stebbins and Cohen 1997), a decline of about 63 percent.

Grinnell and Storer surveyed for vertebrates at 40 sites along a 143 km (89 mi) west to east transect across the Sierra Nevada, through Yosemite National Park, in 1915 and 1919. Drost and Fellers conducted more thorough surveys, specifically for amphibians, at 38 of those sites in 1992. They found that Yosemite toads were absent from 6 of 13 sites in which they had been found in the original survey. At sites where Drost and Fellers found Yosemite toads, the toads occurred in low numbers (only 15 total adult and juvenile toads at all sites), with documented declines in relative abundance in three of the Grinnel and Storer sites, as based on their generalized abundance catagories such as rare, common, and abundant. Therefore, the species has declined or disappeared completely from at least 9 of 13 (69 percent) of the Grinnel and Storer (1924) sites.

The only long-term study on the size of a population of Yosemite toads indicates that the population has declined dramatically. Kagarise Sherman and Morton studied Yosemite toads at Tioga Pass Meadow (Mono County, California) intensively from 1971 to 1982, and made less systematic observations from 1983 to 1991. They captured and marked toads entering breeding pools to estimate the adult population size. From 1974 to 1978, an average of 258 males entered the breeding pools. In 1979, the number of male toads began to decline, and by 1982, the number of males had dropped to 28. During the same time period, the number of females varied between 45 and 100, but there was no obvious trend in number observed. In periodic surveys between 1983 and 1991, it appeared that both males and females continued to decline, and breeding activity became sporadic. In 1990, the researchers were only able to locate one female, two males, and four to six egg masses. In 1991, they found only one male and two egg masses. The researchers also surveyed non-breeding habitat in the same area and found similar population declines. To date, the population at Tioga Pass Meadow has not recovered.

Kagarise Sherman and Morton also conducted occasional surveys of six other populations in the eastern Sierra Nevada. Five of these populations showed serious, apparently long-term, declines between 1978 and 1981, while the sixth population held relatively steady until the final survey in 1990, at which time it dropped precipitously. In 1991, E.L. Karlstrom revisited the site at which he had studied a breeding population of Yosemite toads from 1954 to 1958, just south of Tioga Pass Meadow within Yosemite National Park (Tuolumne County, California), and found no evidence of toads or signs of breeding.

Status

On April 3, 2000, the Fish and Wildlife Service received a petition dated February 28, 2000, from the Center for Biological Diversity and Pacific Rivers Council to list the Yosemite toad as endangered. The petitioners also requested that critical habitat be designated concurrent with listing. On December 10, 2002, the Fish and Wildlife Service published a twelve-month petition finding in the Federal Register (Vol. 67, No. 237). The conclusion of the 12-month finding of the U. S. Fish and Wildlife Service is that the proposal to list the Yosemite toad as endangered or threatened is warranted, but is precluded by other higher priority listing actions.

Risk Factors

The U.S. Fish and Wildlife Service's twelve-month petition finding for the Yosemite toad goes into considerable detail citing all relevant research, unpublished data, draft conservation assessment work, and observations by researchers and managers and reveals the potential adverse effects of multiple affectors on the decline of the species and its long-term viability. These multiple affectors may be working singly and in combination at various landscape scales from the local breeding pond to rangewide throughout the Sierra Nevada to decrease the species vigor to withstand population reduction and extirpation events related to disease, weather, and predation.

Potential impacts to this species and its habitat include livestock grazing, commercial and recreational packstock grazing, recreational use of meadows, hiker and stock trails in toad habitat, predation from introduced non-native fish species, forest management herbicide and pesticide applications, pesticide drift from Central Valley agricultural areas, automobile exhaust pollutant drift, disease as a result of fungal, bacterial and other parasitic infections, long-term drought and climate change, and possibly recent increases in UV radiation.

In addition to the risk factors noted in the FEIS (Chap. 3, part 4.4, pg. 218-219), other potential impacts to this species and its habitat include: (1) decreased growth rate of tadpoles as a result of bacterial increase effects from livestock fecal matter, (2) mortality of Yosemite toads from being buried by livestock fecal deposition, (3) reduced vegetative hiding cover for metamorphs, juveniles and adults potentially increasing their vulnerability to predation from snakes, and birds, and (4) the collapse of rodent burrows from livestock hoof punching has the potential to entrap or bury Yosemite toads that use the burrows for hiding cover. The effect on the viability of the Yosemite toad from livestock trampling of toads, cover reduction and subsequent increased predation vulnerability of toads, rodent burrow collapse and toad entrapment and mortality, and adverse effects of livestock and their fecal matter including burying of toads and lower tadpole survival and metamorph growth is unknown. These effects are listed here from researcher unpublished data and personal communications, as well as manager observations and remain to be thoroughly investigated by research.

Research on environmental toxin effects on this species has also not been conducted. The Pacific chorus frog was shown to have lowered levels of Cholinesterase, an important nervous system enzyme, and other amphibians have shown sensitivity to numerous pesticides, herbicides, and fertilizers.

Forest Service management can influence the following affectors: chemical toxins from localized pesticide and herbicide application, livestock grazing, commercial and recreational packstock grazing, recreational use of meadows, hiker and stock trails in toad habitats, fish stocking, and disease spread as a result of Forest Service activities. Forest Service management can also affect genetic diversity of the species, which is important for long-term population viability. Management approaches should aim to maintain all known populations down to specific breeding areas to ensure that genetic diversity is not reduced to the point where the genetic vigor of the species is compromised.

3.2.2.9. Northern Leopard Frog (*Rana pipiens*)

The information below was extracted and compiled from the following reference: USDA Forest Service. unpublished. Draft Conservation Assessment for the Northern Leopard Frog (*Rana pipiens*). USDA Forest Service, Pacific Southwest Region, Vallejo, CA. Detailed references can be found in that document. This section updates and supplements the information found in FEIS Volume 3, Chapter 3, Part 4.4, pp. 226.

Habitat Requirements

The northern leopard frog has been called the “meadow frog” for its summertime movements away from ponds. They may range widely into a wide variety of habitats, even hay fields and grassy woodlands but apparently require a high degree of vegetative cover for concealment.

In Minnosota, the typical breeding pond of leopard frogs is described as “temporary pond with a maximum depth of 1.5 – 2 m (5 – 6ft.), that does not support a fish population, is not connected with any other body of water, and dries up periodically every few years.” Merrell noted that the distance between overwintering and breeding sites was often 1-2 km (0.6-1.2 mi) in Minnosota. Hine et al. use a simple model to identify potential leopard frog breeding habitat. They first located potential overwintering ponds (permanent, deep water), and then surveyed all temporary ponds within 1.6 km (1 mile) of these potential overwintering sites.

These frogs commonly emerge in early spring (March or April) and males immediately begin calling for mates. During this time, frogs are concentrated in or around lentic water bodies where courtship and spawning takes place. After breeding, adult leopard frogs move away from ponds to a variety of habitats nearby. The distribution appears to be related to a variety of factors, including available food, adequate cover, and moisture. They can be anywhere from a few meter from a pond to as much as 1.6 (1 mile) away. They avoid areas with grass over 1 m tall, wooded areas, open areas lacking vegetation, or heavily grazed or mowed areas. Leopard frogs usually move at night, and will make greater summer movements on rainy days.

After metmorphosis, young frogs may emigrate from their breeding ponds to more permanent water source, like a lake or stream. Small frogs often congregate along the shores of these water sources. They appear to segregate from larger frogs by remaining at the water’s margin. Emigration occurs in late July in Minnesota and early July in Iowa.

Movements in the fall begin with cooler weather, often in September. Movement generally take place at night, but frogs may move on dark rainy days as well. Overwintering occurred between the months of October and April in Minnesota. Overwintering habitats are larger lakes and streams that do not freeze completely during winter. Leopard frogs do not hibernate during winter, but activity levels are much reduced. Frogs can be found wintering among stones or sunken logs, in leaf litter or vegetation depressions along the bottom.

Mortality

Merrell reports that the majority of mortality among leopard frogs occurs in the tadpole stage. Waterfowl, fish, bullfrogs and aquatic insects are thought to be responsible for much of this mortality. Adults are eaten by snakes during the summer and fall months. Garter snakes (*Thamnophis* spp.) are thought to be a common predator of leopard frogs. Because leopard frogs migrate from breeding to summer to overwintering habitats, vehicles on roads are a significant mortality source. Roads built between ponds and larger summer, fall, and overwintering water bodies can result in large numbers of vehicle-killed leopard frogs. The lack of oxygen in water inhabited by overwintering leopard frogs has resulted in large winter kills.

Tadpoles may be eaten by numerous vertebrates and invertebrate predators. Among the vertebrates are belted kingfishers (*Ceryle alcyon*), hooded mergansers (*Lophodytes cucullatus*), common garter snakes (*Thamnophis sirtalis*), western garter snakes (*T. elegans*), and neotonic tiger salamanders (*Ambystoma tigrinum*). Turtles may also prey upon tadpoles.

Many introduced species, including largemouth bass (*Micropterus salmoides*), pumkinseed (*Lepomis macrochirus*), brown bullhead (*Ameiurus nebulosus*), black crappie (*Pomoxis nigramaculatus*), carp (*Cyprinus carpio*), and rainbow trout (*Oncorhynchus mykiss*) have been introduced to waters within the historic range of the leopard frog and may have played a role in losses of leopard frog populations.

Drought is apparently an important source of mortality as well. Corn and Fogleman document local extirpation of leopard frogs when drought dried ponds in the fall and winter months. Hine et al. found 2 of 5 breeding ponds to not produce young because they dried up prior to metamorphosis one year. He also found that in 1976, during the worst drought in a century, only 4 or 23 ponds that had breeding activity produced frogs.

Historical and Current Range and Distribution

According to museum records, northern leopard frogs historically inhabited several isolated locations of California with most of the populations occurring in or near the Sierra Nevada. Populations were clustered in three main areas, south of Goose Lake (in the surrounding vicinity of Alturas; Modoc Co.), Lake Tahoe (El Dorado Co.), and areas in and around Bishop (Inyo Co.).

The most recent records of the species (near Tule Lake, Siskiyou Co., 1990 and Round Valley near Bishop, Inyo Co., 1994) are the only specimens on record in California in over two decades. Their locations fall within two of the three main clusters of records for the state. However there have been no systematic field verifications of historical northern leopard frog locations in California. It is, therefore, impossible to reasonably deduce whether this species is currently viable or even extant.

Status

The Northern Leopard frog is listed as a sensitive species on the Region 5 Regional Forest's Sensitive Species List. In addition, the species is a California Species of Special Concern.

Risk Factors

For a summary of risk factors, reference the SNFPA FEIS, Chapter 3, Part 4.4, page 226.

3.2.2.10. Cascades Frog (*Rana cascadae*)

The information below was extracted and compiled from the following reference: USDA Forest Service. unpublished. Draft Conservation Assessment for the Cascades Frog (*Rana cascadae*). USDA Forest Service, Pacific Southwest Region, Vallejo, CA. Detailed references can be found in that document. This section updates and supplements the information found in FEIS Volume 3, Chapter 3, part 4.4, pp. 223.

Habitat Requirements

Cascades frogs are highly aquatic and are found in or around ephemeral and permanent water sources including wet meadows, marshes, ponds, creeks, and lakes. Breeding sites are found in vegetated ponds, potholes, flooded areas in meadows, and shallow alcoves of lakes that generally contain protected gently sloping shallow areas close to shore.

Breeding habitat is less well-known in California than in Oregon and Washington where more research has been conducted. A recent study conducted in the Klamath Mountains of California found that Cascades frogs primarily breed in lakes, ponds and wet meadows that are fish-free and contain a high percentage of silt in the near-shore habitats. The three known remaining reproductive sites on the Lassen National Forest are in springs or wet meadows adjacent to mainstem streams, or in upper headwater shallow ponds. Because these are the only remaining breeding populations of a historically common frog in the Lassen area, interpretations about general habitat associations in this region should be made with caution.

Adults and juveniles use a wider variety of habitats than those used for breeding. Brown and Welsh (unpublished data) found adults in all types of aquatic habitats including ponds, meadows, deep lakes, and creeks. In a study in Olympia National Park in Washington, Cascade frog adults were found in a high proportion of lakes, ponds, meadows and streams. Cascade frogs in Mt. St. Helens National Park, Washington also showed similar habitat utilization (C. Crisafulli pers. comm.). Microhabitat of adults has not been well-studied, but adults seem to prefer sites with open, sunny areas along the shoreline for basking. Brown often found adults and subadults along small side channels of creeks that had muddy substrate for cover.

Little is known about overwintering habitat for the Cascades frog. Frogs are believed to over-winter in the sediment on the bottom of lakes and ponds under the ice or in spring-water saturated ground.

Cascades frogs are relatively long-lived and late maturing. In one study in Oregon, six- and seven-year old males and females were found at one site. Ages at maturity are estimated to be at least 3 years for males and 4 years for females. The frog has a high degree of site fidelity. Adults are diurnally active and bask and feed along the shoreline of lakes, ponds, streams and wet meadows.

The Cascades frog may undergo severe population fluctuations caused by natural stochastic events such as drought and prolonged winters. Because populations tend to be small they are vulnerable to random natural events that could quickly extirpate them.

Natural Mortality: Known natural predators of the Cascades frog include rough-skinned newt, garter snakes, black bear, raccoon, mink, and coyote. Tadpoles are also prey to aquatic insect larvae, several species of birds, and salamander larvae. In addition, introduced trout are known to prey on Cascades frogs.

Frogs are also susceptible to mortality from diseases. Mass mortality of developing *R. cascadae* eggs in Oregon has been documented and linked to the pathogenic fungus, *Saprolegnia ferax*. Because the frogs lay eggs in communal egg masses, they are extremely susceptible to mortality from *Saprolegnia*. *Saprolegnia* is a common fish pathogen and may be introduced by fish into lakes and ponds during fish stocking. *Saprolegnia* has not been found in California.

Life history characteristics such as over-wintering under frozen lakes and ponds, larval development in ephemeral ponds that may dry up before metamorphosis, and multi-year larval development in high elevation sites make the Cascades frog susceptible to die-offs due to extreme winter or drought conditions.

Because many of the remaining populations of Cascades frogs in the Mount Lassen area, Russian Wilderness and Marble Mountains are small isolated remnants, they are vulnerable to random natural events that could quickly extirpate them.

Historic and Current Range and Distribution

The Cascades frog is distributed along the Cascade Range from northern California to northern Washington, with a disjunct population on the Olympic Peninsula in Washington. In California, Cascades frog populations were historically distributed from the Shasta-Trinity area to the Modoc plateau. The southward extent was to the Lassen region and the upper Feather River. The known elevational range in California was from around 230 meters (750 feet) at Anderson Fork, Butte County, to 2500 meters (8000 feet) at Emerald Lake in Lassen Volcanic National Park. The frog's range has traditionally been depicted as two disjunct populations centered around the Lassen area and the Klamath area. However, this may be an artifact of historic knowledge of their distribution. The frog's distribution in California is poorly understood.

In northern California, north of the McCloud River, the Cascades frog seems to be doing well. At historic localities in the upper McCloud River system to the Trinity Alps, the frog was found to be moderately to extremely abundant in areas with no fish. In the southern-most part of its range, however, roughly south of the McCloud River, recent research has shown that this frog is extremely rare.

Although no significant changes in distribution have been documented over the last two decades, major changes in population densities were thought to have occurred. Localities with heavy grazing pressure showed dramatic declines in the frequency of Cascades frog occurrence during habitat walk-throughs, while localities that had not experienced grazing for a two-three year period showed dramatic increases in frequency of occurrence. No localized extirpations were recorded.

Status

The Cascades frog is listed as a sensitive species on the Region 5 Regional Forester's Sensitive Species List. It is also a California State Species of Special Concern.

Risk Factors

For a summary of risk factors see SNFPA Chapter 3, Part 4.4, page 223.

3.2.3. Management Indicator Species

Management Indicator Species (non-TEPS)

Management Indicator Species (MIS) were assessed under numerous different heading in the FEIS. To make evaluation of effects in this document easier to interpret, individual species were grouped into categories based upon a habitat association that has the potential to be affected by implementation of either Alternatives S1 or S2. For this evaluation, the MIS list from each affected forest was reviewed. Federally listed threatened, endangered, and proposed species and Forest Service sensitive species were excluded from this evaluation because they are considered in more detail in the FEIS and in this SDEIS. Of the remaining species, the California Wildlife Habitat Relationships personal computer database (CA Dept. Fish and Game, 2002) was reviewed to assign each species to one or several general habitat associations. In some cases, individual national forests assigned their MIS to habitat associations. This evaluation independently assigned habitat associations so they may not match those of the individual national forests.

Further review was conducted by several fisheries biologists (Phil Strand, Marty Yamagiwa, and Melanie McFarland) to assess whether or not there was new information that would lead one to believe 1) something had physically or biologically changed for each of the fish species and 2) if changes had occurred, would those changes require additional analysis beyond what was provided in the FEIS. It was determined by the reviewing fisheries biologists that there was no pertinent new information and because the Aquatic Management Strategy remains unchanged, the effects of the alternatives in the SEIS would be within the range of effects provided in the FEIS. Therefore, it was determined that it is not necessary to conduct further analysis beyond what was represented in the FEIS.

Table 3.2.3a displays the list of remaining non-TESP MIS being assessed in this draft SEIS. Each species has been placed in its representative habitat assemblage based upon potential for effects.

Table 3.2.3a. Management Indicator Species and corresponding habitat assemblage.

Species	CWHR Identifier	Snag and Down Log (Cavity-nesters)	Meadow	Riparian (Wetlands)	Aquatic (Lakes/Streams)	Chaparral	Cliff, Caves, Talus and Rock Outcrops	Hardwoods (oaks, aspen)	Openings and Early Seral	Pinyon Juniper	Eastside Pine	Ponderosa Pine	Grasslands and Shrub-steppe	Mature Conifer	Multi-habitat	Mixed Conifer
Ensatina	A012													X		
Pacific Tree Frog	A039		X	X	X											
Black-throated Gray Warbler	B436							X		X						
Band-tailed Pigeon	B251							X								X
Black-headed Grosbeak	B475			X				X		X						X
Blue Grouse	B134															X
Brown Creeper	B364	X										X				X
Bufflehead	B103				X											
Calliope Hummingbird	B289		X	X					X							
Canada Goose	B075			X	X											
Cassin's Finch	B537		X	X							X					
Cinnamon Teal	B083				X											
Downy Woodpecker	B303	X		X												
Golden Eagle	B126						X						X			
Golden-crowned Kinglet	B362													X		X
Great Blue Heron	B051	X			X											
Hairy Woodpecker	B304	X														X
Hammond's Flycatcher	B317											X				X
House Wren	B369			X				X								
Lincoln's Sparrow	B506			X												
Mallard	B079				X											
Mountain Bluebird	B381	X														
Mountain Quail	B141					X										X
Northern Flicker	B307	X														X
Northern Oriole	B532			X				X								
Osprey	B110				X											
Pacific-slope Flycatcher	B320			X				X								X
Pileated Woodpecker	B308	X												X		
Prairie Falcon	B129						X						X			
Red Crossbill	B539															X
Red-breasted Nuthatch	B361	X														X

Species	CWHR Identifier	Snag and Down Log (Cavity-nesters)	Meadow	Riparian (Wetlands)	Aquatic (Lakes/Streams)	Chaparral	Cliff, Caves, Talus and Rock Outcrops	Hardwoods (oaks, aspen)	Openings and Early Seral	Pinyon Juniper	Eastside Pine	Ponderosa Pine	Grasslands and Shrub-steppe	Mature Conifer	Multi-habitat	Mixed Conifer
Red-breasted Sapsucker	B299	X						X								X
Red-naped Sapsucker	B298	X														X
Sharp-shinned Hawk	B115			X							X		X			X
Song Sparrow	B505		X	X												
Three-toed Woodpecker	B306	X												X		
Townsend's Warbler	B437								X							X
Violet-green Swallow	B340	X														
White-breasted Nuthatch	B362	X						X								X
White-crowned Sparrow	B510		X	X												
White-headed Woodpecker	B305	X														X
Wild Turkey	B138							X	X				X			X
Williamson Sapsucker	B300	X									X					X
Wilson's Warbler	B463			X												
Winter Wren	B370			X												X
Wood Duck	B076				X											
Yellow Warbler	B430			X												
Yellow-bellied Sapsucker	B709	X														
Nelson Bighorn Sheep (Desert)	M183												X			
Black Bear	M151		X					X						X	X	X
Bobcat	M166														X	
Douglas Squirrel	M079	X						X						X		X
Dusky Shrew	M004			X												
Dusky-footed Woodrat	M127					X			X							
Elk	M177			X					X				X	X		
Mountain Beaver	M052		X	X												
Mountain Lion	M165														X	
Mule Deer	M181								X						X	
Northern Flying Squirrel	M080	X												X		
Ornate Shrew	M006			X												
Pronghorn	M182									X						
Raccoon	M153			X											X	
Vagrant Shrew	M003		X	X												

Species	CWHR Identifier	Snag and Down Log (Cavity-nesters)	Meadow	Riparian (Wetlands)	Aquatic (Lakes/Streams)	Chaparral	Cliff, Caves, Talus and Rock Outcrops	Hardwoods (oaks, aspen)	Openings and Early Seral	Pinyon Juniper	Eastside Pine	Ponderosa Pine	Grasslands and Shrub-steppe	Mature Conifer	Multi-habitat	Mixed Conifer
Water Shrew	M010		X	X	X											
Western Gray Squirrel	M077							X						X		X
Western Jumping Mouse	M143		X	X												
CA Mountain Kingsnake	R059					X		X								X
Gopher Snake	R057					X							X		X	
Western Aquatic Garter Snake	R063		X	X	X											
Western Skink	R036								X							
Western Terr. Garter Snake	R069		X	X												

It is unlikely that the alternatives in the SDEIS would affect the aquatic and cliff, caves, talus and rock outcrops habitat associations. Since the land allocations and desired conditions remain largely unchanged between the FEIS and the SDEIS, the change in effects to species associated with the other habitat associations are expected to be limited. However, because there are changes to the standards and guidelines between alternatives in the SEIS, those other habitat associations will be evaluated in Chapter 4 to assess the magnitude and direction of those changed effects.

Citation:

California Department of Fish and Game. 2002. California Wildlife Habitat Relationship Version 8 Personal Computer Program. California Interagency Wildlife Task Group. Sacramento, CA.

3.2.4. Neotropical Migratory Birds

Neotropical migratory birds (NTMB) are birds which breed in North America and migrate south of the continental U.S. during non-breeding seasons. These species are protected under the Neotropical Migratory Bird Treaty Act based on their international importance. The list of neotropical migratory birds within the California region is large and includes a broad number of habitat associations (USDA 1994). The overall effect of management activities on neoptropical migrant species populations has not been specifically studied, unless a species falls within the category of Threatened, Endangered, Forest Service Sensitive (TES) or MIS. The Forest Service has a legal mandate to provide habitat for viable populations of NTMBs. If any NTMBs had viability concerns they would have been included as Forest Service Sensitive species. Current management guidelines ensure that habitat would be protected for these species, but not that the presence of these species will be guaranteed throughout the landscape.

Habitat modification and herbicide use would be expected to effect neotropical migratory bird, some more than others. Timber harvest, hand treatments, prescribed burning and herbicide effects could include but are not limited to: 1) mortality of young in the nest that are too young to escape activities or when adults abandon nests due to disturbance or if directly sprayed by herbicides; 2) loss of nesting, roosting or foraging habitat; 3) adverse effects to young and adult NTMBs as a result of consuming herbicide contaminated prey/vegetation. Direct and indirect effects related to herbicides would be expected to be similar to other avian species analysis. However, avian species analyzed were T&E species which are emphasized due to their listing status or Forest Service Sensitive and MIS species requiring special management attention because of viability and diversity concerns.

3.2.5. Endangered, Threatened, Proposed, and Sensitive Plant Species

The SNFPA FEIS (Chapter 3, Part 4.6, pages 5 to 75) conducted vulnerability assessments on 135 Threatened, Endangered, Proposed, and Sensitive plant species. Two field seasons have elapsed since the signing of the ROD. Information on all but eight plant species remains as they were identified in the FEIS. New information on these plant species is provided below.

Since the signing of the ROD, *Sidalcea keckii* was been listed as Threatened by the U.S. Fish and Wildlife Service and critical habitat has been proposed. At this time, no populations or critical habitat are known to occur on Forest Service lands. However, known populations are known to occur adjacent to the Sequoia and Sierra National Forest.

In addition, two listed vernal pool associates present on Forest Service land now have Designated Critical Habitat (68 FR 12336 – 12337). The two species are *Orcuttia tenuis* and *Tectoria greenei*. Neither species had Designated Critical Habitat as of the signing of the ROD.

Abronia alpine: Ramshaw Meadows abronia is endemic to Ramshaw and Templeton Meadows on the Inyo National Forest. In the original assessment, it was believed at that time that livestock grazing posed a threat to this species. More recent information shows that livestock grazing in Ramshaw and Templeton no long pose a threat. This allotment is no longer under permit and grazing is no longer an issue.

Astagalus lentiginosus var. *kernensis:* Kern Plateau milk-vetch is found on the Kern Plateau in Tulare County from Bald Mountain north to Volcano Creek. Onc occurrence is known from Charleston Peak in Nevada. Information in the FEIS stated that “this plant is known from less than 20 occurrences.” The primary threats to this species are believed to be livestock trampling, roads, and motorized and non-motorized recreational use. Since the signing of the ROD, additional field surveys have detected new individuals or populations. There are now more than 30 known occurrences.

Astragalus monoensis var. monoensis: The Mono milk-vetch is an endemic of Mono County. The FEIS reported 19 occurrences with more than 100,000 individuals. Threats included livestock grazing and trampling, road construction and maintenance, and timber harvest. More recent information shows that OHV is considered as the primary threat.

Hulsea brevifolia: Short-leaved hulsea is known to occur on the Sierra, Sequoia and Inyo National Forest and in Yosemite National Park. The information in the FEIS stated that “this plant is known form less than 25 occurrences.” Continued survey efforts since the signing of the ROD have now found additional occurrences. There are now known to be more than 35 occurrences. No new threats, beyond those threats identified in the FEIS, have been identified.

Hydothyria venosa: The species has been renamed as *Peltigera hydrothyria*. Veined water lichen is found in cold unpolluted streams in mixed conifer forest along the western slope of the Sierra Nevada on the Sequoia, Sierra, and Stanislaus National Forests. The FEIS stated that “this aquatic lich is known from less than 20 occurrences in California.” Continued survey effort now shows this species form at least 27 occurrences in the Sierra Nevada.

Phacelia monoensis: Mono County phacelia is known in Mono County of California, and Esmeralda and Mineral Counties of Nevada. Information in the FEIS states "Population size varies from year to year for this annual plant. There are less than 40 occurrences." Since the signing of the ROD, monitoring of this species know shows that there are fewer than 20 occurrences. Because the population tends to vary in size from year to year, the trend for this species is unknown. The primary threats are invasive weed infestation, mining, and road maintenance.

Opuntia basilaris var. *treleasei:* Bakersfield cactus was not thought to be present on Forest Service land at the time the ROD was signed and was therefore dismissed from further analysis. It was since been discovered on the Sequoia National Forest.

This species is found in the San Joaquin Valley and Sierra Nevada foothills below 600 m (2000 feet) in blue oak woodland, riparian woodland, and sparse open semi-desert. One population of *Opuntia basilaris* var. *treleasei* has been confirmed at the Lower Richbar picnic ground on the Lower Kern River.

3.3. Land and Resource Uses

3.3.1. Commercial Forest Products

This section updates and supplements the information found in FEIS Volume 2, Chapter 3, Part 5.2, pp. 370-371and Part 5.9, pg. 523.

Sawtimber Production

For the three-year period including fiscal years 1988-1993, an average of 743 million board feet of timber was offered for sale from Sierra Nevada national forests (Table 3.3.1a). Over the last decade, the volume of timber offered from national forests in the Sierra Nevada has dropped 71 percent.

Table 3.3.1a. Timber Sale Offerings from Sierra Nevada National Forests for Fiscal Years 1991-2002 (Does not include the Humboldt-Toiyabe National Forest).

	Averages FY 1991-1993		Averages FY 1994-1996		Averages FY 1997-1999		Averages FY 2000-2002	
	Green (MMBF)	Salvage (MMBF)	Green (MMBF)	Salvage (MMBF)	Green (MMBF)	Salvage (MMBF)	Green (MMBF)	Salvage (MMBF)
Eldorado	70.928	110.631	11.916	11.916	11.916	29.401	30.196	12.908
Inyo	9.983	0.000	4.955	4.955	4.955	1.334	1.883	1.335
Lassen	58.569	44.337	36.417	36.417	36.417	24.770	48.134	17.046
Modoc	24.302	9.131	5.147	5.147	5.147	10.282	8.731	0.0
Plumas	58.504	59.332	24.518	24.518	24.518	20.594	10.021	5.793
Sequoia	16.159	45.466	12.003	12.003	12.003	3.934	4.959	2.876
Sierra	33.657	46.014	16.201	16.201	16.201	11.637	4.083	5.693
Stanislaus	21.312	71.459	31.481	31.481	31.481	27.420	8.319	6.767
Tahoe	35.455	15.837	23.637	23.637	23.637	34.137	22.325	22.127
LTBMU	5.708	6.318	0.569	0.569	0.569	3.300	1.198	0.407
Total	**334.577**	**408.526**	**166.844**	**166.844**	**166.844**	**166.810**	**139.849**	**74.954**
Combined Average Total		**743.103**		**429.730**		**313.750**		**214.803**

The volume of timber sold in Sierra Nevada national forests has also decreased over the last several years (Table 3.3.1b). Sales of sawtimber dropped by nearly half during the period from 1991 through 1993 compared to the high production levels of 1988-1990. The CASPO interim guidelines caused timber harvest volumes to decline even further between 1994 and 1996, to less than one-third of the average annual amount harvested during the previous three-year period. The most recent three-year average of timber sale volume (2000-2002) continues the downward trend, with timber sale volume falling to a decade low of 118 million board feet.

Table 3.3.1b. Average Annual Sawtimber Sold from National Forests in the Sierra Nevada Region, calendar years 1988-2002, in millions of board feet.

National Forest	1988-1990	1991-1993	1994-1996	1997-1999	2000-2002
El Dorado	156.4	109.5	5.9	40.6	35.2
Inyo	5.1	5.2	0.3	1.1	3.4
Lassen	134.9	124.2	19.3	41.7	19.8
Modoc	51.9	31.6	5.2	9.2	4.6
Plumas	185.3	75.6	20.0	23.3	6.0
Sequoia	48.5	47.7	4.9	14.1	6.1
Sierra	122.6	51.8	19.4	10.9	7.9
Stanislaus	180.1	47.4	14.2	31.7	10.2
Tahoe	103.3	33.3	47.3	31.1	25.1
LTBMU	4.0	3.6	13.8	1.4	0.4
Humboldt-Toiyabe	5.4	3.2	3.3	0.0	-
TOTAL	**997.5**	**533.0**	**153.7**	**205.1**	**118.8**

Source: USDA Forest Service Cut and Sold Reports, Regions 4 and 5, 1988-2002.

Commercial Biomass

Table 3.3.1c shows the distribution of woody biomass (convertible wood products and excelsior) sold from Sierra Nevada national forests. The Lassen and Plumas National Forests have historically been the largest producers of in-woods chips. Outside the Sierra-Cascade Axis subregion, only the Modoc and Stanislaus National Forests have been significant producers of commercial biomass. The Inyo, Humboldt-Toiyabe, Sequoia, and Sierra National Forests have produced small amounts of merchantable biomass. Low production in the Southern Sierra and Eastside Sierra subregions and the highly variable yearly output by forest and in the bioregion is indicative of the nature of the biomass market. The demand for biomass changes very rapidly. The result is that field units and private industry are both reluctant to invest significant time and energy in this effort compared to other activities. This behavior is coupled with the difficulty of establishing profitable forest biomass cogeneration facilities where supplies are inconsistent. Biomass utilization would likely improve under circumstances where there is stability and economic efficiencies in the delivery of raw material.

3.3.2. Grazing

The following information is provided to supplement the information provided in the SNFPA FEIS Volume 2, Chapter 3, part 5.3, pg. 402.

Grazing Use Levels

Over the past 15 to 20 years, livestock grazing has decreased in the Sierra Nevada national forests. In 1981, there were approximately 163,000 head of cattle and sheep; numbers 2002 are estimated at 74,000. Many factors have contributed to this decline, including the implementation of standards and guidelines of existing forest plans, management for threatened and endangered species, management to meet water quality standards, and livestock market fluctuations.

Table 3.3.1c. Commercial Biomass Produced from Sierra Nevada Region National Forests Calendar Years 1990-2002 (Bone Dry Tons).

National Forest	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
El Dorado			3,225	393			15	2,205	8,500		1,276	5,799	
Inyo				25									
Lassen	34,248	10,543	1,010,404	177,366	2,321	131,549	34,064	111,123	74,597	73,765	46,965	84,539	70,674
Modoc	2,645	495	6	2,959	73,906	68,109	17,105	35,756	14,664	2,500	1,000	29,272	8,297
Plumas	18,485	8,680	76,628	13,632	22,586	30,144	34,724	40,956	50,027	26,682	19,387	11,846	11,948
Sequoia				1,188									
Sierra	3	6	8	2,625		7,771	775	2,538	406		2,365		96
Stanislaus	9,665	13,043	26,030	7,939	1,615	17,742	16,028	12,635	1,320	4,818	3,413	3,071	6,873
Tahoe		55	9,582	35,851		55,748	80,413	23,242	3,703	17,324	11,778	10,503	9,606
LTBMU					6,875			3		38	1	1,084	488
Humboldt-Toiyabe													
TOTAL	**65,046**	**32,822**	**1,125,883**	**241,978**	**107,303**	**311,063**	**183,124**	**228,458**	**153,217**	**125,127**	**86,185**	**146,114**	**107,982**

Chapter 4: Environmental Consequences

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Chapter 4: Environmental Consequences

Introduction

This chapter presents the environmental consequences for the alternatives analyzed in this draft supplemental EIS for the Sierra Nevada Forest Plan Amendment. Information in this chapter addresses aspects of the environment likely to be affected by the management actions proposed in the alternatives. This chapter describes the scientific and analytical basis for the summary comparison of the effects of the alternatives presented at the end of Chapter 2.

The environmental consequences sections in the SNFPA FEIS were reviewed to assess whether new information and/or proposed management changes could change the effects analyses previously conducted for the SNFPA FEIS. Various aspects of the biological, physical, and social environment would not be affected differently by either new information or proposed management changes from those effects previously disclosed in the SNFPA FEIS; therefore, these topics were not further analyzed in this supplement. Appendix C "Consistency Review of Documentation for the Sierra Nevada Forest Plan Amendment" provides the rationale for not further analyzing specific topics in this Draft SEIS.

Parts 4.2 through 4.5 of this chapter focus on the environmental consequences associated with Alternatives S1 and S2. Part 4.6 briefly describes the environmental consequences for Alternatives S3 and F2 through F8. Detailed analyses of environmental consequences for Alternatives F2 through F8 are presented in the SNFPA FEIS, Volumes 2 and 3. The information presented in this document for these alternatives (F2 through F8) addresses aspects of environmental consequences that have changed based on new information identified during the SNFPA review process.

4.1. Cumulative Effects

Background

Cumulative effects are those impacts on the environment that result from the incremental effects of an action when it is added to other past, present, and reasonably foreseeable future actions, regardless of the responsible agency or party (See 40 CFR part 1508.7). The FEIS provided a detailed assessment of the potential cumulative effects of the eight alternatives for managing the national forests in the Sierra Nevada. The assessment included discussions of cumulative effects on: (1) other plans, policies, and initiatives; (2) the five problem areas addressed in the SNFPA; and (3) specific management programs. A summary of the assessment is provided below. Most of assessment adequately describes the cumulative effects of implementing the proposed changes in this Draft SEIS. Where that is not the case, supplemental information is also provided to update the assessment from the FEIS.

1. Cumulative effects on other plans, policies, and initiatives

The assessment in the FEIS related the alternatives under consideration to other Federal, State, and local policies, plans, and initiatives that affect the Sierra Nevada (SNFPA FEIS, Volume 2, Part 1.3, pages 3-16). The assessment concluded that all the alternatives were consistent with other Forest Service policies, plans, and initiatives. The alternatives were also consistent with all applicable State regulations. While no conflicts with other policies, plans, or initiatives were identified, the FEIS recognized that conflicts were possible at the local level. The FEIS noted that all agencies routinely seek review from others in government during development of work under their authority. The purpose is to avoid conflicts in policies, plans, and initiatives at all levels.

The assessment in the FEIS adequately describes the relationships of national forest management to other plans, programs, and initiatives in the Sierra Nevada. Generally, the relationships do not vary by alternative, have not changed since the FEIS was completed, and most are not sensitive to the changes being proposed in this Draft SEIS. However, some programs have changed since the FEIS in ways that could make them sensitive to the changes being proposed in the Draft SEIS. Moreover, some new programs have emerged. New information for these efforts is provided below.

A). Revisions to the National Forest Management Act regulations

On November 9, 2000, the Secretary of Agriculture adopted a final rule substantially revising the National Forest System land and resource management planning regulation at 36 CFR part 219 (65 FR 67514). Section 219.35 of that rule provided for the transition from the 1982 planning rule to the 2000 rule. Under the requirements of § 219.35 as adopted, all amendments and revisions to land and resource management plans must be prepared pursuant to the November 2000 planning rule, unless the amendment or revision was initiated before November 9, 2000, and a notice of availability of the required environmental disclosure document was published before May 9, 2001. However, the Department subsequently determined that the Forest Service was not sufficiently prepared to implement the November 2000 planning rule. Therefore, on May 17, 2001, the Department issued an interim final rule immediately extending the compliance date of May 9, 2001, until May 9, 2002, in anticipation that a revised planning rule would be final by that date (66 FR 27552). A subsequent Federal Register notice, on May 20, 2002, modified the transition language to extend the compliance date to whenever the Department of Agriculture promulgates revised planning regulations (FR 02-12508). A set of draft planning regulations was published in the Federal Register on December 6, 2002. The public comment period was extended and closed on April 7, 2003. The Department intends to issue final planning regulations as soon as possible, with a release date targeted for December 2003.

The Notice of Intent to prepare an Environmental Impact Statement to amend the Sierra Nevada Forest Plans was published in the Federal Register on November 20, 1998, well in advance of the May 9, 2001 deadline explained above. The Sierra Nevada Forest Plan Amendment and Supplement were prepared using many of the same key elements in the 2000 Regulations and the Draft 2003 Regulations. They were developed in a collaborative manner, included emphasis on ecological, social and economic sustainability, are science based, and stress an adaptive management approach. But given that the project began well before the 2000 Planning Regulations were released, the Department's concerns over the ability to use the 2000 Regulations, and the ongoing uncertainty regarding final direction in the new regulations, it was decided that the Sierra Nevada Plan Amendment would comply with the requirements of the 1982 rule. The decisions resulting from the Supplemental FEIS will be subject to administrative appeals under the provisions of 36 CFR 217.

B). Fish and Wildlife Service's decisions on the California spotted owl

On April 3, 2000, the USDI Fish and Wildlife Service (USFWS) received a petition from the Center for Biological Diversity, the Sierra Nevada Forest Protection Campaign and other organizations to list the California spotted owl (*Strix occidentalis occidentalis*) as threatened or endangered. On October 12, 2000, USFWS found that listing the California spotted owl may be warranted and requested information and data regarding the species. On February 7, 2003, the USFWS found that the listing of the California spotted owl was not warranted under the Endangered Species Act of 1973.

The USFWS concluded that findings related to demographic analysis are not conclusive with respect to the population status of the California spotted owl. "There is no definite evidence that the population is decreasing across its range, and various analytical results of the individual study areas are not wholly supportive of conclusions regarding declines in any given study area." (Federal Register, Vol. 68, No. 31, February 14, 2003 page 7595) "Substantial scientific uncertainty remains regarding the effects of fuel treatments in PACs [protected activity centers] and foraging areas. However, in absence of demonstrated effects, and considering the potential negative impacts are also accompanied by positive effects from fire risk reduction and faster development of high quality habitat, we [USFWS] find that the timber harvest and fuel treatments proposed under the SNFPA do not constitute a significant threat to the California Spotted owl at this time." (Federal Register, Vol. 68, No. 31, February 14, 2003 page 7601) Because the outcome of possible changes in management direction through the SNFPA SEIS may substantially affect California spotted owls, the USFWS intends to monitor and review the effects at a later date, if necessary.

C). National Fire Plan

In August 2001 the Secretaries of Agriculture and the Interior joined the Western Governors' Association, National Association of State Foresters, National Association of Counties, and the Intertribal Timber Council to endorse *A Collaborative Approach for Reducing Wildland Fire Risks to Communities and the Environment: A 10-Year Comprehensive Strategy*. The Secretaries of the Interior and Agriculture and the Governors jointly develop a long-term national strategy to address the wildland fire and hazardous fuels situation and the needs for habitat restoration and rehabilitation. The strategy is being developed with close collaboration among citizens and governments at all levels. This initiative has been commonly called "the National Fire Plan" by the departments of Agriculture and Interior. The implementation plan does not alter, diminish, or expand the existing jurisdiction, statutory and regulatory responsibilities and authorities or budget processes of participating Federal, State, and tribal agencies.

The goals for the National Fire Plan are to improve fire prevention and suppression, reduce hazardous fuels, restore fire-adapted ecosystems, and promote community assistance. Its three guiding principles are:

1. Priority setting that emphasizes the protection of communities and other high-priority watersheds at-risk.
2. Collaboration among governments and broadly representative stakeholders
3. Accountability through performance measures and monitoring for results.

In California, Federal agencies joined with State and local fire protection providers to form the California Fire Alliance. The overall mission of the Alliance is to merge the California Fire Plan and National Fire Plan in ways that provide the public with effective and efficient fire protection statewide.

In the Sierra Nevada, cooperative implementation of the California Fire Plan and National Fire Plan is now underway. Increasingly, State, Federal, and local agencies are working with community groups to develop local fire protection plans that identify high priority projects across ownerships. The agencies are then using the aggregate of their available funds to complete projects.

All cooperating agencies are bringing their planning processes to this new cooperative fire planning venture. The combined processes are being used to produce projects that conform to the regulations, guidelines, and other directives of each agency. The proposed changes in this Draft SEIS, the Forest Service would also provide fire protection programs that improve conditions within the region, complimenting the work of other fire protection agencies.

D). The President's Healthy Forest Initiative

In 2002, President Bush directed the Secretaries of Agriculture and Interior, and the Chairman of the Council on Environmental Quality to improve regulatory processes to ensure more timely decisions, greater efficiency, and better results in reducing the risk of catastrophic wildfires by restoring forest health. This includes:

- improving procedures for developing and implementing fuels treatment and forest restoration projects in priority forests and rangelands in collaboration with local governments;
- reducing the number of overlapping environmental reviews by combining project analysis and establishing a process for concurrent project clearance by Federal agencies;.
- developing guidance for weighing the short-term risks against the long-term benefits of fuels treatment and restoration projects; and
- developing guidance to ensure consistent NEPA procedures for fuels treatment activities and restoration activities, including development of a model environmental assessment for these types of projects.

To accomplish this assignment, Interior Secretary Norton, Agriculture Secretary Veneman, and CEQ chairman Connaughton met with President Bush in December 2002. Together, they identified several steps that would guide forest health activities and ensure more timely decisions. These steps are:

a. More Fuels Treatment and Restoration Projects

The Departments of Agriculture and the Interior will propose new procedures that will enable priority fuels treatment (thinning) and forest restoration (reseeding and planting) projects to proceed quickly. Fuels treatment projects under this procedure must be identified by Federal agencies working in collaboration with State, local and tribal governments and interested persons. Based on the agencies' experience with hundreds of these projects where the procedures will eliminate the need for individual analyses and lengthier documentation. These hazardous fuels reduction and ecosystem rehabilitation projects will help restore forest and rangeland ecosystems, benefiting many species and their habitat. These procedures will be published in the Federal Register for public notice and comment.

b. Amend Rules for Project Appeals to Hasten Process

Agriculture and Interior have proposed new rules to amend their administrative appeal process. The rules would expedite appeals of forest health projects and encourage early and more meaningful public participation. The rules for Agriculture would prohibit appeals of categorical exemptions, limit who can appeal other projects, identify who can determine emergency conditions, and allow variable comment periods on planning documents. These improvements will simplify complex procedures, provide more timely decisions and provide greater flexibility in emergency situations. The draft rules have been published in the Federal Register.

c. Improve Endangered Species Act Process to Expedite Decisions

The Departments of Interior and Commerce have jointly released two guidance documents to their staffs that change the process for reviewing fuels treatment projects under the Endangered Species Act (ESA). The first document encourages the use of several streamlining techniques to expedite the consultation process, such as carrying out integrated regional planning for fuels treatment projects. The second document clarifies that ESA evaluations should consider the long-term environmental benefits of fuels treatment projects, as well as the potential for adverse effects, and that projects with net benefits should be expedited. Both documents are intended to facilitate timely completion of fuels treatment projects, while providing protection for wildlife and restoring habitat.

d. Improved and Clearer Process on Environmental Assessments

CEQ will issue guidance to Interior and Agriculture establishing an improved and focused process for conducting environmental assessments under the National Environmental Policy Act (NEPA) for healthy forest projects. Agriculture and Interior will send senior advisors to work with their field offices to immediately implement the new process. The two agencies will undertake at least 10 pilot projects to establish the effectiveness of these expedited procedures. Two of the 10 pilot projects are in California and one (Eldorado National Forest) is in the Sierra Nevada. The alternatives being considered in this SEIS are consistent with the goals and expectations of the Forest Health Initiative. Implementation of the proposed changes will not result in the inability to move forward with the initiative as planned.

2. Cumulative effects on the five problem areas in the FEIS

The cumulative effects of managing all ownerships on the five problem areas were estimated in the FEIS (Vol.2, part 1.3, pages 16-25). Because the changes proposed are consistent with the range of choices in the FEIS, this assessment adequately describes the conditions that would result from implementing the alternatives in this Draft SEIS.

Old Forests. The assessment concluded that, under all alternatives, the national forests and national parks will remain the primary contributors of old forest conditions in the Sierra Nevada. Most of the old forests will be on the national forests and the amount of old forests will increase in various degrees in all alternatives.

Aquatic, Riparian and Meadow Habitats. The combined work across ownerships will lead to improved aquatic, riparian, and aquatic habitat conditions in the future. The strategies for managing these resources in all the alternatives would contribute to this condition.

Forest Fuels and Fire Protection. All of the alternatives to various degrees would contribute to an overall improving trend in fuels reduction and fire protection in the region.

Invasive Plants. The Forest Service would provide programs for reducing the spread of noxious weeds in all alternatives. When combined with the programs of other agencies and landowners, this will lead to better control of noxious weeds in the Sierra Nevada over time.

3. Cumulative effects on specific management programs

The SNFPA FEIS disclosed cumulative effects of multiple management programs on air quality, recreation, mining, grazing, and timber harvest. The discussions are summarized below. Relationships of the proposed changes in this document to these resources are also discussed.

Air Quality. The Forest Service consistently accounts for less that 5 percent of the burn permits issued in California. The agency has an Memorandum of Understanding (MOU) for prescribed burning with the California Air Resources Control Board. The MOU describes the procedures by which the Forest Service can complete prescribed fire projects in ways that are consistent with State air quality standards. These conditions did not change under any alternative and all the alternatives would therefore be consistent with the program for managing burning across ownerships in California. The proposed changes in this document would not change the procedures by which the Forest Service works with California Air Resources Board. The proposed changes would allow the national forests to be managed in ways that help the State maintain air quality at levels that comply with the Clean Air Act.

Recreation. As stated in the FEIS, the demand for recreation will continue to increase in the Sierra Nevada and the national forests will satisfy most of the demand. Demand will increase across the spectrum of recreation activities. The FEIS noted that the overall supply of recreation would vary only in Alternatives 3 and 5 where off-highway use would be reduced. The analysis in the FEIS indicated that reduction in OHV opportunities in Alternatives 3 and 5 could shift this use to other ownerships, but neither of these options was chosen in the Record of Decision. Therefore, the national forests should be regarded as the primary source of public recreation in the Sierra into the future. The proposed changes in this document would not change the types or range-wide availability of recreational opportunities from those described for Alternative Modified 8 in the FEIS.

Mining. About 58 percent of the 11,800 mines in the Sierra Nevada are located on national forest lands; however, most of the active mines are located off the national forests. Mines on national forests presently yield few mineral products. With the exception of one mine on the Inyo National Forest, they do not contribute significantly to regional or national outputs. Large changes in production are unlikely. The proposed changes would have no effect on these trends.

Grazing. Grazing on public lands continues to decline in the Sierra Nevada and across the west as increasing emphasis is given to protecting water quality, fish and wildlife, recreation, and other resources. Yet many ranchers in the region still depend on national forest range allotments for their operations. The FEIS concluded that declines in cattle grazing would occur under all the alternatives. The reductions would range from 30,000 to 50,000 AUMS in Alternatives 1 and 4 to as much as 160,000 AUMs in Alternatives 2 and 8. These reductions are not expected to produce significant shortages in beef supply for California or the Sierra Nevada. However, they will have direct effects on some families and communities in the Sierra. The number of families and the overall economic impact is difficult to quantify at this time because it is impossible to determine the number of families that would abandon their ranching operations in response to national forest management. Determining the impacts of the proposed changes on grazing intensity and range use is equally problematic.

Timber harvest. In the years immediately preceding the FEIS, roughly one fifth of the timber volume from the Sierra Nevada was produced on the national forests. The remainder was harvested from private lands. Alternatives 4 and 7 in the FEIS would increase harvest from the national forests. Alternative 2, 3, 5, 6, 8, and Mod 8 would decrease timber production by the Forest Service. None of the alternatives would make sufficient changes to shift the overall proportions in production between public and private land. The same is true for the proposed changes being evaluated in this Draft SEIS.

Timber management on private land is regulated by the State Board of Forestry and Fire Protection through their Forest Practice Rules. The recent trend in the Forest Practice Rules has been to provide increasing protection for water, fish, and wildlife. Additional protections are now being contemplated by the Board of Forestry and the California Legislature.

The overall finding from this assessment is that the proposed changes may increase the level of timber harvest from the national forests. But this increase will not likely change the proportion of timber that comes from the Forest Service unless major changes are made in the Forest Practice Rules. Since California presently imports roughly 80 percent of its wood products, proposed changes in this Draft SEIS are also not likely to make any significant changes to the wood supply for California.

4.2. Physical and Biological Environment

4.2.1. Old Forest Ecosystems

A. Measures or Factors Used to Evaluate Alternatives

Three different factors were used to evaluate the alternatives for the FEIS: (1) the amount and distribution of old forest; (2) fire risk and hazard and predicted losses to wildfire; and (3) old forest functions and processes. In addition, to the factors considered in the FEIS, the consequences of potential drought and insect/pathogen outbreaks are addressed for this supplement. In this section, consequences in relation to drought, insects and pathogens are tiered to the more detailed discussion regarding forest ecosystem health in Part 4.2.2.

B. Assumptions and Limitations

Drought, Insects and Pathogens

While most insects and pathogens currently operating in the project area are native and have and continue to play important roles in old forest processes and functions, the scale and magnitude of insect/pathogen and drought related mortality events are thought to have changed since pre-settlement conditions (Ferrell 1996). Extensive areas with high levels of mortality, particularly of large and/or old trees can have major consequences to old forest structure, composition and function. Given the restricted amount and distribution of large patches (larger than 100 acres) or blocks (>1,000 acres) of old forest, any severe insect/pathogen mortality related event can be a significant loss to the remaining old forests. In order to evaluate the consequences of such mortality events, Alternatives S1 and S2 were interpreted qualitatively to evaluate likely changes in the potential for extensive, high severity, insect/pathogen related mortality events. The relative susceptibility of the forest type and location to drought and insect/pathogen related mortality was considered. This included typical precipitation patterns, forest composition, and forest density. It was assumed that forest types occurring in the drier portions of the landscapes (low average annual precipitation) and near the limits of the environmental tolerances for the species (e.g. lower limit of precipitation where they can survive) were the most susceptible. This includes all montane eastside (eastside pine, eastside mixed conifer and eastside white fir) and most of the lower montane westside (ponderosa pine, lower elevation mixed conifer) forests.

There are several aspects to the response of old growth to drought and insect/pathogen related mortality that were discussed in the related forest and vegetation health section, presented earlier in this document. First, recent research has shown that large, and often older trees respond differently to drought than smaller trees. How different the response is, also may depend upon the climatic regime under which the tree developed—hence there may also be differences due to tree age. Water relations research on drought response in relation to tree size in western US conifers has revealed that large trees can be more resilient to drought due to: greater and longer access to soil water because of deeper roots, and increased water storage capacity in boles and large branches (Williams et al. 2001, Ryan et al. 2000, and Phillips et al. 2003). The deeper roots may be particularly pronounced when the trees have developed during drier climatic regimes, because of greater allocation of energy toward root production during these conditions (Williams et al. 2001). As discussed in the forest and vegetation health section, the recent 150 years has been relatively wet. Therefore, it could be that large trees that grew prior to 150 years ago, would have developed deeper root systems, conferring them additional resilience to drought. The degree of advantage of deep roots, depends in part on subsurface water and soil conditions (Reigel, pers. comm.). The implications of this research is not that large, old growth trees are immune to drought or drought-related insect/pathogen mortality but that stand density guidelines for forest health that have been developed in younger forests may not be directly applicable to older forests. Older forests may be able to carry higher basal areas than younger forests in similar conditions.

Despite the potentially greater resilience of large, and especially older trees to drought, given that they are considered to be below desired levels in the Sierra Nevada, and particularly in the eastside and ponderosa pine dominated forests, reduction of competition for water and nutrients from dense small trees is important to their survival.

Progress toward Desired Conditions for Old Forest

In the FEIS, one of the indicators/measures used for addressing consequences to old forest ecosystems was “Historic Conditions as a Management Reference”. Both alternatives include desired conditions for old forest that are based in part on historic conditions and therefore, this measure is not as critical as the degree and rate at which the alternatives emphasize or make progress toward the desired conditions. This measure has been refined and replaced with the indicator of progress toward desired conditions for old forest. This incorporates the aspects of desired conditions for old forest at both local and bioregional scales. At the local scale, the desired future conditions have been specified in terms of specific levels of large trees, canopy cover, openings and the recruitment pool for large trees (USDA, 2001, FEIS, Volume I, Chapter 2, page 136-143). At the bioregional scale, the amount, location and distribution of old forest emphasis areas encompass desired conditions for old forest that incorporate provision of: 1) high levels of old forest patch types (>70% of landscape where site capacity allows); 2) large blocks of old forest based on best remaining landscape concentrations; 3) ensuring complete landscape units—and their associated genetic and ecological variability—are incorporated; 4) maintenance of unknown old forest associated species, processes and functions (Franklin et al. 1996).

Franklin et al. (1996) discussed the importance of conservation of large blocks of old forest to ensure a full array of old forest functions in the Sierra Nevada. The reasons included: 1) “large contiguous areas of high quality LS/OG forests did occur in the presettlement landscape of the Sierra Nevada”; 2) “a habitat requirement for large blocks of LS/OG forest neither has been proven or disproven for vertebrate species in the Sierra Nevada”; 3) “large LS/OG blocks are important to ensure landscape units—and their associated genetic and ecological variability—are incorporated within the LS/OG conservation strategy”; and 4) “large LS/OG blocks are important to incorporate natural patterns of disturbance and successional stage resulting in complex mosaics typical of high-quality LS/OG forests. In the Sierra Nevada, there is some evidence that some vertebrates may require large blocks of late-successional forest habitats for their long-term persistence. For example, demographic model simulations indicate that the California spotted owl consistently persists longer using a conservation strategy with fewer large reserves (sufficient for 10-20 owl pairs) than with many small reserves (sufficient for 1-3 owl pairs) (Andersen and Mahato 1995).”

Since the FEIS, research on California spotted owl habitat-demography relations in the westside forests of the Lassen Demographic study area has revealed that there is closer correspondence between old forest definitions including large trees at the patch and landscape scale and owl reproductive success than was previously known (Blakesley pers. comm.). Further research is needed to determine if similar relationships occur in other portions of the owl’s range. Previously, there has been some disparity between environmental effects analysis of California spotted owl, with the emphasis on the CWHR habitat type classification (focusing on size class and canopy cover), and old forest ecosystems, with an emphasis both on CWHR classifications and old forest classifications including large tree densities and canopy cover (Frankin and Fites-Kaufman 1996).

C. Effects of the Alternatives on Old Forests

Expected losses to wildfire are discussed first, since these predicted losses influence estimates in trends in the amount, distribution and function of old forests.

Fire Risk and Hazard and Predicted Losses to Severe Fire

Alternatives S1 and S2 are projected to decrease the annual acreage burned by wildfires with Alternative S2 projected to have approximately double the rate of reduction than Alternative S1. The projected trends estimate that Alternative S2 would burn 4,200 fewer acres than Alternative S1 on an annual basis during the first decade and 8,800 fewer annual acres during the second decade, when the strategic fuel treatments are projected to be completed.

What is more important to effects on old forests is the probability of future fires in concentrations of existing old forest and the level of mortality associated with the predicted fires. Alternative S1 uses a strategic fuels reduction approach, and watersheds with the highest fire hazard and risk rating have highest priority for treatment. Alternative S1 has a standard and guideline directing focus on the low elevation mixed conifer and ponderosa pine ecosystems that have the highest fire hazard and risk. However, fuel treatment levels and rate, and the uncertainty of the ability to effectively implement fuel treatments due to wildlife habitat retention guidelines (see fire section), make expected reduction in undesirable wildfire effects uncertain. In particular, the standards and guidelines affecting fuel treatments (including LOP's for burning) in Alternative S1 would apply in areas likely to contain concentrations of old forest: habitat associated with the California spotted owl and the Pacific fisher. This may delay implementation of planned activities adjacent to areas where the species is present or alternate prescriptions may need to be developed which result in retention of higher fuel levels. Therefore, Alternative S1 causes a slight reduction in the likelihood of loss of old forest to high severity fire compared to no treatments at all. However, it is likely that some small proportion of key old forest would be at less risk from severe wildfire.

Alternative S2 provides less restrictions on fuel treatments, making it more effective in changing fire behavior, fire severity and acres burned in the landscapes treated. However, the emphasis is on the WUI for at least the first five years, where only a portion of the old forest occurs. After the first decade, there is no specified focus on old forest or the forest types that are currently at greatest risk, therefore it is uncertain as to the extent of changes in wildfire in old forest. There would be greater retention of old forest under Alternative S2 in the WUI, but possibly little or no difference from Alternative S1 in other old forest locations.

Cumulative Effects. There are likely cumulative effects of increased population growth in California, increased development in urban intermix zone, and increased air pollution on fire risk and hazard and predicted losses to severe fire. The number of ignitions and fire risk is likely to increase with increased populations and increased development in the urban intermix zone. Current zones of highest ignitions and fire risk often coincide with areas of high human influence. This trend could differ with increased fire prevention and education (e.g. Cole and Kaufman 1966, Doolittle and Welch 1974, Folkman 1973 and 1975, see California Fire Plan: http://frap.cdf.ca.gov/projects/pre-fire_mgmt/pre-fire.html). Air pollution in the southern Sierra Nevada is showing signs of affecting forest vigor, including old forests and increasing litter production rates and surface litter/fuel accumulations in pine dominated forests. Decreased vigor of trees predisposes them to a higher likelihood of mortality especially following stressful events such as wildfire.

There are also likely cumulative effects from potential future, severe drought and related insect/pathogen related mortality. Potential drought could result in direct and indirect mortality from insects/pathogens as well as increased potential for high severity fire in old forest. This potential would be particularly high in the southern Sierra Nevada mixed conifer and yellow pine (ponderosa and Jeffrey pines), westside ponderosa pine and low elevation mixed conifer forests occurring where average annual precipitation is low and in eastside pine, mixed conifer and white fir forests.

Amount and Distribution of Old Forest Conditions

Large or Old Tree Element. The amount of large and/or old trees is expected to increase in both alternatives due to restrictions on harvest of large trees. These increases are offset to different degrees by the predicted wildfire losses that vary by alternative. Alternative S2 has a greater diameter limit (30 inches dbh) for treatment, than Alternative S1 (eastside pine 24 inches dbh). Trees greater than 30 inches dbh are particularly rare in the eastside forests (Franklin et al. 1996). Trees 20 to 30 inches dbh provide the primary and most immediate recruitment pool for restoration of large trees, larger than 30 inches. It is not known how much of this recruitment pool will be removed as part of fuel hazard reduction or other activities in the eastside. Removal of trees in this recruitment pool could delay the restoration of old forest conditions in the eastside by at least several decades.

The cumulative effects of fire management strategies and associated fire losses on large tree levels vary between alternatives, although the differences are primarily in the WUI in the first 10 years. Alternative S1 would have limited effect on the large tree component because of the standards and guidelines are likely to limit effectiveness of treatments to some degree. Alternative S2, although expected to have greater effectiveness of fuel treatments and thus reduced acres burned, has fuel treatments concentrated in the WUI in the first 10 years, where a limited portion of large trees occur. Therefore, the alternatives would not differ greatly in effects on the large tree component due to decreased acres burned in the first 10 years. Beyond that, less loss of old forest (and thus large trees) to high severity wildfire is expected in Alternative S2 than in Alternative S1, due to the lower acreage of predicted wildfire. However, since there is no stated focus on reducing fire hazard in old forests in Alternative S2, it is uncertain how much of this reduction will benefit large trees. Alternative S1 prioritizes reduction of fuel hazard in old forest, second to WUI and therefore could have a more beneficial effect to reducing loss of large trees to wildfires after the first 10 years. However, the efficacy of the fuel treatments is not predicted to be as great, and therefore the benefits uncertain.

Old Forest Patches. Both a spatial simulation of old forest patch types classified using CWHR classes for closed-canopied late seral forest, and SNEP LSOG ranks (Sessions et al. 1997) and qualitative assessment of the effects of the allocations and standards and guides were used to assess consequences.

CWHR Late Seral, Closed-Canopied Patches. There is little to no difference between the alternatives in the amount of CWHR types 5M, 5D, or 6 in the first two decades. Forest stand simulation modeling predicts that, over time (80-100 years), Alternative S2 has the potential to provide more CWHR type 5D than Alternative S1, primarily through a reduction in wildfire losses.

Patches with Large Trees. The amount of old forest patches, defined as SNEP LSOG rank 4 and 5 (Sessions et al. 1997) were simulated over time. The amount of patches ranked 4 and 5 increased steadily in both alternatives, but neither of the alternatives reached 40 percent of the forested landscape until the seventh decade. After, the seventh decade, Alternative S2 showed continued increases in the proportion of the landscape.

Old Forest Ecosystem Functions and Processes

Fire as a Process. Both alternatives have nearly the same projected acres of prescribed burning as a sole treatment. Alternative S2 contains approximately 3,500 acres of additional prescribed burning in wildland SPLATs. It is uncertain how much of the projected additional acres would be in old forest and this amount is not great, relative to the amount of old forest across the project area. Alternative S1 contains specific standards and guides emphasizing restoration of fire as a process in old forest and use as a fuel hazard reduction tool. Therefore, there is an increased likelihood of restoration of fire as a process in old forest in Alternative S1 more rapidly than under Alternative S2. However, both of the alternatives have standards and guidelines applying to prescribed burning around PAC’s that may make it more operationally difficult to burn in old forest areas. The end result is that there is likely little to no difference between the two alternatives in restoration of fire as a process.

Connectivity. Connectivity of old forests is provided to some degree at multiple scales in both alternatives through management direction for: (1) old forest emphasis areas-where applicable, (2) riparian zones, (3) protected activity centers, and (4) general forest desired conditions. Large blocks managed for old forest provide the greatest degree of connectivity for all modes and distances of movement because old forest is present at multiple scales and the most continuously distributed.

There is little difference between the alternatives with respect to connectivity. The alternatives share the same allocations for old forest. Both include large, dedicated blocks for old forest, old forest emphasis areas, which would provide for similar levels of connectivity. The lack of canopy cover retention standards in eastside forest types in the proposed action would lead to fewer areas of the landscape in moderate to dense canopy cover condition. However, this was likely an uncommon condition historically in these systems and therefore the importance of moderate to high canopy cover conditions for connectivity less important.

There would be differences in effects on connectivity in the HFQLG pilot project area, primarily from the group selections, where managers would only be required to retain large trees (greater than 30 inches dbh). The degree of the effect would depend on the context of the site where the group selections were conducted. If many groups are placed in landscapes with many existing openings (generally greater than 30% of the area) due to past management activities, natural openings, or wildfires, then the groups could result in decreases in connectivity for closed-canopied associated species. If the groups are placed in landscapes where existing canopy cover is generally continuous (greater than 30% of the area in openings), then the groups may not prevent movement of close-canopied associated species across the area.

Cumulative Effects related to Connectivity. The cumulative effect of wildfire losses on old forest connectivity varies by alternative and location in the Sierra Nevada. The westside of the southern Sierra Nevada is particularly vulnerable to losses of forest connectivity because montane and upper montane forests occur in an inherently narrow elevation band. The predicted decreases in wildfire losses in the proposed action may result in a decreased likelihood of loss of connectivity to old forests, particularly in the southern Sierra Nevada.

Representativeness. Both alternatives ensure representation of a diversity of old forest because all strategies provide for distribution of old forests across watersheds or in old forest emphasis areas.

Carbon Cycling. Both of the alternatives are expected to have an increased amount of carbon storage because of the increase amount of large trees. The effects of different management strategies on sequestration are unknown.

Progress toward Desired Conditions for Old Forest

Local, Watershed Scale Desired Conditions for Old Forest. Both the alternatives have the same watershed-based desired conditions. However, in Alternative S1 the emphasis on retention of wildlife habitat, in particular canopy cover, will result in maintenance and increase of forest densities and canopy covers that are thought to be a result of fire suppression and in some areas greater than was thought to occur historically, particularly in the drier pine-dominated types. This includes both eastside pine, eastside mixed conifer and lower elevation westside mixed conifer (area below white fir dominated mixed conifer, Douglas-fir and ponderosa pine mixed conifer, Fites 1993). Alternative S2 includes a standard and guide to favor pine, but it is unclear how much difference this will make in restoration or maintenance of the pine component in these forest types.

The lack of canopy cover restrictions for fuel treatments across much of the eastside pine landscape will increase the likelihood that shade-intolerant ponderosa and Jeffrey pine will have a greater likelihood of successful regeneration and recruitment. The slight differences in canopy cover retention standards between the alternatives in westside forests will result in little or no difference in the ability of pine to regenerate, survive and grow to increase the overstory pine component, particularly where stand densities and canopy cover are thought to be greater now than they were historically (dry productive sites, on upper slopes, especially south and west-facing). SPLATs are placed in a distributed spatial pattern across watersheds in both alternatives. Where treatments occur on the upper, south or west facing slopes (dry sites) they may help move toward a desired condition of more open canopied conditions and where they occur on lower, north or east-facing slopes (moist sites) they may detract from a desired condition of more closed-canopied conditions.

The alternatives will likely have little difference in achieving desired conditions that would influence forest health, particularly insect and pathogen related mortality. There is a greater likelihood of reduced density in old forests in Alternative S1 because of the standards and guides specifying priority in fuel hazard reduction in lower elevation forests most at risk to drought induced insect/pathogen related mortality and priority for fuel hazard reduction in old forest. Alternative S2 would have a greater likelihood of improved forest health in eastside old growth and restoration of old growth due to greater flexibility in canopy cover reduction.

Bioregional Desired Conditions. Both of the alternatives contain a key component addressing desired conditions for old forest at the bioregional scale, the spatially explicit delineation of an old forest emphasis area system. However, the two alternatives vary in consequences to the four key elements described under assumptions and measures: 1) high levels of old forest patch types; 2) large blocks of old forest based on best remaining landscape concentrations; 3) ensuring complete landscape units—and their associated genetic and ecological variability—are incorporated; and 4) maintenance of unknown old forest associated species, processes, and functions.

In Alternative S1, there are specific standards and guidelines that direct different management practices in old forest emphasis areas that address the bioregional desired conditions for old forest ecosystems. This includes minimizing mechanical treatment and the associated uncertainty in effects to old forest associated species, processes, and functions. While this is applied to the entire old forest emphasis area in Alternative S1, the consequences to old forest ecosystems are particularly important for the “core” remaining large blocks of old forest represented by high ranked SNEP LSOG polygons and identified in the SNEP ALSE system. This alternative therefore maintains existing bioregional old forest ecosystem conditions that meet these desired conditions as well as provide for movement toward full achievement. Alternative S2 does not contain any different standards and guides for management in old forest emphasis areas, except in portions in the HFQLG area where there is a high proportion of core old forest emphasis areas and remaining large blocks in offbase and deferred allocations. The offbase and deferred areas overlap with a significant proportion of the LSOG rank 4 and 5 and SNEP ALSE’s. These areas would not be treated until the end of the HFQLG, at which time, they could be considered for treatment. Therefore it is uncertain whether the existing old forest conditions are retained or whether there will be progress in moving toward achieving the bioregional old forest desired conditions.

4.2.2. Forest and Vegetation Health

A. Measures or Factors Used to Assess Environmental Consequences

1. Vegetation Density and Composition

Consequences to vegetation density and composition were based upon likely changes relative to movement toward desired conditions (USDA 2001, FEIS Volume I, Chapter 2, pages 136-143). Particular focus was placed on those ecosystems and forest types with the greatest changes in density and composition since European settlement, and most at risk from potentially severe mortality events from drought, insects and pathogens. This was inferred from the amount, location and type of treatments and standards and guides affecting vegetation management.

2. Insects, Pathogens and Abiotic Factors

Measurements to analyze the effects of the alternatives to insects and diseases in the Sierra Nevada are as follows;

- amount and location of forests treated with vegetation management
- ability to suppress out-breaks through direct removal
- creation of slash
- potential fire damage

3. Regeneration

Three measures were used to evaluate consequences to regeneration: 1) acres treated (mechanically or by prescribed fire); 2) acres in group selection cutting; 3) acres burned (wildfire)

B. Assumptions and Limitations with Projecting Environmental Consequences

Insects/Pathogens

Location, severity and length of drought are important factors in determining mortality levels. This mortality would typically result in, (1) openings that range from less than 1/4 acres to 50 acres or more, and (2) an increase in the amount of standing dead and down woody material.

These effects have consequences relative to:

- a continuing need/opportunity to enter stands to conduct salvage operations;
- an increase in fuel loadings;
- more snags and down woody material;
- fewer large, older trees and fewer of the mid-diameter trees that represent the pool from which the large trees of the future will come;
- reduction in crown closure and loss of wildlife habitat;
- a short term increase in nutrient cycling and
- depending on location, an increase in hazard trees;
- fewer trees/acre
- increase species diversity/decrease species diversity
- a change in species composition

The importance or significance of these effects depends on their severity and extent, and ultimately how they affect (positively and/or negatively) ecosystem structure and function (desired condition) and specific management goals and objectives.

C. Effects of the Alternatives

1. Forest Density and Composition

The two alternatives both differ and are similar in their consequences to forest density and composition. Alternatives S1 and S2 focus fuels reduction treatments in the defense zone of the WUI and in a strategic pattern of SPLATs across the threat zone of the WUI and into the wildland. These SPLATs are designed to adhere to a strategic pattern across the landscape to interrupt the potential for fire spread. Fidelity to the base spatial pattern results in SPLATs occurring scattered across the landscape rather than concentrated treatment in isolated portions of the landscape. Although the pattern of SPLATs would be similar in both alternatives, the intensity of treatments would differ. Since SPLATs are not focused in the drier portions of the landscape where forest density concerns are greatest, the rate of movement towards desired conditions, density reductions and pine restoration would be less than if treatments were focused upon the areas of highest risk. Alternative S2 allows greater reduction in canopy cover in the eastside pine ecosystems. This would enhance the likelihood of moving toward desired conditions and restoration of the pine component and reduced stand densities in this ecosystem. In the HFQLG area under Alternative S2, the DFPZ's are more likely to be placed on upper slopes or ridgetop positions, where benefits to density reduction and pine restoration are important although the benefits would be tempered by the higher intensity of thinning. The consequences for group selections to density reduction and pine restoration are mixed. While density would be reduced in the groups, it is unknown what the benefit would be to overall stand density and susceptibility to drought induced, insect/pathogen related mortality in the remaining portions of the stand. It is likely that the groups would result in enhanced pine recruitment, particularly if planted. It is unknown how much of the group selections would be focused on the forest types and landscape locations where the drier, once-pine dominated forests were.

2. Insects and Pathogens

Direct effects related to insects and diseases can be altered through the use of prevention and suppression activities. Insect and/or disease prevention activities promote tree health and vigor and are designed to limit unacceptable levels of resource damage and mortality before it occurs. Suppression and/or prevention refers to the reduction of insect or disease-related damage or mortality to acceptable rates through the application of either one or a combination of silvicultural, mechanical, chemical or biological control methods.

Two things are important to recognize when assessing the potential consequences associated with bark and engraver beetle-related mortality in the future, (1) periods of precipitation at or above normal create an opportunity to conduct management activities that result in an increase in tree health and vigor during a time when trees are not under severe drought stress, and (2) the onset of a below normal precipitation regime would lead to an increase in drought/bark beetle-related mortality, with higher levels of mortality being detected the longer the drought period is sustained. As observed during the most recent protracted dry period, much of the mortality would occur in the areas that normally receive 40 inches or less precipitation annually.

The environmental consequences of implementing the alternatives from the stand point of insects, pathogens, and abiotic influences are directly related to (1) implementation of vegetation management activities (thinning) intended to create vigorous and healthy growing conditions likely to reduce/prevent insect and diseased-related damage or mortality, (2) implementation of direct suppression efforts against Jeffrey pine beetle, (3) the amount of green slash created and how long the slash stays in a state to be suitable host material for *Ips* beetles, (4) bark beetle-related mortality associated with trees damaged by prescribed or wildfire, (5) the ability to regenerate areas that are heavily infested with dwarf mistletoe or root diseases, (6) the ability to plant rust-resistant sugar pine seedlings to ensure recruitment of sugar pine into future stands.

Thinning

Areas that are precluded from tree removal activities, particularly those areas that would normally receive less than 40 inches of precipitation annually, may experience high levels of mortality when drought conditions return. Assuming that tree harvest treatments in SPLATs and WUIs are designed with one of the goals being to improve stand vigor and health, such treatments should reduce the mortality that might occur with a future drought. There are standards and guidelines that may work against this desired outcome, primarily upper diameter limits on harvested trees. These upper limits (24” eastside, 30” westside in Alternative S1; 30” everywhere in Alternative S2) are not expected to affect the overall ability to reduce the susceptibility of stands to increased mortality because stands with high densities of large diameter trees are uncommon. Recent research on water relations and drought resilience of western conifers indicates that large trees, particularly older ones that developed in drier climatic periods, are more resilient to drought than smaller trees due to deeper roots and greater bole and branch water storage (Williams et al. 2001, Ryan et al. 2000, Phillips et al. 2003). Therefore, although reduction of stand density may be limited in some individual stands of large trees, the risks to those trees may be less than retaining high density of trees in younger stands.

Based on projections of treated acres in SPLATs, DFPZs, and group selection openings, Alternative S2 provides a slight amount of increase in acres that could potentially be improved in terms of reducing stem density as compared to Alternative S1. In terms of the acreage, S2 provides an increase of about 50,000 acres treated mechanically over S1, although the total treated acres (1,460,600 acres) is only about a quarter of the total acreage that has a forested cover (approximately 6,300,000 acres) and most of this increase is in group selections. It is unknown how effective group selections are in reducing risk to drought related insect/pathogen mortality compared to thinning, especially to untreated adjacent stands. The degree of effect of stand density reduction on reduced tree competition and increased vigor when clumped versus distributed with thinning is not known. In terms of this total land base, there is little difference between the alternatives in terms of the potential to reduce risk of drought/beetle/disease complex-caused mortality. Under Alternative S2, there are allowances for forest health projects (primarily thinning) outside of SPLATs and defense zones within mature forest habitat types. The restrictions on the activities within these stands (diameter, crown closure) may still allow for adequate treatment to reduce risk, depending upon the characteristics of the stand of trees being considered. There are no estimates of acreage that could be accomplished as forest health thinnings under Alternative S2 because these treatments would be planned and analyzed locally, based upon site specific risk factors and conditions and because no overall regional goals are being set.

Bark beetle-related mortality, particularly during drought conditions, would be expected to be less in those areas that are dominated by species adapted to the site and in areas where trees are not competing for water and nutrients. Stocking control, through mechanical treatments, would typically limit bark beetle-related mortality to acceptable rates on those treated acres. Stocking control would have a greater impact on bark beetle prevention in eastside stands. Tree growth and vigor would be realized on the west side as well, as a result of stocking control, but these higher quality sites typically receive higher amounts of precipitation, and are therefore less susceptible to bark beetle-related mortality. All additional lands that are overstocked, particularly in the transition and eastside zones during protracted drought periods, would be susceptible to high levels (above 10% of the trees/acre) of bark beetle-related mortality.

Direct Suppression

Tree Removal

Direct suppression by tree removal of infested trees would be an option to reduce Jeffrey pine mortality where Jeffrey pine beetle infestations occur in areas where mechanical treatments are allowed. Similar to the discussion concerning thinning, the acres available for tree removal are not a majority of the forested lands, and diameter limits would further reduce the ability to use this direct control method unless justified by a site-specific exemption through a local forest plan amendment . The ability to quickly plan and implement a treatment unit (most likely a SPLAT) so that it overlaps a Jeffrey pine beetle infestation area would be difficult to accomplish in the early stages of an infestation or for sporadic isolated infestations. Successful direct suppression of Jeffrey pine beetle through removal of infested trees under either Alternative S1 or S2 would seem remote, except where a prolonged infestation were occurring and local planning modified the standards and guidelines to accommodate the needed tree removal.

Slash Treatment

Pine engravers such as *Ips paraconfusus* and *Ips pini* periodically infest green pine slash. Host material can be created through wind events, snow breakage or harvesting activities. Residual trees can be attacked simultaneously when pine engravers are infesting the slash or later by emergent populations that have developed in the slash. Attacks to residual trees can result in top kill and/or whole tree mortality. The alternatives vary somewhat in the amount of slash created, based upon the level of management activities. The ability to deal with non-harvest created green slash, such as the result of a windthrow event, would seem low, especially if it occurred away from the WUI given the current and projected priorities for fuels treatments and budget allocations.

Fire-damaged trees

The wildfire acres burned projections begin at approximately 62,000 acres per year. Over the next 15 decades, Alternative S2 reduces annual wildfire acres by approximately 10-20,000 acres/year. Trees that are not killed outright by the fires but have sustained fire-related injuries to either the crown or cambium will be at higher risk to bark beetle attacks for about a decade following the fire. Observations of significant increase in bark beetle activity or a large increase in mortality associated with bark beetles over the past 5 years following wildfires has not occurred; however, this outcome would have likely been very different in some vegetation types and locations had fires coincided with a protracted drought cycle.

All of the conifers within areas that are under-burned would be considered to be susceptible to bark beetles for 1-2 years if the residual trees sustain fire-related injuries. There is only a slight difference between the alternatives in terms of prescribed burn acreage, with Alternative S2 forecast to have about 3,400 acres more burning as the initial treatment where burn intensity may be higher due to fuel accumulations. Alternative S2 forecasts about 115,500 acres more burning as follow-up and/or maintenance of previously treated areas. Prescribed fire intensity in these area may be less than during initial treatment where mechanical treatment was used during the initial treatment assuming that small diameter undergrowth was treated (mechanically removed or piled and burned). Where prescribed fire was used as the initial treatment, follow-up prescribed burning may be at a higher intensity as small diameter undergrowth killed during the initial burn would become ground fuel for the second burn. Fire-related injuries and subsequent bark beetle infestations would be exacerbated by conducting burns during drought conditions.

Reforestation

The ability to manage areas that are heavily infested with dwarf mistletoe, either through the removal of heavily infected overstory trees, or through the regeneration of areas with a different mixture of species is key to reducing future mortality as a result of mistletoe/insect interaction. With the exception of the limited amount of group selection openings in the HFQLG area (11,000 acres in Alternative S1, 42,500 acres in Alternative S2), neither alternative will allow for the reduction of dwarf mistletoe impacts. Restrictions on canopy cover reduction as well as upper limits on harvest tree diameters will preclude being able to deal with infestations that are in the overstory trees. With the ability to place group selection openings, there may be some limited ability to reduce dwarf mistletoe impacts, however the 30” upper diameter limit in these group selection openings would require planting of species different than the infected overstory for effective reductions to be possible.

The ability to provide adequate openings for the planting and survival of rust resistant sugar pine is key to the future of this species, as current non-resistant seedlings and saplings are highly susceptible to the rust, especially during ‘wave’ years when climatic conditions provide ideal conditions for high levels of infection – wave years occur about once a decade. The number of mature sugar pine in the future will be directly related to the ability to successfully reforest with genetically resistant seedlings and protection of naturally resistant stock. Maintaining existing mature sugar pine can retain the genetic resource only as long as these trees survive. The ability to conduct salvage harvests of dead trees after some disturbance event (windthrow, fire, drought) under Alternative S2 does provide the potential for reforestation of rust resistant sugar pine.

3. Regeneration

Since both alternatives emphasize light thinning and fuels reduction to favor development of late seral desired conditions, most management activities will tend to favor shade tolerant species at the expense of ponderosa pine, black oak and to a lesser degree sugar pine, madrone and other species with intermediate shade tolerance. In many cases, during project implementation, retention of shade intolerant species is favored over shade tolerant species, which may help in maintaining species composition in the short-term. Since both alternatives have the same land allocations with only minor differences in thinning intensity in the managed land base, differences in seedling recruitment will be insignificant, with the exception of acres burned by wildfire (stand replacement) and group selection areas on the HFQLG landbase.

Acres that are precluded from management activity will provide limited opportunity for regeneration and recruitment of shade intolerant trees. Unless disturbance events create larger openings, regeneration will occur mostly in tree fall gaps. If such gaps are smaller than about ¼ acre, shade, root competition and other factors discussed above will tend to favor white fir and other shade tolerant species. Conditions near the center of larger gaps where root competition and shade are not as impacting will be better suited for development of ponderosa pine, black oak and sugar pine. Regeneration in unmanaged and closed canopy forests will generally be at a low level and will be fine-grained, occurring as very small groups within a matrix of much larger trees.

Areas that are thinned for fuels reduction will still retain high levels of residual canopy that will provide ample shade and root competition to favor regeneration by shade tolerant species. However, mechanical treatments and prescribed burning will create suitable seedbed over considerable areas that will encourage seedling germination during good seed crops. Certainly some pockets of regeneration will establish with ponderosa pine, black oak and sugar pine performing better near the centers of openings. Regeneration in these lightly thinned areas will be at an overall low level and will generally persist in small groups. Follow-up fuels reduction treatments (usually prescribed burning) will pose an additional threat to young trees. In fact, eliminating or reducing the numbers of young conifers may be a management objective of these treatments to reduce ladder fuels and overall fuel loading. If new regeneration is desired, treatments will need to be designed to protect young seedlings and saplings from damage. Such treatments may also be used to favor establishment, survival and growth of desired regeneration, through supplemental planting, selective thinning, or control of competing vegetation. Such methods could be used to favor intolerant species where tolerant species would typically dominate.

Comparing composition of seedlings under 30 years of age on high site mixed conifer stands in northern California, Lilieholm (1990) found that ponderosa pine was not present under a heavy overstory in an unmanaged stands. However, active management to favor intolerant species in small openings did allow ponderosa pine (intolerant) and sugar pine (intermediate) to persist in stands with an 8 to 12 year re-entry cutting cycle. This finding indicates that where relatively high stocking is retained on high and moderate sites, some active management will be needed to encourage recruitment of intolerant species for future stand development.

Small group regeneration on HFQLG forests

Small group regeneration allows more flexibility for land managers to control species recruitment through planting or management of natural regeneration. Seedling survival, growth and composition may be managed at the time of initial planting and during follow up treatments to control competing vegetation and pre-commercial thinning. Conditions near the edges of groups would tend to favor shade tolerant species, but the larger scale opening (up to 2 acres) provide ample area of suitable habitat for intolerant tree species to establish and grow. However, the amount of sunlight and reduction of root competition common to openings will be reduced if numerous trees greater than 30 inch dbh are left on site.

Though limited in scope to the Lassen, Plumas and Sierraville Districts of the Tahoe National forest, group selection as part of the two alternatives will provide some opportunity to actively manage species composition in small groups. Over the next five years 27,450 more acres of group selection would be treated under Alternative S2 than Alternative S1. Total group regeneration planned for Alternative S1 is 15,050 over the next five years, compared to 42,500 in Alternative S2. Group selection within these areas will only occur during the life of the HFQLG Pilot Project, which is expected to be completed within five years.

Stand Replacement Events (primarily wildfire)

Large openings greater than 10 acres will result only from stand replacing events such as fire or large scale insect mortality. Restoration following stand replacement may involve salvage harvesting of some trees, reforestation and establishment of other desired vegetation, as well as other fires rehabilitation activities to protect soil, water quality and wildlife habitat. These events are also an opportunity to manage tree species composition through planting, natural seeding, and follow-up treatments.

Conditions in these large opening tend to be more hot, dry and extreme than under stands of residual trees. Usually available moisture is limiting to conifers establishment and survival. Sunlight is almost always ample for all conifers to grow to full potential, if adequate moisture and nutrients are available. Control of competing shrubs and other low vegetation may be needed to reduce competition for moisture to allow quicker establishment of trees. Many hardwoods, including black oak, tanoak, live oak sprout readily from top killed root crowns. Some regenerate from acorns that may escape lethal temperatures during fires. In some cases, resprouting hardwood trees compete with conifers for growing space and moisture. This is particularly true in areas with tanoak. [Standards and guidelines in both alternatives favor hardwood regeneration over conifer regeneration by restricting planting of conifer seedlings in proximity to hardwoods.]

Natural seed source becomes an issue in large, high intensity fires. McDonald (1980) observed that 89% or more of sound seeds of ponderosa pine, Douglas-fir, white fir and incense cedar fell within about 200 feet of the source trees. Though some seed may travel farther, the probability of openings receiving adequate natural seed decreases sharply with increasing distance from a seed source. Therefore planting of openings larger than about 10 acres may be essential to assure adequate conifer stocking to meet desired conditions.

Artificial planting gives managers many options to control species composition. Shade intolerant pines perform very well when planted and other more tolerant species may be mixed in where appropriate. Planting also allows managers to incorporate sugar pine seedlings produced from parent trees that are known to be resistant to white pine blister rust. This is the single most effective tool available to managers to counter this devastating disease of white pines.

Though dramatic and often catastrophic, wildfires are the single best opportunity for larger scale (stand to watershed) recruitment of shade intolerant species. Due to more aggressive and effective fuels treatments Alternative S2 is projected to have about 2,086 acres per year less lethal or stand replacement fires than Alternative S1.

4.2.3. Aquatic, Riparian, and Meadow Ecosystems

A. Methods Used to Assess Environmental Consequences

The FEIS and ROD included aquatic management strategy goals describing desired conditions for aquatic, riparian, and meadow ecosystems (Volume 1, Chapter 2, pages 40-50; ROD, Appendix A, pages A-5 to A-9). These goals are not changed by the SEIS.

The FEIS identified several factors that were used to evaluate the effects of the alternatives on aquatic, riparian, and meadow ecosystems (FEIS Vol. 2, Chapter 3, part 3.4, page 227-228). Three of those factors are related to changes proposed in the SEIS: (1) reduction in the risk of wildfire acres including effects from wildfire recovery and timber salvage; (2) fuel reduction activities including acres of mechanical fuel reduction treatments and acres of prescribed fire; and (3) grazing management.

Effects Related to Wildfire Risk, Wildfire Recovery and Timber Salvage

The FEIS discusses the tradeoffs between the potential for aquatic and water quality impacts from activities (mechanical treatments and prescribed fire) and the risk of damage from high severity wildfire (FEIS Volume 2, Chapter 3, part 3.4). The treatments in both alternatives are predicted to reduce the risk of wildfire (both in extent and severity) over the untreated landscape. Alternative S2, because it treats more acres using mechanical treatments and at a higher intensity, reduces the risk of high severity wildfire to a greater extent than Alternative S1. Commensurate with this, however is a greater risk of effects from the treatments themselves, as described in the following section.

The tradeoffs of salvage logging following catastrophic wildfire were also addressed in the FEIS. Risks were measured by the likelihood of the need for wildfire salvage and recovery, which was related to the risk of wildfire, and by the extent of treatment possible within wildfire areas. The risk of wildfire was addressed above. Alternative S1 includes restrictions on certain areas following wildfires. At least 10 percent of the total stand-replacement area must be retained unsalvaged to provide for wildlife and ecosystem needs. Salvage in old forest emphasis areas and spotted owl home range core areas would only occur to the extent that it would benefit landscape conditions for old forest structure and function. Alternative S2 does not have the area restrictions of Alternative S1, but provides direction to design post-fire restoration projects to reduce potential soil erosion and loss of soil productivity, protect and maintain critical wildlife habitat, and manage the development of fuel profiles over time. Determinations on the extent and intensity of wildfire salvage will be made at the local level based upon site-specific analysis under this alternative. It is likely that more acres in old forest emphasis areas and spotted owl home range core areas will have some level of salvage under Alternative S2 than in Alternative S1 due to the lack of specific area limitations.

Salvage related to insect and disease mortality and other forest events, such as blowdown, and general treatment for forest health was not specifically addressed in the FEIS analysis for aquatic resources. The effects of salvage would be similar to those described in the FEIS and SEIS for wildfire salvage with the exception that it has the potential to be more widespread and distributed across an entire landscape rather than concentrated as in a wildfire. Alternative S1 does not specifically address salvage or forest health treatments not related to stand-replacing wildfire. It is assumed that in this alternative, treatment opportunities would depend upon the desired conditions within the underlying land allocations, snag and down log requirements and area limitation requirements of those land allocations and upon direction in the forest land and resource management plan. Alternative S2 is permissive in addressing non-fire related salvage and forest health. It allows consideration of salvage and forest health for a variety of reasons, including to recover value and support vegetation management objectives. As with Alternative S1, Alternative S2 relies on local analysis to determine the extent and intensity of these types of treatments. Because non-fire salvage is stochastic and unpredictable (in a planning context) and because the actual treatments are determined locally, it is difficult to analyze the effects at a bioregional scale. Similar, treatments to improve forest health would be dependent upon site-specific conditions and the need for and intensity of treatments would be expected to be set locally. Since the land allocations and desired conditions are the same between Alternative S1 and Alternative S2 and since both apply the same Aquatic Management Strategy, although the extent and intensity of treatments may be higher in Alternative S2, the effects on the aquatic, riparian and meadow ecosystems should be similar. Local analysis would be needed for these projects.

Effects Related to Fuel Treatments

The spatial placement of SPLATs largely determines the extent of risk associated with aquatic, riparian and meadow ecosystems. SPLATs in Alternatives S1 and S2 are assumed to be in the same locations, although treatment methods and intensities vary between alternatives. In the FEIS, SPLATs were assumed to primarily be placed on the upper two-thirds of slopes which acted to minimize the overlap with intermittent and perennial streams. In Alternatives S1 and S2, SPLATs are not limited to any geographic position and are assumed to occur in a more systematic pattern across watersheds. This change results in more potential treatments along intermittent and perennial streams. Alternative S1 includes the provision for leaving portions of treatment areas in an untreated condition. It is likely that riparian areas and those along intermittent and perennial streams would be priorities for retention to meet this untreated area requirement. Alternative S2 does not include the requirement for retention of untreated areas within SPLATs and strives to ensure treatments effectively reduce fire behavior and fire effects within treatment units. Both alternatives require completion of a Riparian Conservation Objectives (RCO) Analysis at the project level when treatments affect Riparian Conservation Areas. Potential conflicts between conducting adequate fuels treatments within SPLATs and meeting the riparian conservation objectives may occur but it is not possible to accurately forecast the extent of this conflict at the bioregional scale because the conflicts and their potential resolution are site-specific and locally defined. The purpose for the RCO Analysis is to identify those local issues and to aid in informed management decisions.

The effects of prescribed fire on riparian, wetland, and meadow plant and animal communities are discussed in the FEIS. In general, effects are related to the intensity of the burn. It is assumed that prescribed fire of low intensity that retains sufficient post-burn ground cover will result in minimal effects. In addition, it is assumed that prescribed fire results in lower effects compared to high severity wildfire. Alternatives S1 and S2 have relatively little difference in the total number of acres treated with prescribed fire.

Mechanical treatments are assumed to have more potential for adverse effects primarily due to soil compaction and soil disturbance. The realized difference in effects between prescribed fire and mechanical fuels treatments however is tempered by a typical reduction in fire intensity (wildfire and prescribed fire) where mechanical treatments have occurred. Although more acres of mechanical treatment are proposed in Alternative S2 than in Alternative S1, both alternatives contain the same standard and guideline that limits ground disturbing activities to five percent of the Riparian Conservation Area, which would moderate the effects in these sensitive areas. It is assumed that the bulk of the increased acres of mechanical treatment in Alternative S2 would occur outside of Riparian Conservation Areas and thus contribute minimally to a difference in risk to aquatic resources. The FEIS assumed that implementation of the Soil Quality Standards and site-specific project analysis would minimize disturbance to the soil resource and prevent accelerated erosion from these ground disturbing activities (FEIS Volume 2, Chapter 3, part 3.4, page 231).

Effects Related to Grazing Management

The grazing changes proposed in the SEIS relate specifically to certain standards and guidelines for the great gray owl, willow flycatcher and Yosemite toad and to clarify interpretation of standards and guidelines. In general, the changes proposed in Alternative S2 are designed to allow local flexibility to design management practices that still adhere to the intent of the standards and guidelines in Alternative S1. Since they are developed site-specifically and locally, it is not possible to assess the effects at the bioregional scale. However, to the extent that they adhere to the original intent, the difference in effects would be expected to be minimal.

Summary of Effects to Aquatic, Riparian and Meadow Ecosystems

The FEIS determined that the overall effector on the landscape will be either mechanical fuel treatments or catastrophic wildfires. Both Alternatives S1 and S2 are judged to perform similar to the Modified 8 Alternative from the FEIS, which was determined to best protect the values associated with aquatic and riparian habitats. The primary differences between the analysis in the FEIS and the SEIS are related to the changed spatial distribution of SPLATs rather than differences between Alternatives S1 and S2. Alternative S2 might be thought to have a higher potential risk to aquatic resources than Alternative S1 simply because it prescribes slightly higher amounts of mechanical treatments. However with the application of the same Aquatic Management Strategy goals and related standards and guidelines, Alternative S2 would tend to result in projects with similar on-the-ground effects between the two alternatives.

4.2.4. Fire and Fuels

The alternatives are compared in the following three ways:

- wildland fire acres burned and severity of effects,
- economics of fuels treatments
- risk and uncertainty of implementation

A. Projected Wildfire Acres Burned

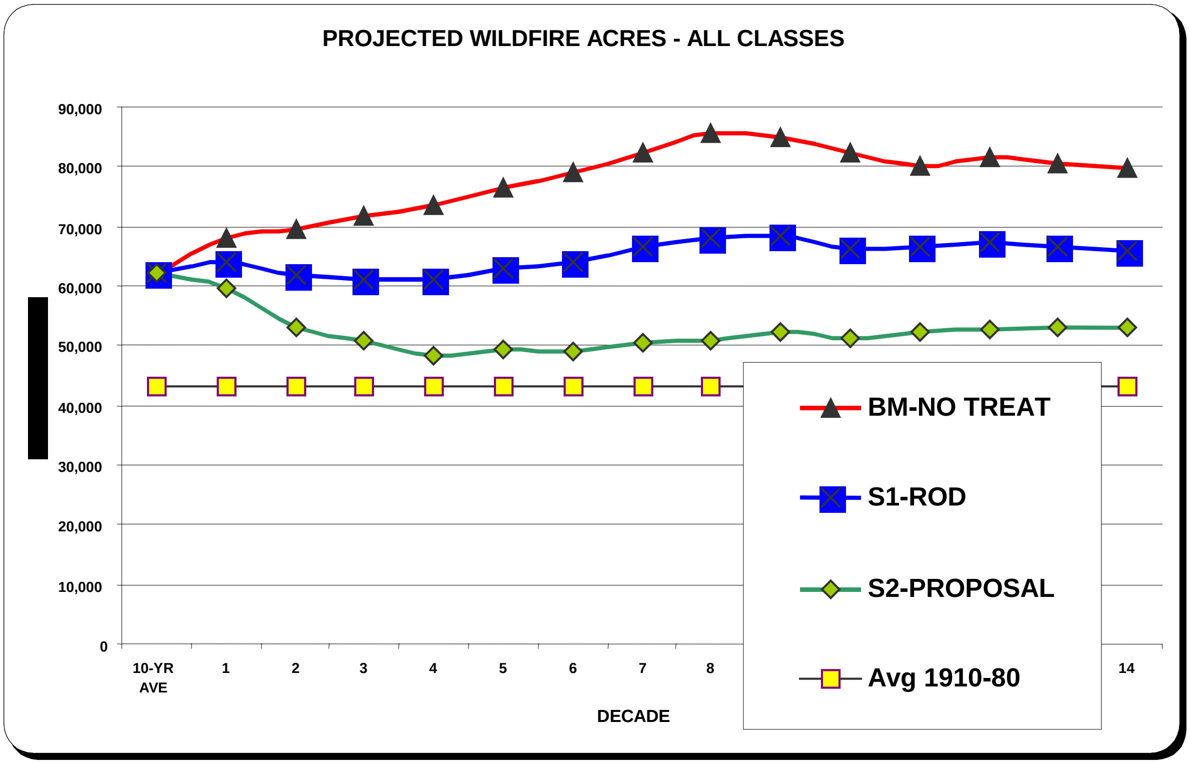
From 1910 through 1980, an average of 43,000 acres per year burned in wildland fires in the Sierra Nevada bioregion. This average, however, does not reflect the episodic nature of large fires.

The modeled output for the projected number of acres burned annually under each alternative is also a mean. Therefore, comparisons between historic averages and the model outputs should be framed as an increasing or decreasing trend compared to the average acres historically burned. The following figures are best interpreted when based on the following three characteristics:

- trend or trajectory,
- sustainability, and
- separation between alternatives.

The trends shown in figures 4.2.4a and 4.2.4b for the first 20 to 30 years are based on the assumption that the alternative is designed to change wildland fire and its effects on the landscape are in place and accomplished. This sets the trajectory for the alternatives. The average of 43,000 acres from 1910-1980 is on the figure as a reference line. There are three lines to represent the projected acres burned under No Treatment, the No Action (S1) and the Proposed Action (S2). The “No Treatment” line rises through the eighth decade, then levels. Alternative S1 initially rises slightly, then drops slightly, and then rises over time. Alternative S2 drops sharply in the first four decades and tends to rise slowly over time. These trends are the same for both figures

Figure 4.2.4a. Projected wildfire acres per year under each alternative for all lethality classes.



Differences in projected wildfire acres between Alternatives S1 and S2 vary over time. Differences range from a low of approximately 4,000 acres in the first decade to a high of approximately 17,500 acres in the eighth decade. The differences then remain in the range from 13,000 acres to approximately 17,000 acres.

Fire intensity effects in forested vegetation are described in three categories: lethal, mixed-lethal, and non-lethal. In non-lethal fires, only the youngest and smallest trees that are least fire-tolerant are killed. As fires burn with increasing intensity, different burn patterns emerge on the landscape, leading to a mosaic of different mortality levels (mixed-lethal fires). Where tree species are fire-adapted or are larger and more resilient to fire, less mortality occurs; other areas may experience higher levels of tree mortality. Lethal fires are those that are stand replacing events, where most or all of the vegetation is killed.

Figure 4.2.4b. Projected wildfire acres per year under each alternative for lethal or "stand replacement events."

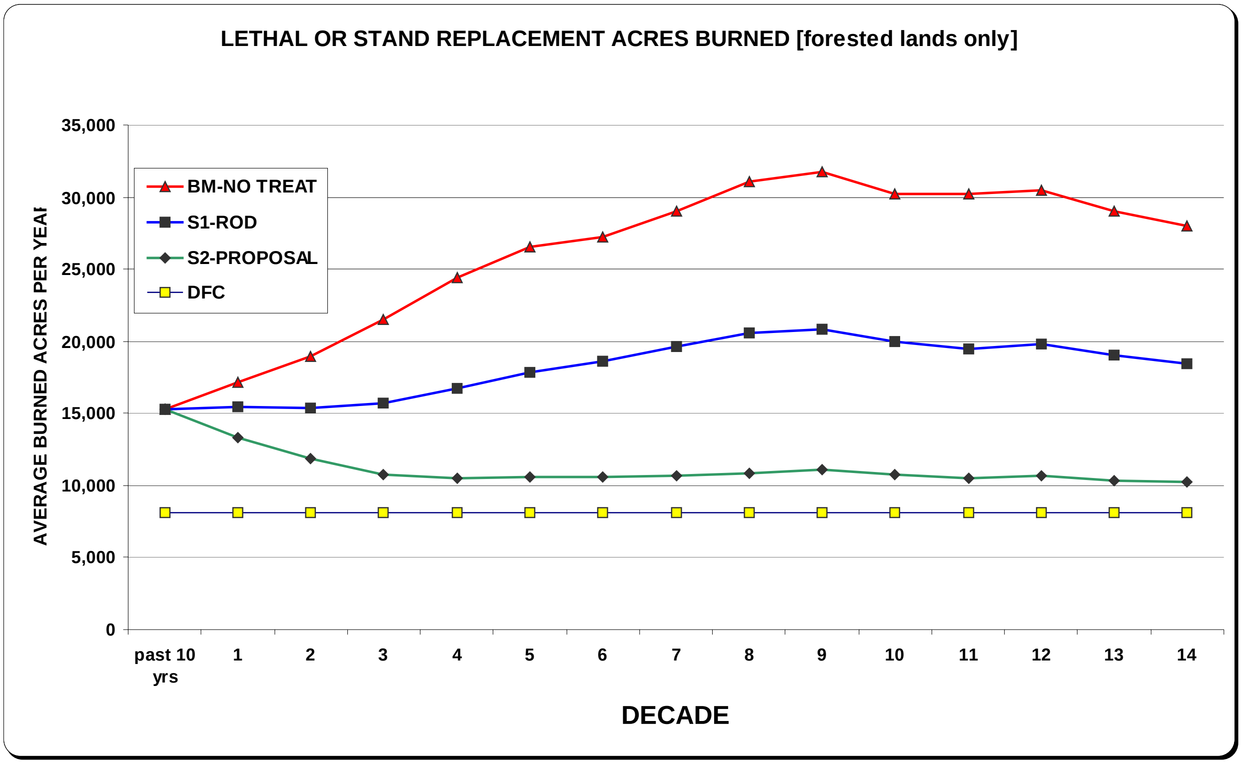


Table 4.2.4a. Summary of Lethal acres as a Percent of Total acres burned for the planning period.

	Past 10 year average	No Treatment	S1	S2
Total	63,203	78,240	65,100	51,858
Lethal-acres	15,251	26,836	18,395	10,957
Lethal-%	24%	34%	28%	21%

Table 4.2.4a above summarizes acres of wildland fire that are characterized as lethal as a percent of the total acres burned. The previous 10-year period was determined to be 24 percent lethal; the "no treatment" indicates a trend to increasing lethality at 34 percent for the projection period; Alternative S1 indicates an increase in lethality, but a reduction from the "no treatment;" finally, Alternative S2 indicates a reduction of lethal compared to past 10-years, and an overall reduction in acres burned resulting in fewer lethal acres.

Alternative S1 generates increases in snags and likely increases in coarse woody debris compared to Alternative S2. Both alternatives exceed desired conditions for snag levels. Coarse woody debris would likely provide fuel loads that could lead to increased lethality.

Table 4.2.4b below shows a breakdown of the treatment types by key land allocations. The expected acres treated between the No Action (Alternative S1) and the Proposed Action (Alternative S2) are similar in many allocations. One notable difference is the approximately 11,750 acres projected for mechanical group selection treatments in the HFQLG pilot project area under Alternative S1 compared to 39,200 acres under Alternative S2.

Table 4.2.4b. Treatment acres by allocation and type

Breakdown by Method of Treatment		Alt. S2	Alt. S1	Percent Change
Group Selection HFQLG				
Mechanical – remaining acres to be treated		39,200	11,750	233.62%
Acres complete or committed		3,300	3,300	0.00%
	Subtotal	**42,500**	**15,050**	**182.39%**
DFPZ's HFQLG				
Mechanical – remaining acres to be treated		141,632	141,632	0.00%
Burning		36,130	36,130	0.00%
Acres complete or committed		102,526	102,526	0.00%
	Subtotal	**280,288**	**280,288**	**0.00%**
Defense Zone				
Mechanical		187,600	187,600	0.00%
Burning		69,500	69,500	0.00%
	Subtotal	**257,100**	**257,100**	**0.00%**
Threat Zone SPLAT's				
Mechanical		337,100	336,100	0.30%
Burning		172,800	172,300	0.29%
	Subtotal	**509,900**	**508,400**	**0.30%**
Wildland SPLAT's				
Mechanical		890,850	889,300	0.17%
Burning		398,650	397,900	0.19%
	Subtotal	**1,289,500**	**1,287,200**	**0.18%**
Subtotal of Initial Treatments – New Acres				
Mechanical		1,596,382	1,566,382	1.92%
Burning		677,080	675,830	0.18%
	Subtotal	**2,273,462**	**2,242,212**	**1.39%**
Follow-up and/or Maintenance Treatment				
	Subtotal	**1,317,180**	**1,352,100**	**-2.58%**
Grand Total		**3,590,642**	**3,594,312**	**-0.10%**

The increased effectiveness of Alternative S2 in reducing the size and effects of uncharacteristically severe wildland fires results from the ability to locate and treat SPLATs to effectively modify fire behavior. Under Alternative S2, fuel treatment prescriptions and lands available for treatment allow managers the greatest flexibility. Treatment approaches, combined with the standards and guidelines in this alternative, allow for the removal of specific stand components that can modify fire behavior. Reducing crown bulk densities, raising crown base heights, and modifying tree spacing creates different patch dynamics and stand mosaics across landscapes. Even though not spatially modeled for this Draft SEIS, the increased heterogeneity of vegetation across the landscape would reduce the potential for catastrophic wildfire effects. This is due to the variety of fuel complexes that occur in these mosaic patterns; by varying vegetative structure, age, and type, each patch creates its own microclimate that in turn influences fire behavior and its effects.

B. Economics of fuels treatments

The following basic assumptions were used to evaluate the relative economic efficiency of the fuels reduction programs under Alternatives S1 and S2. Stumpage values were assigned to the timber volume generated from fuels treatments based on slope and treatment prescription. Stumpage values represent the value of the raw material after subtracting the logging costs. For purposes of this analysis, net product value ranges from $7.50-$150 per thousand board feet. Lower values were assigned to treatments on slopes greater than 35 percent in the wildlands and higher values were assigned to group selection and treatments in the defense zone where it is less expensive to remove material from the woods.

Treatment costs were estimated on a per acre basis and differentiated by slope and location. For Alternative S1, treatments on slopes greater than 35 percent were assigned a cost of $600/acre and all other treatment costs (including group selection and DFPZs) were estimated at $350/acre. Alternative S2 is expected to have somewhat lower per acre treatment costs because the standards and guidelines place fewer restrictions on operability. Under S2, treatments on slopes greater than 35 percent were estimated to cost $550/acre and all other treatment costs (including group selection and DFPZs) were estimated at $350/acre.

As shown in Table 4.2.4c, fuels reduction programs under both Alternative S1 and S2 will require appropriated dollars to complete. However, one of the objectives of Alternative S2 was to provide for economically efficient treatments. This alternative yields a net product value that is more than three times that of Alternative S1. As a result, Alternative S2 is projected to result in an annual average savings of $27 million in appropriated funds when compared with Alternative S1.

Table 4.2.4c. Estimated Treatment Costs, Product Values and Funding Needs for the Fuels Reduction Program on Sierra Nevada Forests – First Decade ($ million).

	Alt. S1	**Alt. S2**
a. Average Annual Treatment Costs	54	49
b. Average Annual Net Product Value	8	30
c. Appropriated Funds Needed *(a-b)*	46	19

C. Risk and Uncertainty of Implementation

Each alternative has varying degrees of risk and uncertainty associated with it. The risk of loss from wildfires is the most important consideration, even though we cannot predict when and where wildfires occur. Most of the uncertainty in implementing a successful fire management strategy is associated with doing enough fuels treatments in enough places to influence fire regimes in the intended ways.

Both alternatives apply strategically placed area treatments (SPLATs) as part of their fire and fuels management strategy. However, the certainty of being able to implement the SPLAT approach differs by alternative. Alternative S1 has the highest degree of uncertainty when it comes to implementing the SPLATs across broad landscapes. The concern is due to the specific stand-level structural retention standards in suitable California spotted owl nesting and foraging habitat that could limit opportunities for effective fuels treatments. Creating a sufficient fuels mosaic so that a surface fire would only occasionally reach into the base of the secondary crowns in the stand, causing only torching of a single tree or small group trees, and maintaining a sufficient distance between crowns of adjacent trees where there is potential for active crowning on the landscape is important to the success of the strategy.

Alternative S2's desired conditions and standards and guidelines provide managers with the greatest degree of flexibility to establish and maintain the SPLAT's and the lowest degree of uncertainty associated with implementing the SPLAT approach.

4.2.5. Noxious Weeds

A. Measures and Factors Used to Evaluate Alternatives

The same factors used in the FEIS to compare the effects of the alternatives on noxious weed spread and control (FEIS, Vol. 2, Ch. 3, part 3.6, pages 319-320) are used in the SEIS:

- Relative risk of wildfire (wildfire acres projected to burn annually)
- Acres of annual mechanical fuels treatments and placement or pattern of treatments on the landscape
- Acres of annual prescribed fire

B. Assumptions and Limitations

Forests continue to participate in and work with local cooperative weed management groups. There has been increased public and legislative interest in noxious weeds and invasive species supporting the assumptions made in the FEIS. No additional assumptions or limitations are identified for this analysis.

C. Effects of the Alternatives on Noxious Weeds

Relative risk of wildfire (wildfire acres projected to burn annually)

Alternative S2 is projected to result in fewer annual acres burned by wildfire relative to Alternative S1 by reducing the overall size of individual wildfires. Where SPLAT treatment areas are effective, the post-fire landscape would likely have more of a mosaic pattern with patches of remnant living trees. Since Alternative S2 generally allows higher intensity treatments, SPLATs would likely be more effective at reducing the extent of lethal and high severity fire effects within the SPLATs. These remnant patches may help to slow or impede the spread of noxious weeds in the post-fire landscape to the extent that they break stand continuity. Standards and guidelines for addressing weed spread during Burned Area Emergency Rehabilitation efforts should also help to reduce the chance of weed spread after wildfires.

Acres of annual mechanical fuels treatments and placement or pattern of treatments on the landscape

Alternatives S1 and S2 propose similar amounts of mechanical fuels treatments over the 20 year planning period. Alternative S2 proposes approximately 78,000 acres of additional mechanical treatment over the level proposed for S1. Approximately 27,500 of those acres would occur in group selection units in the HFQLG area; 21,500 acres would be treatments in SPLATs in the wildland; and 29,000 acres would be follow-up and/or maintenance treatments. As described in the FEIS, DFPZ treatments pose the greatest risk of noxious weed spread due to their linear and connected nature. Treatments in WUI also have an increased risk of spreading or creating avenues for spread of existing noxious weed populations. Finally, treatments in SPLATs pose a lower risk because they are not connected across the landscape. Both alternatives propose the same amount of mechanical fuel treatments in the WUI. In general, treatment intensity would be higher in Alternative S2, resulting in more open canopies and higher levels of ground disturbance relative to Alternative S1. Alternative S2 may provide a better seedbed and conditions for seed germination and it increases the area where mechanized equipment could be a vector for the spread of noxious weed seeds or plant material. The noxious weed strategy (ROD, Appendix A, page 15) and standards and guidelines for noxious weed management (ROD, Appendix A, pages 30-31) apply to both alternatives. As determined in the FEIS, implementation of these standards and guidelines, in particular the development of noxious weed risk assessments during project planning and follow-up inspection of ground disturbing activities would be expected to reduce the overall risk to a low level.

Annual prescribed burn acres

The amount of prescribed burning during initial treatment is essentially the same between Alternatives S1 and S2. Alternative S2 proposes approximately 116,000 acres of additional prescribed burning as follow-up and/or maintenance treatments than Alternative S1. This treatment is likely to occur in units previously treated with either a mechanical treatment or prescribed burning. Repeat prescribed burning is likely to expose patches of mineral soil where down logs and duff is consumed that may be sites for noxious weed inoculation. The extent that mechanized equipment (vehicles, fire equipment, dozers and ATVs) are used in preparation and implementation of the prescribed burn project will affect the risk of noxious weed inoculation. As determined in the FEIS, implementation of the standards and guidelines for noxious weed management, in particular the development of noxious weed risk assessments during project planning and follow-up inspection of ground disturbing activities would be expected to reduce the overall risk to a low level.

Overall assessment of risk

The FEIS ranked alternatives by the overall acreage of initial prescribed burning and mechanical treatment. Re-treatments and maintenance treatments were not considered. Alternatives that treated more acres had higher risk of increasing noxious weed spread. Alternative S2 proposes to treat approximately 51,500 more acres of initial treatment than Alternative S1. Alternative S2 includes a preference to include previously treated stands in SPLATs when possible. This would effectively reduce the acreage of “new” areas treated, however it would also increase the risk of spread of existing noxious weed infestations that may occur within these areas.

As described in the FEIS, the risk of weed spread in all alternatives will be reduced by following the standards and guidelines for weed management. The higher risk associated with Alternative S2 will be somewhat mitigated by the increased opportunity to survey project areas and treat infested areas.

4.2.6. Air Quality

The air quality analysis presented here focuses on projected PM_{10} emissions under Alternatives S1 and S2. Models used to project PM_{10} emissions are described in the SNFPA FEIS, Volume 2, pages 342 and 343. This analysis is based on numbers of acres affected by prescribed fire, mechanical treatment, and wildland fire, and the results are described below.

Table 4.2.6a shows projections for total PM_{10} from projected wildland fires under Alternatives S1 and S2 in the first and second decades.

Table 4.2.6a. Total PM_{10} from Wildfire (tons).

	First Decade		Second Decade		Total for both Decades	
	Alt S2	Alt S1	Alt S2	Alt S1	Alt S2	Alt S1
Eldorado	9,006	10,459	8,003	10,122	17,008	20,581
Inyo	23,778	27,229	21,130	26,350	44,908	53,579
Lassen	27,861	28,674	24,758	27,748	52,619	56,422
Modoc	33,836	35,874	30,067	34,716	63,903	70,590
Plumas	30,081	27,955	26,731	27,053	56,812	55,008
Sequoia	29,764	33,479	26,449	32,399	56,213	65,878
Sierra	24,417	27,616	21,698	26,725	46,115	54,341
Stanislaus	17,844	19,156	15,857	18,538	33,701	37,694
Tahoe	15,646	16,615	13,903	16,078	29,549	32,693
Toiyabe	7,596	8,171	6,750	7,907	14,346	16,078
LTBMU	742	843	659	815	1,401	1658
Total	**220,572**	**236,071**	**196,003**	**228,451**	**416,576**	**464,522**

Alternative S2 provides maximum protection from wildfire emissions. Total PM_{10} produced under Alternative S1 is 416,576 tons versus 464,522 tons under Alternative S1, a reduction of 47,946 tons in two decades. Historically it is during a wildfire that Federal and State ambient air quality standards violations occur. Unfortunately, wildfires are episodic events and can fluctuate year to year. The data suggest a reduction in public exposure to PM_{10} from wildfires under Alternative S1 in both decades.

Table 4.2.6b shows prescribed burn PM_{10} emissions under Alternatives S1 and S2 in the first and second decades.

Table 4.2.6b. Total PM_{10} from Prescribed Fire and Mechanical Treatment (tons).

	First Decade		Second Decade		Total for both Decades	
	Alt S2	Alt S1	Alt S2	Alt S1	Alt S2	Alt S1
Eldorado	1,909	1,681	2,103	1,585	4,012	3265
Inyo	510	243	542	157	1,051	400
Lassen	4,079	3,411	3,523	3,933	7,602	7344
Modoc	2,026	2,044	1,482	2,010	3,509	4054
Plumas	3,743	4,616	4,982	4,496	8,725	9112
Sequoia	1,802	2,018	1,390	1,700	3,191	3718
Sierra	2,513	2,274	2,161	2,259	4,674	4533
Stanislaus	1,993	2,405	1,660	2,606	3,653	5011
Tahoe	2,146	3,249	3,263	3,170	5,409	6419
Toiyabe	560	134	375	72	934	207
LTBMU	367	292	181	250	547	542
Total	**21,648**	**22,369**	**21,659**	**22,237**	**43,307**	**44,606**

Total prescribed emissions are quite similar under both alternatives and in both decades, the maximum difference being in the first decade (a difference of 721 tons between the two alternatives). At this programmatic analysis scale, none of the alternatives for prescribed fire creates conditions that are likely to violate state or federal standards. This assumption is based on worst-case-scenario modeling analysis conducted during EIS development. However, additional air quality analysis will have to be conducted at the project level using site-specific metrological and field conditions. Application of standards and guidelines in the alternatives and the newly developed smoke management programs by local air pollution control districts (APCDs) under Title 17 guidelines would minimize the possibility of smoke intrusion in the sensitive areas.

Alternative S2 allows local managers flexibility in deciding where to use mechanical treatments. The decision to use this treatment will be based on the need to use it as an initial treatment prior to follow-up burning and whether the ground conditions are really suitable for mechanical treatment. Even where mechanical treatments are used, the assumption is that the follow-up treatments will be with prescribed fire. This assumption results in very similar PM_{10} emissions under both alternatives; therefore, the consequences are determined to be similar for both alternatives.

A comparison of wildfire and prescribed fire emissions (Tables 4.2.6a and 4.2.6b) reveal that wildfire affects on air quality are approximately ten times greater than prescribed (416,576 tons versus 43,307 tons under Alternative S2 and 464,522 versus 44,606 tons under Alternative S1). Therefore, the most likely measurable difference in air quality between the alternatives would result from changes in wildfire.

4.2.7. Soil Quality

Alternatives S1 and S2 were reviewed for potential effects on soil quality. The coarse scale used in the determination of consequences in the SNFPA FEIS is not adequately sensitive to determine any difference between Alternatives S1 and S2. Also, the treatment acres are virtually the same for both alternatives; therefore, the consequences are determined to be similar for both alternatives.

4.3. Species of the Sierra Nevada

4.3.1. Threatened, Endangered, and Proposed Species

4.3.1.1. California Red-Legged Frog

Information reviewed as part of this analysis: Draft species information (proposed Affected Environment for SEIS); Sierra Nevada Forest Plan Amendment FEIS (Chapter 3, Part 4, 4.3.3.1); Sierra Nevada Forest Plan Amendment FEIS ROD; Biological Assessment for the FEIS; Standards and Guidelines for Alternatives S1 and S2; and the DRAFT SEIS Chapters 1 and 2.

California red-legged frog (CRLF) adults require dense, shrubby, or emergent riparian vegetation close to deep (greater than 2.3 feet), still or slow-moving cool water. Sites within the Sierra Nevada foothills where the species is located are characterized as being intermittent, having largely intact emergent or shoreline vegetation, lacking introduced bullfrogs, and having native rather than introduced fish. Habitat loss and alteration have been cited as the primary factors leading to the decline of the CRLF. They would be negatively affected by processes or activities that degrade riparian systems and lead to increased sedimentation, decreased vegetation along shorelines, increased water temperature, or other factors that also might decrease invertebrate populations.

The following are the main impacts to habitat that were identified in the Sierra Nevada Forest Plan Amendment FEIS: (1) agricultural and urban development which have caused the loss of wetland habitats, (2) dams and water diversions, (3) mining and road/trail, (4) livestock grazing, and (5) timber harvest. For California red-legged frogs, the key management activities which the Forest Service can influence are: dams and diversions, mining, livestock grazing, road and trail construction, recreation, vegetation management (timber harvest and mechanical fuel treatment), use of prescribed fire, and locally and applied chemical toxins (e.g. pesticides and herbicides).

Alternative S1 (FEIS Alternative MOD 8) was identified as one of three alternatives providing lowest risk and most effective management approach to species persistence and recovery in the FEIS for the Sierra Nevada Forest Plan Amendment. Forest Service activities relating to water development, vegetation management; mechanical fuel treatment, livestock grazing, roads, mining, recreation, and toxins are identical between Alternatives S1 and S2. All of these activities require NEPA analysis, biological evaluations, and a Riparian Conservation Objective Analysis prior to implementation. The Environmental Outcome for both alternatives reflect those of FEIS Alternative MOD 8: Suitable environments are frequently distributed as patches or they exist at low abundance or both.

Outcomes

Environmental: Under both Alternatives S1 and S2, suitable environments are both isolated and exist in low abundance on NFS lands. Although some of the subpopulations associated with these environments may be self-sustaining, there is limited opportunity for population interactions among many of the suitable environmental patches. There is very little difference between Alternative S1 and S2 to change the current status.

Population: The potential distribution of this species is restricted throughout its range. This is characterized by high levels of isolation and very low potential abundance. Gaps where the likelihood of population occurrence is low or non-existent are large the enough that there is little or no possibility of interaction, strong potential for extirpation, and little likelihood of recolonization. Except for some rare, isolated populations that have persisted, there appears to have been a significant reduction in the overall range of the species from the historical distribution. Both Alternatives S1 and S2 have a very low probability of reversing the trend because of the small amount of suitable environments on NFS lands.

Rational

Environmental: It is uncertain as to the historical distribution of California red-legged frogs on National Forest System lands. Surveys have been ongoing for most of the Forests thought to be within the historical range. The California red-legged frog has been documented on four Forest within the project area: Lassen; Plumas; Eldorado and Tahoe.

There is little difference between Alternatives S1 and S2 with regard to the effects relative to the current condition. Both alternatives provide measures to protect the species and it’s habitat at the site specific, project level assessment. Critical Aquatic Refuges (CARs) can be established for isolated populations of California red-legged frogs within known occupied drainages. As additional populations are identified, additional CARs can be added to the system. Habitat for California red-legged frog can be maintained or improved through implementation of Riparian Conservation Areas (part of the Aquatic Management Strategy). Both alternatives limit streambank disturbance to 10 percent of any reach within critical aquatic refuges and important bird areas and limit streambank disturbance to 20 percent of any reach in general. Streambank disturbance (habitat alteration) is one of the major contributing factors affecting this species. The Aquatic Management Strategy, which is common to both alternatives, sets goals for the maintenance and restoration of aquatic systems. Habitat for California red-legged frog can be maintained or improved through implementation of Riparian Conservation Areas (part of the Aquatic Management Strategy), again common to both Alternative S1 and S2. Surveys are required prior to vegetation treatments for both alternatives.

Amounts of prescribed fire are the same for both alternatives. Spring and fall burning periods may overlap with the dispersal period for this species and therefore may affect the California red-legged frog.

Mechanical treatments may affect California red-legged frog in two ways: 1) mechanical treatment to reduce hazardous fuels may change the microclimate of upland stands utilized by California red-legged frogs during periods of movement and 2) mechanical treatment to reduce hazardous fuel may reduce the amount of large woody debris used by California red-legged frog for resting or hiding cover. There is a negligible difference in the number of acres treated mechanically for Alternative S1 and S2. The intensity of treatment on potential habitat alteration is greater in S2 than S1. Alternative S2 proposes to treat some unknown number of acres outside the SPLATs system for forest health reasons. It is difficult to project the impacts resulting from this unknown factor. However budget limitations and past history suggest that the number of acres treated for forest health purposes will be small (+/- 1000 acres).

Population: The California red-legged frog occurs primarily in lower elevation (below 5,000 ft.) riparian ecosystems. It is believed that this species has been extirpated from a large portion of its historic range due principally to water and hydroelectric development, grazing, and urbanization that adversely affect sediment and stream flow regimes. Suitable habitats for this species generally exist at low abundance and are highly isolated or occur in patches. Continued expansion of human presence within the foothills of the Sierra and its associated water use patterns couple with agriculture and its associated actives within it historic range will continue to limit or reduce this species.

4.3.2. Forest Service Sensitive Species

4.3.2.1. Fisher

Measures Used to Assess Environmental Consequences

The following measures were used to assess effects on the fisher.

1. Protection and recruitment of large old trees (conifer and hardwood)
Measure: large trees.

2. Retention of dense forest canopy
Measure: canopy closure

3. Retention and recruitment of large snags
Measure: large snags

4. Retention and recruitment of large down wood
Measure: coarse (large) woody debris

5. Intermix of California black and canyon live oak in suitable coniferous habitats
Measure: intermix of California black and canyon live oak in suitable coniferous habitats.

6. Management of human presence and associated activities
Measure: recreation
Measure: roads

7. Distribution and abundance of fishers
Measure: survey requirements and status and trend

8. Management of reproductive sites and protected areas
Measure: protected areas for fishers

9. Quality and quantity of habitat
Measure: abundance of old forest conditions

10. Quality, quantity and distribution of habitat of prey species
Measure: prey habitat.

Assumptions and Limitations

Analysis of direct effects of this programmatic document should be tempered by the fact that no specific projects are approved by this document. All projects will still be filtered through site-specific NEPA analysis. At that time, a biological evaluation will tailor each project to the conditions of the local landscape and acknowledge specific legacy structures that do not show up under broad scale programmatic assessments. It is at the project level that size and spatial and temporal scheduling become important so that an entire home range is not treated at the same time and so that adjacent watershed and habitat is given time to recover prior to subsequent entries.

This analysis also only addresses the Southern Sierra Fisher Conservation Area (SSFCA) because it is the only known occupied habitat. The habitat models run to show differences between Alternatives S1 and S2 indicate that habitat range-wide will improve significantly and fuel modification will be increasingly effective over time in protecting existing habitat. Thus the short-term trade offs in current habitat quality to sustain these long-term benefits are only of great importance to fisher viability within the area of known occupancy, the SSFCA. The FEIS included projections of improved habitat, connectivity and opportunity for expansion of existing populations. These projections appear to remain valid barring unpredictable effects of large stand replacing events that may tend to further isolate or fragment existing populations.

Assumptions made in the FEIS for Alternative MOD 8 are the same except as noted below. Trends in habitat and habitat elements important to fisher are projected out to 150 years. However, the longer the forecast period, the greater the uncertainty becomes about the reliability of the projections. Information beyond 20 years is provided to identify general trends but not quantifiable data.

Large Trees

The literature does not place any upper limit on the number of large trees per acre benefiting fisher. Survey of representative old forest//late seral stands indicate that natural conditions support approximately 6-7 trees over 30” dbh/ acre. Current inventory and modeling indicate approximately 10 trees > 30” dbh/ac as current average conditions, rising to approximately 16 trees /acre > 30” dbh at 20 years. There is very little difference in the number of large trees in modeling projections out to 20 years. Modeling of the proposed action indicates a trend toward higher numbers of large trees over time, assuming greater growth and recruitment of large trees as a result of thinning smaller stand and lower loss of large trees to stand replacing fire as a result of more aggressive fuels treatment under the proposed action. Both Alternative S1 and S2 would have nearly indistinguishable effects over a projected life of 20 years. As such, this element will not be further considered in this analysis.

Canopy Cover

Application of canopy closure related to fisher use, measured on site with a densiometer to landscape level analysis based on Landsat imagery or photo interpretation, is still a major limitation in analysis of effects and implementation. However, some data is beginning to emerge based on common measurements using CWHR analysis and landscape level analysis of areas used by fisher. Fisher will use habitats at 40% canopy closure and less if there are sufficient clumps of denser vegetation with large legacy elements for rest sites. However, area with greater than 60% canopy closure may be a limiting factor and appears to be preferentially selected when establishing a territory.

Changes in standards and guidelines between Alternative S1 and S2 that affect canopy closure include:

- Limitation on fuel treatment in 1 acre or larger patches of CWHR 5M, 5D or 6 is removed under Alternative S2
- Canopy cover retention is changed from limiting change to no more than 20% reduction under Alternative S1 to a lower goal of 50% canopy closure (with treatment to 40% acceptable) under Alternative S2
- Retention of 60% canopy closure over 60% of planning watersheds is removed under Alternative S2

Change in management of PACs within WUI allows more treatment in PACs that may affect canopy closure and general habitat for fisher

Modeled average canopy closure across the SSFCA indicates no significant difference between Alternatives S1 and S2 at 20 years. Both show a steady rise in average percent canopy closure as gaps and sparse areas fill in. More extensive thinning and thinning to a 40 percent minimum canopy closure show a slower growth in average canopy closure for Alternative S2. However, long-term effects of Alternative S2 are projected to maintain a higher canopy closure compared to Alternative S1 because of the reduced effects of stand-replacing fire.

Snags

Current snag levels over much of the SSFCA are currently near old forest conditions developed from unmanaged sites (Potter et al, R5 old forest definitions unpublished). Based on model projections, there would be no significant change between Alternative S1 and S2 at twenty years. Both would show approximately a 25 percent increase over current large snag levels. Projected out over the long term, Alternative S2 would maintain a lower level of snags but still achieve double the existing snag levels. Alternative S2 retains guidance to identify important legacy elements such as large snags and protect them during fuels treatments. Preference for use of mechanical equipment within the SSFCA to protect snags, down logs and legacy elements is retained. Guidelines exist for the retention and recruitment of large trees to become large snags over time. Alternative S2 does not significantly change management of large snags for fisher compared to Alternative S1. Therefore, snags are not further addressed in this analysis.

Coarse Woody Debris

Standards for down woody debris are essentially the same under Alternative S1 and S2.

Intermix of California black and canyon live oak in suitable coniferous habitats

There would be no change in suitable oak habitats between Alternative S1 and S2.

Recreation

Guidelines for evaluation of recreational and other forest activities is modified in Alternative S2 but does not substantially change the requirement to evaluate new and ongoing activities for disturbance of known den sites that was included as part of Alternative S1.

Roads

There is no change in direction on roads from Alternative S1 to S2.

Fisher Distribution and Abundance

Survey and monitoring direction is the same for both Alternative S1 and S2.

Fisher Diet/Prey habitat

Fisher use a diverse array of prey and foraging habitat under either alternative does not appear to be limiting, assuming that cover and appropriate rest sites are well-dispersed over the territory. There would be no change in prey availability between Alternative S1 and S2.

Protection of Selected fisher sites

Protection of fisher den sites is unchanged between alternatives. Both alternatives protect known fisher den sites. Due to limitations of detection, these sites are in and around communities, near roads and other potentially harmful disturbances. They are at maximum conflict with WUI management. Due to their proximity to human disturbance, the potential for disease, interaction with domestic animals and harm from roads etc, these sites may be of less value than identifying and protecting more remote sites with high reproductive potential but undetected den sites. Also note several of the den sites are for the same animal and there is almost 100 percent overlap of den site buffers for these sites.

Effects of Alternative S2

The primary effect of Alternative S2 compared to Alternative S1 on fisher is the change in standards and guidelines affecting canopy closure. Modeling does not indicate change in average canopy closure at a landscape scale. Although Alternative S2 has the potential to degrade denning habitat across the SSFCA, this potential is tempered by the Sequoia and Sierra National Forest's awareness of and involvement in fisher research. Both Alternatives S1 and S2 include direction to assess potential impacts of fragmentation on old forest species, particularly fisher and marten. Each individual project must conduct NEPA analysis, including a biological evaluation of effects on fisher and a cumulative effects analysis of other projects within the SSFCA. This places a greater burden on the forests to communicate and provide consistency in analysis and greater uncertainty in the analysis of this programmatic direction. Under one proposal for analyzing effects of actions similar to the proposed within the Kings River Demonstration Project, the average percent of mapped, occupied fisher home ranges with greater than 60% canopy closure would fall from 43% to 6%. As a research project to determine effects and provide for adaptive management, this may be acceptable over a portion of the fisher range but across the SSFCA it would greatly increase risk and uncertainty over viability of the local population.

This aspect of greater reliance on forest level restraint is also true for the eastside pine habitat within the SSFCA. There are no guidelines in place that would adequately protect remaining fisher habitat within this vegetation type. However, habitat conditions are highly variable across the landscape and it may not be feasible to implement broad, programmatic guidelines that would fit the habitat variability associated with fisher use of eastside pine.

The SNFPA ROD directed the Forest Service to develop a Conservation Assessment that will in turn lead to a conservation strategy. The conservation strategy, when developed, should provide for consistency in analysis and recommended actions or guidelines to maintain or enhance the fisher population in the southern Sierra.

Although the direction in Alternative S2 does not provide the level of detail to support a high level of confidence that fisher will persist in the southern Sierra, direction in Alternative S2 is not conflict with appropriate fisher management at the forest level because project-specific NEPA analysis should provide that certainty.

Outcomes

Environmental: The current status suggests that suitable environments are distributed frequently in patches and exist in low abundance. Gaps where suitable environments are in low abundance but are large enough that some subpopulations are isolated, limiting opportunity for species interaction across national forest system lands. Some populations are so disjunct or of such low density that they are essentially isolated from other populations. Alternative S2 leads to some improvement over the planning horizon while Alternative S1 maintains the status quo when considering the risk of stand replacing events in the occupied habitat.

Population: The current status is attributed to the combination of environmental and population conditions that restrict the potential distribution of the species, which is characterized by areas with high potential for further population isolation and very low potential abundance. While some of the subpopulations my be self-sustaining, gaps where the likelihood of population occurrence is low or zero are large enough that there is limited opportunity for interaction among them. Both Alternatives S1 and S2 lead to an improvement over the current condition.

Rationale

Although there is greater uncertainty that suitable fisher denning habitat will be retained across the landscape in the proportions for which fisher select home ranges, there is guidance to the forests to ensure this analysis is carried out at the local level both at the project and landscape analysis levels. Modeled habitat attributes for the primary elements used by fisher, large trees, large snags, large down woody logs, and higher average canopy closure remain similar between Alternatives S1 and S2 and show a significant upward trend. Landscape level attributes such as spotted owl nesting habitat, mature forest and late seral/old forest (LSOG) conditions also show upward trends, which results in greater connectivity and lower fragmentation over time. Activities proposed are, in general, fine-scale and allow for relatively quick recovery compared to the much larger and more disruptive effects of stand-replacing disturbances that the proposed actions are intended to reduce. Modeled effects of treatments show a much greater potential for success in changing stand replacing fire behavior under Alternative S2. This change is a significant factor in determining habitat and population outcomes for fisher. Much of the change in fire effects will not show until after the 20-year analysis horizon and there is greater uncertainty in outcome of longer-term effects. The guidelines under Alternative S2 will retain travel foraging habitat as a minimum, such that large tracts will not be rendered unusable as would be the case in stand-replacing fire. If undesirable effects are detected, recovery would be relatively short-term compared to recovery after stand-replacing fire.

Large tracts of suitable fisher habitat are outside of the WUI where initial treatments will be focused. The forest and region-wide monitoring as well as adaptive management studies tied to the Kings River Demonstration project will have the opportunity to provide some information on effects on fisher populations during the while the fuels reduction strategy is being implemented in the WUI and before there is much expansion beyond that area. A cautious approach in area of known overlap between fisher territories and WUI, tied to monitoring, will give the opportunity for adjustment as more information is known. Much of these same uncertainties were also evident with Alternative S1.

The environmental and population outcomes for Alternative S2 would not change significantly from Alternative S1. The largest events affecting fisher in the southern Sierra and their potential to sustain a viable population appear to be large stand replacing wildfires. Large wildfires affected habitat in large patches across the Sierra Nevada in the past and resulted in a large barrier to northward movement on the Stanislaus National Forest. Additional cumulative effects since publication of the SNFPA ROD include the McNally Fire. The McNally fire burned approximately 155,000 acres in 2002 on the Sequoia and Inyo National Forests. Approximately 17,000 acres were stand-replacing intensity within suitable and presumed occupied fisher habitat. The Sequoia has revisited the area with track plate surveys and has found fisher within the area including some detections within the severely burned areas. Track plate surveys will continue to track fisher use of the area. This fire may present a barrier to movement between the Kern Plateau sub population and other sub populations to the west of the Kern River. All linkage of suitable habitat was severely burned, movement to the south is limited by open grassland, rock outcrop and burned chaparral habitats within the steep and Kern Canyon and to the north by open rocky habitat divided by the sharp escarpments of the upper glaciated kern Canyon. All conifer habitats for approximately .5 to 2 miles on both sides of the Kern Canyon from Johnsondale Bride to Hell Hole were removed (10-15 miles). The forest is exploring options to replant and provide travel cover as quickly as possible.

There is also concern over the cumulative effects of adaptive management studies in the Kings river demonstration area and potential changes in management under the Giant Sequoia National Monument Management Plan. Together these two administrative units affect approximately 29 percent of the SSFCA. Although neither unit is proposing to treat the entire land area, final management and study plans have not been approved at this time. The Giant Sequoia Monument Plan proposes to manage similar to the SNFPA and will focus treatments within the WUI for the majority of the first 25 years. Management is linked to monitoring of fisher and adaptation of management to avoid loss or degradation of fisher territories. The Kings River Demo project is tied to monitoring of radio telemetered fisher to determine effects of management under a number of supervised research projects.

4.3.2.2. Marten

Factors Used to Assess Environmental Consequences

As described in the preceding “affected environment” section, a variety of factors influence the marten population and its habitat. These factors are listed here, along with measures that were used to assess each alternative’s effects on the marten.

1. Protection and recruitment of large old trees
Measure: large trees

2. Retention of dense forest canopy
Measure: canopy closure

3. Retention and recruitment of large snags
Measure: large snags

4. Retention and recruitment of large down wood
Measure: coarse (large) woody debris (CWD)

5. Presence of meadows and riparian habitat in proximity to conifer forests
Measure: meadows and riparian habitat

6. Human presence
Measure: recreation
Measure: roads

7. Distribution and abundance of martens
Measure: survey requirements and status and trend

8. Management of reproductive sites and protected areas
Measure: protected areas for martens

9. Quality and quantity of habitat
Measure: abundance of old forest conditions

10. Quality, quantity and distribution of prey species habitat
Measure: acres of prey species' habitat

Assumptions and Limitations

The assumptions and limitations used in this analysis are described in detail in the FEIS (Chapter 3, part 4.4, pages 25-28) and are incorporated here by reference.

Effects of Alternatives on the Marten

Large Live Trees

Alternatives were analyzed for retention of large live trees in categories of very large trees (> 50" dbh) and large trees (>30" westside, 24" eastside, 21" alpine)

In the short term (20 years), both Alternatives S1 and S2 would maintain similar amounts of very large and large trees; alternative S2 would provide a marginally greater amount (+0.25 percent) of this habitat component compared to Alternative S1. At 20 years, both alternatives would provide approximately 23 to 25 percent more large and very large trees compared to the present as a result of large tree retention standards and projected growth of smaller size classes.

Both Alternatives S1 and S2 are projected to retain sufficient amounts of large and very large trees over time (130 + years). Alternative S2 would provide approximately 18 percent more in both categories (large and very large trees) compared to Alternative S1 in the long term. In the eastside pine type, Alternative S2 results in a greater degree of risk to large tree retention by raising the maximum diameter limit of trees that can be cut from 24 inches to 30 inches.

Dense Forest Canopy

At a landscape scale, canopy closure is projected to vary little between alternatives. Regardless of which alternative is implemented, the same proportion of the bioregion would be treated to create SPLATS (approximately 1,666,000 acres). Similarly, the number of acres within the Defense Zone (295,100) proposed for treatment is the same. The difference between alternatives is that S2 has less restrictive canopy closure retention requirements. Alternative S2 allows up to a 30 percent reduction in canopy cover for vegetation and fuels management treatments, whereas, Alternative S1 only allows a 10 to 20 percent reduction in canopy cover depending on land allocation and stand condition. In the short term (20 years), implementation of S2 is projected to result in a minor (0.91 percent) overall reduction in canopy closure relative to S1. In the long term (130+ years), Alternative S2 is projected to result in a slight increase in canopy closure (3 percent) compared to Alternative S1. In the eastside pine type, Alternative S2 poses a higher risk to canopy closure retention by eliminating canopy closure reduction limits.

Snags

Under both alternatives, the number of snags greater than 15 inches diameter at breast height (DBH) is projected to increase gradually for approximately 70 years, and then remain relatively constant. Comparison of snag densities between alternatives indicates that implementation of Alternative S2 could result in fewer (approximately 10 percent) overall snags than Alternative S1 in both the short and long term. However, snag retention requirements are similar in Alternative S1 and S2 and adequate numbers of snags to meet desired conditions are provided for in both alternatives.

Coarse Woody Debris (CWD)

Projected levels of coarse woody debris (greater than 15 inches) were not modeled empirically. Two factors regulate levels of coarse woody debris within a forest stand, recruitment and loss. Coarse woody debris is recruited from large snags, so it can be assumed that the management schemes that increase the number of snags will also increase recruitment of coarse woody debris. Coarse woody debris can be lost from the landscape through mechanical removal, consumption by fire or natural decay.

Alternative S1 represents the lower level of risk for coarse woody debris. Both alternatives contain similar Standards and Guidelines for snag and coarse woody debris retention, however Alternative S2 grants local land managers the discretion to deviate from these standards on a project-by-project basis. Therefore, Alternative S2 results in less certainty that coarse woody debris goals will be met. Both alternatives project a gradual increase in the number of snags across the landscape, however the projected increase is more rapid under Alternative S1. If fewer snags were present under Alternative S2, levels of recruitment of coarse woody debris would likely also be lower over time. Alternative S1 emphasizes the use of prescribed fire that could generate snags, but could also consume an unknown proportion of large snags and coarse woody debris. Wildfire affects coarse woody debris levels in a similar fashion. Immediate impacts include a short-term reduction in the amount of CWD as logs and other ground-fuels are consumed. Wildfire may also create snags, which could increase eventual recruitment of CWD. The number of acres projected to be affected by both lethal and non-lethal wildfire is significantly less under alternative S2.

Meadow and Riparian Habitats

At the landscape level, there would be little appreciable difference in meadow and riparian habitats when comparing implementation of Alternatives S1 and S2. With the exception of changes to the Standards and Guidelines for the willow flycatcher and Yosemite Toad, meadow and riparian habitat conditions are expected to be similar under both alternatives since the Aquatic Management Strategy (AMS) goals and standards would be the same under both alternatives. At a localized scale, Alternative S1 would likely provide greater stubble height of herbaceous plants and improved ecological condition where grazing would be prohibited in the meadows of known occupied willow flycatcher sites.

Recreation

The extent of recreation-related risk is the same under both alternatives. Both require mitigation of impacts where there is documented evidence of disturbance to den sites from existing recreation, off highway vehicles routes, trails and road uses (including road maintenance).

Roads

The extent of road-related risk to martens is the same under both alternatives.

Survey Requirements

Under both alternatives, broad-scale, systematic surveys would occur.

Trend in Population Size

Alternatives S1 and S2 do not provide direction for obtaining demographic information, therefore, population status and trend would remain uncertain under both alternatives.

Protected Areas

Both alternatives protect martens where they co-occur with fishers in the southern Sierra conservation area. Both alternatives establish 100-acre buffers around verified marten natal and kit rearing dens. Den site buffers are protected from disturbance from vegetation treatments with a limited operating period (LOP) from May 1 through July 31 under both alternatives. Although Alternative S1 applies the LOP to new activities other than vegetation treatments, existing Forest Service policy for biological evaluations (FSM 2672.4) would assure that these activities are adequately analyzed under Alternative S2 and that LOPs would be established if necessary to protect den sites from disturbance.

Quality and quantity of habitat

Important forest types for martens include red fir, lodgepole pine, subalpine conifer, mixed conifer-fir, Jeffrey pine and eastside pine (Zeiner et al. 1990). The following California Wildlife Habitat Relationships (CWHR) habitat stages are moderately to highly important for the marten: 4M, 4D, 5M, 5D and 6. The differences between the two alternatives are primarily associated with differences in Standards and Guidelines for vegetation treatments within SPLATs. The quantity of marten habitat is predicted to increase modestly under both alternatives with greater short-term increases projected under S1 and greater long-term increases under S2. Figure 4.3.2.2a displays projected acreage of old growth late seral stage forest (CWHR class 5M, 5D and 6), which also provides the highest quality marten foraging and reproductive habitat. Under Alternative S1, the total amount of late-seral forest is projected to increase from the current level of 1,538,230 acres to 2,185,303 acres (42%) within 20 years. Under Alternative S2, the amount of late-seral forest is projected to increase to 2,085,343 acres (36%) during the same time period. By the end of the analysis period (130+ years) the amount of late seral forest is projected to increase to 3,283,354 acres (113%) and 3,845,904 acres (150%) for alternatives S1 and S2 respectively. However, as projections are made over longer time periods, confidence intervals increase, requiring care in interpreting distant outcomes. The mix of CWHR classes would change similarly under both alternatives, with a short and long-term reduction in 4M and 4D and a commensurate increase in 5M and 5D. Under Alternative S2, CWHR class 6, which is important to martens for its contribution to near-ground cover, experiences a moderate short term decline relative to Alternative S1, but is present in greater amounts relative to S1 after approximately 70 years.

When comparing alternatives, protection of habitat from wildfire is an important consideration for martens. Under Alternative S1, projected wildfire acreage per year is expected to remain constant or increase slightly over the long term. Conversely, the total number of acres expected to experience wildfire each year is projected to decrease under Alternative S2, relative to both the current situation and Alternative S1. The number of acres projected to experience lethal or stand-replacing wildfires follows a similar trend for both alternatives.

Prey Species

Prey species availability is likely more critical during winter months when many animals commonly included in marten diets are not available. During the summer, voles, chipmunks and squirrels are relatively abundant. During the winter, only a few of these species (e.g. Douglas squirrel, northern flying squirrel) are readily available and probably help martens survive the severe Sierra winters. Habitat for both Douglas and northern flying squirrels is projected to increase slightly under both alternatives, with a slightly higher increase anticipated under Alternative S2 (Table 4.3.2.2a).

Table 4.3.2.2a. Projected changes in CWHR habitat suitability for select American marten prey species from the current time to year 140 across alternatives.

SPP ID	Species Name	Acres of Habitat (2004)	Acres of Habitat (S1 – 2024)	Acres of Habitat (S2 – 2024)	Acres of Habitat (S1 – 2144)	Acres of Habitat (S2 – 2144)	S2/S1 (2024) %	S2/S1 (2144) %
M080	Northern Flying Squirrel	2,529,015	2,659,424	2,684,493	3,238,535	3,375,577	0.9%	4.2%
M079	Douglas Squirrel	2,683,991	2,798,936	2,859,770	3,342,573	3,525,841	2.2	5.5

Summary of the Effects of the Alternatives

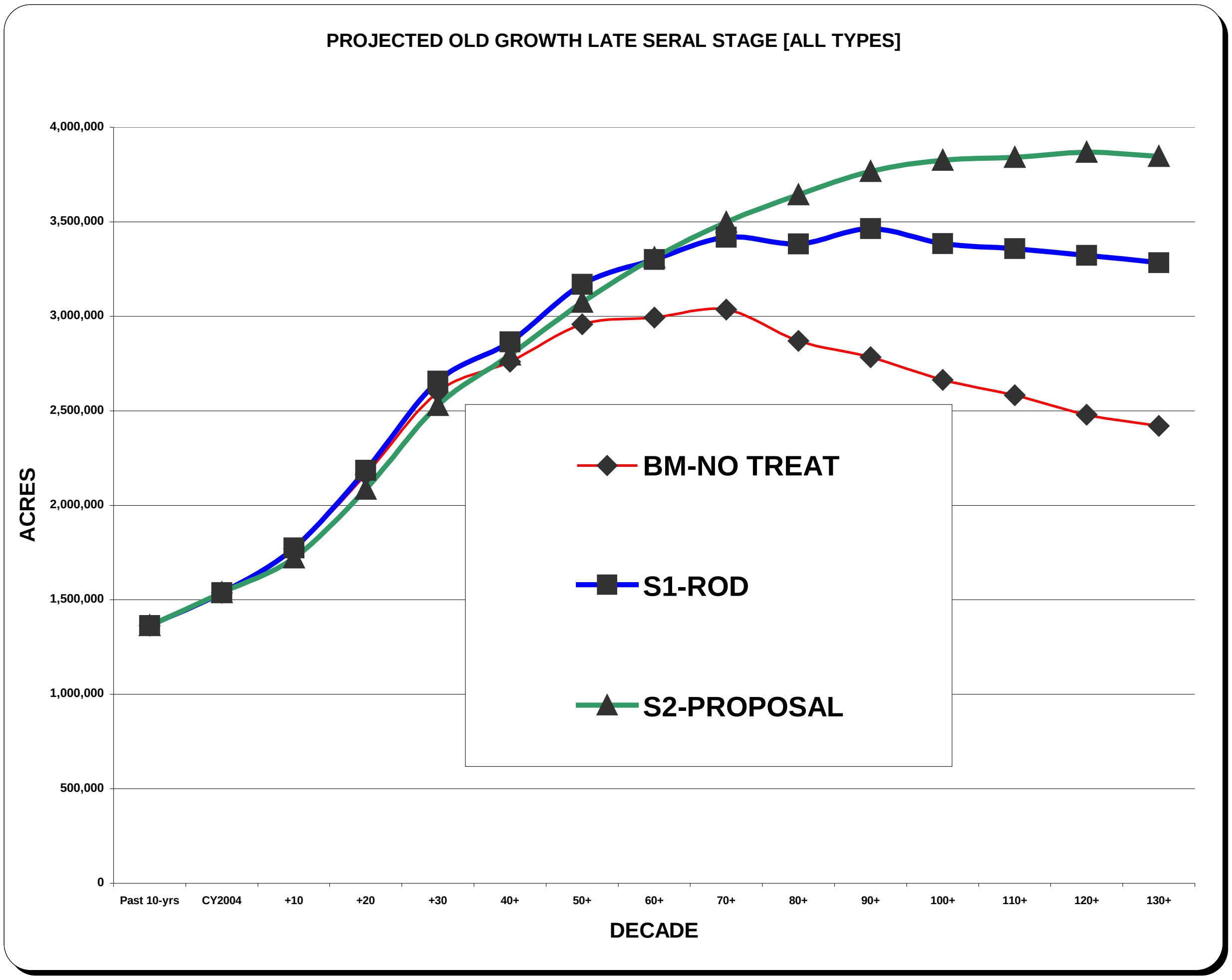
Management and protection of martens and their habitat would vary only slightly between the two alternatives. Martens currently appear to be well distributed throughout their historic range in the Sierra Nevada. The red fir zone forms the core of marten occurrence in the Sierra Nevada and most activities proposed under both alternatives would be conducted below the red fir zone (FEIS, Ch. 3, part 4.4, pg. 25). The SPLAT concept would result in limiting the spread and intensity of wildfire by treating an estimated 25% of the Threat Zone, General Forest and Old Forest Emphasis Area land allocations in areas of the Sierra Nevada characterized by high to very high fire hazard and risk. This equates to approximately 15 percent of high quality marten habitat (CWHR 5M, 5D and 6). The remaining 75% of these land allocations are not specifically proposed for mechanical treatment under either Alternative S1 or S2. Therefore, marten habitat within 75% of the land base (85 percent of total available habitat) is expected to remain the same regardless of which alternative is selected. Vegetation treatments outside of SPLATs would only occur after appropriate site-specific analysis and an additional determination of the effects on marten population viability.

To evaluate the alternatives for overall risk to marten persistence the measures described in previous sections were condensed into a single category: vegetation structure and composition. The remaining measures (e.g. human presence, survey requirements, protected areas) were determined to be virtually identical under both alternatives.

Vegetation Composition and Structure

Overall, neither alternative poses a significant risk to marten persistence and continued distribution throughout the Sierra Nevada bioregion. Each alternative presents certain advantages and disadvantages relative to the other. Both alternatives would retain large live trees at sufficient levels as to represent low risk to this habitat element over time. Alternative S1 has a lower level of risk than S2 in three regards: (1) it has higher projected snag levels, (2) it is projected to maintain higher levels of coarse woody debris and (3) the number of acres within individual SPLATs left untreated is higher. In terms of overall habitat quantity, Alternative S1 reduces risk over the short term by providing approximately 5% more late seral (CWHR 5M, 5D, 6) forest, however at 70 years, modeling projections indicate the difference is negligible and at 130 years habitat quantity under S2 is 17% higher. Similarly, canopy closure is projected to be slightly higher under Alternative S1 during the first 30 years after implementation, but Alternative S2 is expected to provide higher canopy closure after that time. Alternative S2 poses a lower short and long term risk of habitat loss to wildfire. Although Alternative S2 allows greater canopy cover reduction and removal of larger trees than Alternative S1 in the eastside pine type, this should not pose a significant risk to marten persistence since martens on the eastside are generally found in the red fir and mixed conifer transition zones.

Figure 4.3.2.2a. Region-wide projected acres of old growth late seral stage forest (all types).



Outcomes

Environmental: The current conditions are such that suitable environments are either broadly distributed and of high abundance across the range of the species: however, there are temporary gaps where suitable environments are absent or only present in low abundance. Disjunct areas of suitable environments are typically large enough and close enough to permit dispersal and interaction among subpopulations across the species range. Both Alternative S1 and Alternative S2 lead to improvements over time. There may be some gaps but the combination of distribution and abundance of environmental conditions provides for opportunity for nearly continuous intraspecific interactions.

Population: The current conditions are such that the combination of environmental and population conditions provides the opportunity for the species to be broadly distributed and high abundance across its range but, there may be gaps where populations are potentially absent. However, the disjunct areas of higher potential population density are typically large enough and close enough to other subpopulations to permit dispersal among subpopulations and to allow the species to interact as a metapopulation across its historical range.

Rationale

See SNFPA FEIS Volume 3, Chapter 3, part 4.4, pages 34-35 for rationale for outcome ratings. For purposes of this assessment, the assumptions and criteria described in the analysis of environmental consequences above generally apply. Given the uncertainties inherent in the model projections and lack of spatial location of stand conditions in the future, the effects of implementation of the Standards and Guidelines on distribution and quality of habitat were also considered.

Environmental Outcome

Alternative S2 has some more intensive treatments at local scales compared to Alternative S1 which would lead to a greater risk to important marten habitat components including canopy closure, large tree density, snag and down log recruitment, and multi-storied structural diversity. Alternative S2 poses greater risk to Old Forest Emphasis Areas where SPLATs would be treated since Alternative S2 does not differentiate Standards and Guidelines for late-seral habitats while Alternative S1 does provide greater protection for existing late-seral habitat condition. However, in the context of the broad planning area, Alternative S2 would result in little overall change in marten habitat compared to Alternative S1. This is based on the assumption that the SPLAT treatments would not exceed approximately 25 percent of the landscape and that red fir types would not generally be managed for fuels treatments.

Population Outcomes

Both Alternative S1 and S2 are expected to retain a broad distribution within the planning area.

4.3.2.3. California Spotted Owl

The measures, assumptions and consequences used to assess the effects of Alternatives S1 and S2 on the California spotted owl are the same as those used in the FEIS (see Volume 3, Chapter 3, Part 4.4, pp. 82 and 11).

Distribution of Sites among Land Allocations

Each alternative includes two large land allocations as part of its strategy for conserving old forest ecosystems and species associated with these ecosystems: old forest emphasis areas and California spotted owl home range core areas (HRCAs).

For both Alternatives S1 and S2, slightly less than half (49%*)* of known owl sites occur in these allocations. These land allocations are managed differently under each alternative. Alternative S1 allows less mechanical treatment in these areas. Treatments are conducted to reduce hazardous fuels. Standards and guidelines direct managers to use light thinning prescriptions (generally removing trees less than 12-inches dbh) when mechanical treatments are needed to reduce hazardous fuels conditions in stands within old forest emphasis areas and HRCAs.

Alternative S2 uses an active management approach to move landscapes toward desired conditions. Treatment prescriptions are designed not only to reduce hazardous fuels but also to address local forest health issues and, where feasible, to help defray the costs of fuels treatments. Mature forest stands (CWHR types 4M, 4D, 5M, 5D, and 6) in old forest emphasis areas and HRCAs are treated under a forest-wide prescription for mechanical thinning treatments. This forest-wide prescription directs managers to retain medium and large live conifers (trees greater than or equal to 30 inches dbh), at least 40 percent of the basal area in the largest trees, and at least 40 percent canopy cover (unless treatment of ladder fuels results in lower levels of canopy cover).

The Herger-Feinstein Quincy Library Group (HFQLG) Forest Recovery Act Pilot Project Area is also treated differently under the two alternatives. Under Alternative S1, resource management activities, as defined in the HFQLG Act, are generally consistent with Alternative S1's Sierra Nevada-wide standards and guidelines for California spotted owl conservation. An exception is made for certain areas to be managed according to special provisions in the Act itself during the life of the pilot project. Specifically, resource management activities may not be conducted within the following land allocations: Offbase and Deferred (466,433 acres), California spotted owl PACs (411 PACS), and California Spotted Owl Habitat Areas (SOHAs).

Alternative S2 provides for full implementation of the HFQLG Act. Resource management activities, as defined in the Act, may not be conducted within the following land allocations: OffBase and Deferred (466,433 acres), and spotted owl PACs (411 PACS). Under Alternative S2, defensible fuels profile zones (DFPZs) could be constructed within the LSOG 4 and 5 land allocation; however, stands classified as CWHR types 5M, 5D, and 6 in this land allocation would not be entered. After the pilot project is completed, lands within the HFQLG pilot project area would then be managed according to Alternative S2's Sierra Nevada forest-wide direction. Thus, for the next 4 to 5 years, owl sites within the HFQLG area are less likely to experience reductions in habitat suitability compared with other owl sites within the range of the species.

Provisions for Protection of Known or Potential Nest Stands

Survey Requirements

Both alternatives require owl surveys to protocol for all fuels and vegetation treatments conducted in suitable California spotted owl habitat. This includes resource management activities within the HFQLG Pilot Project Area.

Proportion of California Spotted Owl Breeding Territories Protected

Both alternatives maintain the existing 1,321 PACs established through 2002 (including 260 spotted owl sites within SOHAs in the HFQLG pilot project area). Both alternatives require PACs to be established for newly discovered California spotted owl sites and protect all known spotted owl nest sites. PACs would be maintained in the network unless they were rendered unsuitable by wildfire and protocol surveys indicated that they were no longer occupied. This direction would apply to the HFQLG pilot project area under both alternatives.

Alternative S1 limits the numbers of PACs that may be treated in any given year or decade, and modeling projections indicate that most PACs outside defense zones (83 percent of all PACs) would not be treated under this alternative. PACs in defense zones (17 percent of all PACs) could be mechanically treated using the standards and guidelines for the general forest land allocation.

Under Alternative S2, PACs within the wildland urban intermix (WUI), which includes both defense and threat zones, could be mechanically treated using forest-wide standards and guidelines. However, treatment of PACs is discouraged under both alternatives. Fifty-one percent of the California spotted owl PACs are located in the WUI.

Due to provisions within the HFQLG Forest Recovery Act, the 411 PACs within the HFQLG pilot project area would not likely be treated during the life of the pilot project, including those within the WUI, under either Alternative S1 or S2. (PACs within the HFQLG Pilot Project area may only be treated under a prescribed burning prescription specifically designed to improve the habitat suitability or integrity of the PAC.) After completion of the pilot project, these PACs could be treated commensurate with the standards and guidelines described in the ROD.

Size and Configuration of Protected Activity Centers

Management direction specifying the size of PACs and delineation of habitat within PACs is the same for both alternatives. PACs must be the best available 300 acres and should consist of the best available habitat, including known and suspected nest stands, in as compact a unit as possible. Within HFQLG Pilot

Project area, both 300-acre PACs and 1,000-acre SOHAs are maintained. (SOHAs are maintained for the duration of the HFQLG Pilot Project.)

Management within Protected Activity Centers

Alternative S1 limits activities in PACs outside WUI defense zones to reducing surface and ladder fuels through prescribed fire treatments. PACs within defense zones (17 percent of all PACs) may be treated under the general forest land allocation standards and guidelines, which includes removing snags and logs, and opening up the overstory canopy with thinnings.

Alternative S1 allows no more than 5 percent of the PACs to be treated per year and 10 percent per decade. A treatment of 10 acres or less is assumed be be typically avoided at the project level and is likely not to have a significant effect on a PAC and has been discounted in this analysis. There are 1,321 PACs currently identified in the bioregion so over the 20 year analysis period, no more than 264 PACs could be treated in Alternative S1. Based upon the modeling performed for this analysis, portions of 198 PACs (18,100 acres) overlap with the defense zone. It was assumed that all of these PACs would be treated, based upon the priority placed upon treatments within the defense zone. Of the 637 PACs that overlap with the threat zone, modeling estimated that 166 PACs would likely need treatment and of the 1008 PACs that occur outside of the WUI, modeling estimated that 265 would likely need treatment. However, only an additional 66 PACs could be treated within the 20 year analysis period (2 decades). Based on the modeling exercise using the average size of a PAC overlap with a treatment unit, approximately 2,860 acres would be treated in these 66 PACs. Allocation of treatments within these limited PACs would likely need to be coordinated regionally through rigorous implementation monitoring. Estimated results are summarized in Table 4.3.2.3a below.

Under Alternative S2, PACs within the WUI (defense and threat zones) can be mechanically treated to reduce hazardous fuels consistent with forest-wide standards and guidelines for mechanical thinning treatments in mature forest stands. (Fifty-one percent of the California spotted owl PACs are located in the WUI.) This is a key difference between the two alternatives: Alternative S1 allows mechanical treatments in PACs in the defense zone only while Alternative S2 allows PACs to be mechanically treated in both the defense and threat zone. Alternative S2 also differs from Alternative S1 in that no more than 5 percent of the **acres** per year or 10 percent of **acres** per decade within PACs can be treated. PACs within threat zones may be mechanically treated where avoiding PACs would significantly compromise the overall effectiveness of the landscape fire and fuels strategy. There are 421,796 acres of PACs currently identified in the bioregion so over the 20 year analysis period, no more than 84,360 acres could be treated in Alternative S2. As with Alternative S1, it is assumed that the 18,100 acres within the portions of the 198 PACs would be treated. Of the approximately 131,452 acres of PACs that overlap with the threat zone, modeling estimated that 7,190 acres would likely need treatment and of the 271,600 acres of PACs that occur outside of the WUI, 11,740 acres would likely need treatment. These treatment acreages do not exceed the 66,260 acres that could be treated within the 20 year analysis period (2 decades). It is modeled that an additional 166 PACs in the threat zone and 265 PACs outside of the WUI would be treated in these additional acres. However, activities in PACs will be minimized and when treatments are necessary, the PAC will be adjusted to compensate for those acres treated (i.e. there will be no net loss of PAC acres). Estimated results are summarized in Table 4.3.2.3a.

Table 4.3.2.3a. Comparison of numbers of California spotted owl PACs and acres of PACs affected.

	Alt. S1	Alt. S2
Total number of PACs affected – 20 years (Percent of 1321 total PACs)	264 (20%)	629 (48%)
Acres of PACs affected – 20 years (Percent of 421,796 total PAC acres)	20,960 (5%)	37,030 (9%)

Alternatives S1 and S2 provide the same level of protection for PACs located inside the defense zone: mechanical treatments are prohibited within a 500-foot radius buffer around the California spotted owl activity center. Prescribed burning is allowed within the 500-foot buffer. Prior to burning, managers may conduct hand treatments, including the cutting of small trees (less than 6 inches dbh) within a 1-to-2 acre area surrounding the nest trees. The remaining area of the PAC can be mechanically treated to reduce hazardous fuels.

Modeling for the Middle Fork Cosumnes River analysis (see *Sierra Nevada Forest Plan Amendment Management Review and Recommendations*, March 2003) indicated that between 20-30 percent of PACs within this landscape would require treatment to meet the fire and fuels strategy outlined in Alternative S2. Modeling for the Middle Fork Cosumnes River analysis indicates that not all PACs within a WUI would require treatment to effectively meet goals for modifying landscape scale wildland fire behavior.

Within the HFQLG Pilot Project, under both alternatives, vegetation and fuels treatments would not be conducted within PACs during the life of the project, with the exception of light underburning to enhance habitat suitability.

The primary intent of treatments within PACs is to meet the fuels objectives for the defense and threat zones. The risk of losing PACs to high-severity fire is uncertain, and likely varies considerably among PACs. The annual rate of loss is approximately 0.2 percent of the PACs/SOHAs the Sierra Nevada over the past 8 years, which equates to approximately 2.5 PACs per year. Over the last 4 years (1998 to 200) it appears that the annual rate of loss has increased to 0.34 percent of PACs or an approximately average loss of 4.5 PACs. It is suspected that with the amount of mechanical thinning activity expected under Alternative S2, the loss of PACs/SOHAs from wildfire may be reduced below this 8-year average.

Provisions for Habitat Abundance at the Landscape and Home Range Scales

Modeled changes in CWHR Type Abundance

Modeled habitat projections indicate that Alternative S1 contributes to increasing amounts of CWHR types 4M, 4D, 5M, 5D, and 6 in the short term (20 to 50 years) and both alternatives increase these types in the long term (130 years) with Alternative S2 showing a greater increase than Alternative S1.

Table 4.3.2.3b. Projected differences in modeled suitable habitat (defined as CWHR types 4M, 4D, 5M, 5D, and 6) between Alternatives S1 and S2 at 20 years and 130 years.*

	Preferred Nesting 6	Suitable Nesting 5M, 5D, 6	Suitable Habitat 4M,4D, 5M, 5D, 6	CWHR 4M	CWHR 4D	CWHR 5M	CWHR 5D	CWHR 6
Difference between Alts S1 to S2 in Year 20	99,441 less acres than S1 (-8%)	96,868 less acres than S1 (-6%)	59,287 more acres than S1 (+3%)	5, 952 more acres than S1 (+0.5%)	22,027 less acres than S1 (-2%)	30,252 more acres than S1 (+3%)	21,948 more acres than S1 (+9%)	99,441 less acres than S1 (-8%)
Difference between Alts S1 to S2 in year 130	152,413 more acres than S1 (+19%)	335,343 more acres than S1 (+15%)	184,606 more acres than S1 (+7%)	41,316 less acres than S1 (-7%)	49.697 less acres than S1 (-11%)	127,200 more acres than S1 (+7%)	190,999 more acres than S1 (+14%)	152,413 more acres than S1 (+16%)
Overall changes over time		By the 6th decade S1 acres = S2 acres	For all decades S2 acres >S1 acres	Decades 4-10 S2 acres>S1. S1 acres >S2 acres after decade 11	First 5 decades S1 > S2 acres. Decades 6-11 S2 > S1 acres	Decades 2-13, S2 acres > S1 acres	Decade 2-7, S1 acres>S2, decade 8-13 S2 acres>S1	Decades 2-6 S1>S2 acres. Decades 7-13, S2 > S1 acres.

*The long term projections (130 years) are a requirement of the National Forest Management Act that mandates land management plans. The best information available is used to make these projections and must be considered as best effort projections.

Under Alternative S2, within the HFQLG Pilot Project area, the California Spotted Owl Interim Guidelines provide the standards for mechanical treatments. Constructing DFPZs and implementing group selection and individual tree harvests in the Pilot Project area would result in a 7 percent decline in nesting habitat (CWHR types 5M, 5D, and 6) by 2007 and an 8.5 percent decline in suitable habitat (CWHR types 4M, 4D, 5M, 5D, 6) by 2007. After completion of the pilot project area, changes in CWHR types within the HFQLG pilot project area would follow trends shown in Table 4.3.2.3b above.

While new information indicates that California spotted owl population declines may not be as great as previously thought and are within the 95% statistical confidence limits of a stable population, vegetation treatment impacts over the short term (20 years) may involve risks to the California spotted owl population that are not evident by considering longer term habitat projections. The habitat model projections indicate trade-offs in habitat: acreage in CWHR types 4M and 4D decline in the early decades under Alternative S2 due to management actions for conducting fuels treatments; however, the net result is an increase in CWHR types 5M and 5D due to retention of 30–inch dbh and larger trees and release and growth in treated CWHR size class 4 stands. The models do not reflect habitat modifications that occur within the lower layers of treated stands. Alternative S2's standards and guidelines for mechanical thinning in mature forest types could result in removal of habitat attributes that provide quality nesting and foraging habitat: dead and down woody material and snags and smaller trees that provide the multi-aged, multi-layered component of suitable owl habitat**.** Under Alternative S2, a minimum of 40 percent basal area retention in the larger trees allows for some removal of dominant, co-dominant, suppressed and intermediate trees within the upper and lower canopy layers, thereby removing structure and canopy that contributes to overall owl habitat quality.

Amount of Habitat Provided in Owl Home Ranges

Alternative S1 specifies amounts of habitat to be retained within specific areas known to be utilized by spotted owls (i.e. California spotted owl home range core areas, or HRCAs). Within HRCAs (1,046,249 designated acres) vegetation and fuels treatments would be implemented using old forest emphasis area standards and guidelines. Standards and guidelines for mechanical fuels treatments in these areas are designed to allow for fuels reduction while maintaining habitat components important for old forest species, specifically the California spotted owl (large trees, snags, down wood, canopy cover, vertical, multi-aged layering provided by trees larger than 12 inches dbh). Approximately 311,144 acres designated as HRCA occur within WUI threat zones. While WUI threat zone standards and guidelines supercede standards and guidelines for HRCAs when these land allocations overlap, standards and guidelines for mechanical fuels treatments in CWHR types 4M, 4D, 5M, 5D, and 6 in these land allocations (and in old forest emphasis areas) are identical. These treatments are reflected in the light thinning prescriptions described as Rx 21, 25, 30, and 31 in the SNFPA FEIS Appendix B, page 63. Alternative S1 provides suitable habitat within the most used core area surrounding the PAC, which increases the effectiveness of this habitat protection and concentrates high quality habitat within a core area closest to the activity center.

Alternative S2 specifies amounts of habitat to be retained within the specific areas known to be utilized by spotted owls (i.e. home range areas, or HRCAs), but within these HRCAs (1, 046,249 designated acres) mechanical vegetation treatments could be implemented using forest-wide standards and guidelines. These standards and guidelines potentially reduce the vertical layering up to 30-inch dbh trees using 40 percent basal area retention standard (particularly in stands previously treated under CASPO Interim Guideline prescriptions), and have the potential to reduce the canopy cover up to 30 percent from existing condition, but, under most conditions, not below a minimum 40 percent canopy cover standard. These treatments are reflected in the more intensive thinning prescriptions described as Rx 45 and 55 in SNFPA FEIS Appendix B, page 63. Approximately 311,144 acres designated as HRCA occur within WUI threat zones. Mature forest stands within SPLATs in these areas would be treated under the forest-wide mechanical thinning standards and guidelines. The degree of vegetation treatment under Alternative S2 makes it difficult to determine the extent to which this alternative will provide habitat likely to support higher levels of owl occupancy and productivity. For example, it has been shown that structural diversity or heterogeneity within a stand is important in providing habitat for owls. This includes multi-storied canopy, standing and down woody material, standing dead trees, large trees, and dense canopy closure. Throughout the literature, these habitat components are correlated to greater success in reproductive outputs for owls. An estimated 285,280 acres of CWHR type 6 (high quality nesting habitat) would be treated under both Alternatives S1 and S2. Standards and guidelines in Alternative S1 retain more of these habitat components (i.e. higher canopy closure, multi-story canopy conditions, a variety of residual tree sizes) within the treatment units. Alternative S2 would maintain 40 percent canopy, 40 percent basal area, and large trees. Alternative S2 would reduce the amount of multi-story canopy, stand complexity and canopy closure which could affect owl reproductive output.

There are a projected 3.2 million acres within the Sierra Nevada national forests characterized by a high risk pest-drought condition. Many of these acres have a relatively high Stand Density Index (SDI) or high basal area condition relative to site capacity. These are the same conditions one would find in many of stands thought to provide high quality habitat conditions for California spotted owls. An unknown amount of habitat may be treated to address local forest health issues under Alternative S2. Present funding levels indicate +/- 1,000 acres per year. This could further affect the amount of suitable habitat.

During implementation of the HFQLG Pilot Project under Alternative S2, the CASPO Interim Guidelines would apply, with no special management standards and guidelines for HRCAs. (HRCAs encompass approximately 290,073 acres in the pilot project area.) Outside of PACs and SOHAs, select strata may be thinned to maintain 40 percent basal area in largest trees and other strata may be thinned to maintain 30 percent basal area in largest trees. The CASPO Interim Guidelines were designed to maintain owl habitat elements most at risk for a short period of time; they were not designed, nor intended to, increase effectiveness of suitable habitat by protecting and concentrating high quality habitat within a core area close to an activity center. In addition, group selection harvests do not have basal area retention guidelines; these treatments are only required to retain trees greater than or equal to 30 inches dbh.

California spotted owl home ranges within the HFQLG pilot project area were analyzed using the methodology referred to as the Bart Analysis (50 percent of an owl home range should consist of suitable habitat for productivity and survivorship). For the HFQLG analysis, home ranges varied between 2,000 and 8,000 acres, depending on location and owl density. Within the HFQLG Pilot Project area, 73 percent of all owl home ranges associated with PACs and SOHAs in the project area contained greater than 50 percent suitable habitat (existing condition in 1999). The analysis indicated that the proposed action (Alternative 2, which included implementation of the CASPO Interim Guidelines) would result in a downward trend to 65 percent from 73 percent of the PACs and SOHAs in the analysis area supporting 50 percent or greater suitable habitat.

Amount of Habitat Provided Within Owl Home Ranges Occurring in Geographic Areas of Concern

Neither alternative provides unique management direction specific to Geographic Areas of Concern (AOC) (Verner et al. 1992). Both Alternatives S1 and S2 lack assurances that vegetation treatments will not reduce the occupancy and productivity of owl sites in these areas. Alternative S1 does provide a higher likelihood of providing for replacement rate reproduction for owl sites within these areas by establishing an objective for the amount of habitat for each owl's home range, and implementing old forest emphasis area standards and guidelines for fuels and vegetation treatments. Alternative S2 results in a higher risk of declining owl sites during the next 20 years with implementation of more intensive thinning based on land allocation management objectives and application of the forest-wide standards and guidelines for mechanical treatments in mature forest stands. This direction increases the risk identified for widening gaps between habitat parcels, resulting in reduced owl densities and reduction in distribution of owls and owl habitat in AOCs.

The HFQLG Pilot Project area 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 A and AOC 1 on the Lassen National Forest and AOC 3 located on the Sierraville Ranger District on the Tahoe National Forest. Implementation of the HFQLG Pilot Project, as described under Alternative S2 would result in increased fragmentation of habitat in these AOC's. The authors of *The California Spotted Owl: A Technical Assessment of its Current Status* (1992) cautioned against increasing fragmentation in the AOCs.

Effects on Habitat Suitability for Select Prey species of the California Spotted Owl

Projected changes in overall habitat suitability scores for California spotted owls were estimated using CWHR habitat suitability ratings (HSI) and vegetation treatment prescriptions. Under Alternative S1, 82 percent of the analyzed prey species' HSI increased, while under Alternative S2, HSI increased for 71 percent of the analyzed prey species for up to 50 years. Habitat modeling for northern flying squirrel indicates Alternative S2 results in 25,069 more acres of northern flying squirrel habitat at the end of 20 years than Alternative S1, while Alternative S2 results in more long-term available habitat (152,914 acres more at the end of 130 years). Habitat modeling for dusky footed woodrat indicates Alternative S2 results in 23,778 more acres of woodrat habitat at the end of 20 years than Alternative S1, but Alternative S1 results in more long-term available habitat (25,979 acres more at the end of 130 years). Both species appear to increase slightly over current conditions, but there is very little difference between alternatives in terms of prey species effects in either the short- or long-term.

Levels and Types of Forest Management Activities

Acres of Mechanical Vegetation Treatment

In the SNFPA FEIS, Table 3.5r (Chap 3, part 3.5 page 297) indicates annual mechanical acres treated over one decade. Based on Table 4.4.2.1i and Table 4.4.2.1j (Chap 3, part 4.4 page 96-97): Alternative S1 is reflective of Biomass thin (Rx21), Light thin (Rx 31, 35) and Heavy Thin (45, 51, 55) resulting in approximately 680,000 acres of mechanical vegetation treatment scheduled in the first and second decade. The majority of acres treated under Alternative S1 would be characterized by the biomass thin and light thin prescriptions; heavy thin prescriptions would primarily be conducted in WUI defense zones. Rx21, 31 and 35 have a high to moderate probability of retaining important structural attributes of spotted owl habitat, whereas Rx 45, 51, and 55 have a low probability of retaining important structural attributes of spotted owl habitat (SNFPA Chap 3, Part 4.4 page 96, Table 4.4.2.1i).

Alternative S2 (based on the same tables noted above) is reflective of Rx 45 and Rx 55 (Heavy Thin), as well as Rx 61 (Group Selection) in the HFQLG Pilot Project area. Under Alternative S2, 450 PACs within WUI threat zones (135,000 acres) would be potentially available for mechanical SPLAT treatments. These prescriptions have a low probability of retaining structural attributes of spotted owl habitat. However, in the defense zone, entry into PACs is discouraged. Additionally, a “replacement acre” concept would be applied to PACs where unmanaged acres would be added to PACs (where available) to replace acres disturbed through management actions.

Alternative S1 would implement mechanical vegetative treatments on an estimated 68,000 acres/year across the Sierra Nevada landscape as well as an additional 50,000 acres of DFPZ/year in the HFQLG Pilot Project area for a total of approximately 118,000 for the next 4 to 5 years. Alternative S2 would implement vegetation and fuels treatments on approximately 70,000 acres, as well as 8,700 acres of group selection and 50,000 acres of DFPZ construction within the HFQLG Pilot Project area, for a total of 128,700 acres treated annually for the next 4 to 5 years. By the end of 2007, approximately 350,000 acres could be treated with the HFQLG Pilot Project. (Approximately 63,855 acres of DFPZs, 3,320 acres of groups, and 2,296 acres of individual tree selection have been completed in the HFQLG Pilot Project area as of FY2002).

Fragmentation Effects Resulting from Vegetation Treatments

Vegetation and fuels treatments under Alternative S1 do not create habitat gaps and have a low likelihood of creating discontinuous habitat and isolation (Chap 3, part 4.4 page 97). Alternative S1 explicitly provides standards and guidelines limiting the extent to which canopy cover and structure can be reduced. Alternative S2 has a higher likelihood of increasing habitat gaps and ecotonal differences between treated patches and remaining patches of habitat. The more intensive vegetation treatments under Alternative S2 have a high or moderate likelihood of changing suitable habitat to unsuitable habitat. Implementation of group selections, in conjunction with placement of DFPZ’s, within the HFQLG Pilot Project area would lead to increases in habitat fragmentation by 2007.

Location of Vegetation Treatments in Relation to Geographic Areas of Concern

Neither of the alternatives provides unique management direction specific to these geographic areas of concern (AOCs). Both Alternatives S1 and S2 lack assurances that vegetation treatments will not reduce the occupancy and productivity of owl sites in these areas. Vegetation treatments implemented under Alternative S1 do not create habitat gaps and have a low likelihood of creating discontinuous habitat and isolation within AOCs. Alternative S2 has a higher likelihood of increasing habitat gaps and contrast between treated patches and remaining patches of habitat created by thinning to meet management objectives under the forest-wide standards and guidelines. Alternative S2 could potentially affect 52 PACs within geographic AOCs (4 percent of all PACs).

Implementation of group selection, in conjunction with placement of DFPZ's, within the HFQLG Pilot Project area could increase the likelihood of fragmentation by 2007 in three AOCs. There are 18 PACs located in AOCs in the HFQLG pilot project area. These PACs will not be entered with vegetation treatments until the completion of the Pilot Project (2007), when forest-wide standards and guidelines for mechanical thinning treatments in mature forest stands within SPLATs (in WUI threat zones and wildlands) and direction for treating defense zones become effective.

Standards & Guidelines for Important Elements of Habitat Quality

The following discussion centers on the effects of Alternative S1 and Alternative S2 only and does not discuss the effects of wildfire which also effects spotted owl habitat components.

Canopy Cover

Alternative S1 ensures that all vegetation treatments maintain a minimum of 50 percent canopy cover where it exists in westside habitats, thereby retaining owl habitat both within and outside spotted owl home ranges. Vegetation treatments maintain a minimum of 30 percent canopy cover in eastside habitats. Standards and guidelines for Alternative S1 provide for a maximum canopy cover reduction in OFEA and HRCA of 10 percent and in general forest 20 percent. Alternative S2 has a 50 percent canopy cover goal, but 40 percent minimum is called for in all allocations. Canopy cover can be reduced by as much as 30 percent relative to the existing condition. Thus, potentially more open overstory can be created with Alternative S2 than with S1.

Habitat modeling indicates that Alternative S1 maintains more canopy cover for the first three decades than Alternative S2, but after the third decade, there is no discernable difference. The DFPZs created in the HFQLG pilot project will be created with the desired condition of 40 percent canopy cover.

Structure

To maintain stand structure, Alternative S1 maintains existing patches of high capability owl habitat (5M, 5D and 6) that are greater than one acre in size. Canopy retention guidelines set forth lower limits and limits upon the degree of change from the existing canopy cover in the stand (limited to 10 percent change in old forest emphasis areas and HRCAs and 20 percent change in urban areas and the remainder of the general forest). This alternative prevents vegetation treatments from resulting in uniform canopy cover. These standards help to avoid uniformity and provide for a diversity of canopy cover conditions throughout spotted owl home ranges and across the landscape as a whole.

With Alternative S2, all stands, including 5M, 5D, and 6 are available for treatment using Forestwide Standards & Guidelines, which retains 40 percent basal area, of which 5 percent of the stand in size class 6-24" dbh trees to provide total post treatment canopy cover in lower layers. Within the HFQLG Pilot Project, 5M, 5D,and 6 stands within LSOGs 4 and 5 will not be treated with resource management activities (DFPZ's, Individual Tree Selection and groups). There is a higher risk of structural uniformity across the landscape using the 5 percent retention level than the higher stand retention levels called for in Alternative S1.

Large, Old Trees

Both alternatives retain large trees greater than 30 inches dbh in Westside forests and all trees greater than 24" in eastside types (Alternative S2 specifies 30 inches in eastside type). Alternatives differ in the stand-level retention standards that will affect recruitment and density of large trees over time. Alternative S1 retains all trees over 12" dbh in old forest emphasis areas and 20" dbh in general forest land allocations that would have understory thinning (large trees could be removed for operability needs). This guideline specifically retains the 20 to 30 inch size class for future recruitment of large trees. This alternative also relies largely upon canopy cover retention to ensure a continuing supply of large diameter trees across the landscape.

Alternative S2, with its 30" dbh forest-wide retention standard, provides a different strategy for large tree recruitment. Large tree recruitment would be achieved by retaining 40 percent basal area of the largest trees within the stand, a goal of 50 percent canopy cover, and retention of 5 percent of the stand in size class 6-24" dbh trees.

Modeling projected a general increase in large tree availability, in terms of numbers of acres supporting greater than six 30" dbh trees per acre, with both alternatives. Alternative S1 would support slightly more large trees after 20 years than Alternative S2, as there would be a 2 percent increase in acres supporting 30-inch trees in ponderosa pine and a 4 percent increase in mixed conifer. But after 130 years, Alternative S2 would result in a 30 percent increase in ponderosa pine and a 17 percent increase in mixed conifer acres over Alternative S1.

Snags and Down Wood

Both alternatives have standards that require retention of a number of snags greater than 15 inches in dbh in the general forest allocation. Snag retention requirements in Alternative S1 consist of two standards: 1) within general forest retain 4 of the largest in mixed conifer, 6 of the largest in red fir and 3 of the largest in eastside pine, and 4 of the largest in westside hardwood ecosystems; 2) within Old Forest Emphasis Areas, including HRCAs, the standard calls for retention of all snags over 15" or greater except for after stand-replacing events.

Alternative S2 forest wide standards and guidelines do not call for the retention of all snags over 15" in old forest emphasis or in HRCAs, as there is only one snag standard: 4 of the largest snags in mixed conifer, 6 of the largest snags in red fir and 3 of the largest snags in eastside pine, and 4 of the largest snags in westside hardwood ecosystems. Thus with Alternative S2, there would be potentially fewer snags/acre present in old forest emphasis areas, including HRCAs. Alternative S2 modeling indicates declines in all decades from Alternative S1 snag densities because of the removal of the OFEA snag standard, increased upper diameter limit for tree retention (from 12" and 20" dbh to 30" dbh), thus fewer trees available to recruit snags, plus improved health of residual trees. But modeling also indicates that both alternatives maintain a minimum 5 snags/acre in all decades.

Under Alternative S2, within the HFQLG Pilot Project area, snags are managed as per the CASPO Interim Guidelines: 4-8 of the largest snags/acre up to 20 square feet basal area/acre in the range of the spotted owl and 3 of the largest snags/acre within eastside pine.

Retention of Duff Layer

Alternative S1 treats slightly fewer acres than Alternative S2 with mechanical vegetative treatment due to full implementation of HFQLG Pilot Project. Alternative S1 implements mechanical vegetative treatments on approximately 70,000 acres/year across the Sierran landscape as well as an additional 50,000 acres of DFPZ/year in HFQLG pilot project area for a total of approximately 120,000 for the next 4-5 years. Alternative S2 implements actions on approximately 70,000 acres, as well as 8700 acres group selection and 50,000 acres DFPZ construction within the HFQLG Pilot Project area, for a total of 128,700 acres treated annually for the next 4-5 years. By the end of 2007, a maximum of 350,000 acres out of the 1.5 million-acre Pilot Project area could be treated (approximately 63,855 DFPZ, 3,320 acres of groups, and 2,296 acres of individual tree selection are completed as of FY2002). Thus, Alternative S2 has a slightly greater potential for disturbance of the total duff layer and associated micro-habitat that may be important to spotted owl prey.

Level of Disturbance Including Change in Area Affected by Stand Replacement Fire

Table 4.4.2.1l (Volume 3, Chapter 3, part 4.4, page 103), displays that Alternative S1 would average 62,000 acres per decade of changes as a result of wildfire and higher intensity vegetation treatments.

Alternative S2 will average 84,000 acres per decade of changes, as well as those acres changed as a result of HFQLG implementation.

Of the large conflagrations which have occurred from 1993 to 2001, approximately 103 PACs have experience some level of effects from fire. When looking at an eight-year average, the rate of loss is approximately 0.2% per year equating to 2.5 PACs per year. Over the past four years, 18 PACs have experienced significant modifications to habitat. Eighteen PACs over the past four-year period equates to 0.34% or 4.5 PACs potentially lost per year.

Cumulative Effects

HFQLG: Since the HFQLG FEIS ROD was signed in August 1999, the pilot project has accomplished 79 projects consisting of approximately 64,000 acres of DFPZ, 3,300 acres of small group selection, and 2,300 acres of individual tree selection. The 79 projects are comprised of 34 timber sales, 22 service contracts with embedded timber sales, 14 service contracts, and 9 force account projects. Activities associated with timber sales and service contracts have generated approximately 90.8 million board feet (181,600 CCF) of sawlogs, and 612,000 green tons (255,102 CCF) of biomass. Additionally, the Pilot Project has accomplished 40 riparian restoration projects consisting of 1,900 acres.

All group selection acres were accomplished within the eastside pine outside the range of the California spotted owl. Prior to the release of the SNFPA, DFPZ construction occurred outside the range of the spotted owl. After release of the SNFPA, DFPZ’s were planned within the range of the spotted owl using SNFPA standards and guidelines designed to provide owl habitat.

Accomplishments projected in August 1999 by the HFQLG EIS through FY02 are 120,000 to 180,000 acres of DFPZs, 26,100 acres of group selection, and unspecified amounts of individual tree selection and riparian restoration, not exceeding 210,000 total acres of Pilot Project treatments. These accomplishments have not been realized.

Projected accomplishments for FY03 include 15,130 to 26,873 acres of DFPZ, no acres of group selection, 131 acres of individual tree selection, and 1,300 acres of riparian restoration.

An Administrative Study on the Lassen and Plumas National Forest that would evaluate the effects of extensive fuels treatment on the California spotted owl was initiated in 2002. In April 2003, a decision was made to scale back the extent of the Administrative Study, but to continue to study effects to owl habitat at some level. The new study design is forthcoming but not yet available.

Summary

This section synthesizes the discussion of environmental consequences to arrive at an estimate of the environmental and population conditions (SNFPA Chapter 3, Part 4, page 8) that would exist in 20 and 130 years for the California Spotted owl, under each alternative. The environmental outcomes address habitat distribution and its anticipated consequence to species dispersal and interaction capabilities. Population outcomes factor in the availability of both federal and non-federal habitat and other influences on the spotted owl population that are not accounted for in the environmental outcomes. Assigning these outcomes is inherently subjective, although based on a reasoned thought process and the best available information.

The baseline environmental outcome (current condition) are such that suitable environments are broadly distributed across its historical range; however, there are temporary gaps where suitable habitat conditions are absent and present in low abundance. Disjunct areas of suitable habitat are typically large enough and close enough to permit dispersal and interaction among subpopulations across the species range. From a population outcome perspective, the combination of environmental and population conditions provides the opportunity to be broadly distributed across its historical range, but there are gaps where populations are presently in low density. However, population density is typically large enough and close enough to other subpopulations to permit dispersal among subpopulations to allow for inaction as a metapopulation.

Alternative S1 tends to improve the continuity of habitat conditions over the 20 year time period and than maintains these conditions (i.e. habitat continuity and structure) over the 130 planning period within the planning area, allowing for the dispersal and interaction of subpopulations. However, present environmental conditions at the southern portions of this species range have further isolated that subpopulation further limiting its ability for potential interaction with the more Sierra Nevada subpopulation.

Alternative S2 tends to disrupt the continuity of habitat conditions (i.e. habitat structure and distribution) over the 20 year time period. This disruption may lead to increases in fragmentation and habitat patchiness. The increases in fragmentation and patchiness are likely to isolate subpopulations and limit the opportunity for interactions across NFS lands. To exacerbate these short-term conditions, present environmental conditions at the southern portions of this species range are further isolating that subpopulation and further limiting its ability for potential interaction with the more Sierra Nevada subpopulation.

Based on the modeling outcomes both Alternatives S1 and S2 appear to provide for suitable environmental conditions to provide for broadly distributed habitat across the range of the species.

Rationale for Outcomes

Modeling showed that both alternatives provide increasing amounts of habitat (as reflected in changes to CWHR types) over time (130 years). Short term changes are more ambiguous, as decreases in suitable nesting habitat are apparent with Alternative S2 over Alternative S1 by year 20, Alternative S2 appears to provide a 3% increase in overall suitable owl habitat (creating foraging from nesting) over Alternative S1 by year 20. The magnitude of differences between the alternatives is difficult to interpret. Modeling is good at projecting tree growth and associated canopy change. Modeling does not do a good job of projecting the structural components of owl habitat. So, when one looks at increases in CWHR 5M and 5D one would normal assume large increases in habitat. What are being described in CWHR 5M and 5D are trees >24 in DBH and canopy cover > 40%, large trees and high canopy cover. Large trees and high canopy cover are only two components of owl habitat. Although Alternative S1 and Alternative S2 treat the same acreage, the standards and guidelines associated with each of these alternatives lead to significantly different outcomes. Both Alternatives S1 and S2 propose treating 285,280 acres of CWHR 6. Alternative S1 maintains structural diversity within the treated stands while Alternative S2 provides for very limited structural diversity in treated stands. In addition, there are a projected 3.2 million acres having pest-drought driven forest health problems. There is uncertainty as to the amount of acreage that could receive treatment to improve forest health. Available funding suggests that treatments for forest health will be in the range of 1,000 acres per year. Table 4.3.2.3c compares the standards and guidelines for Vegetation and Fuels Management Mechanical Treatment under Alternative S1 and Alternative S2.

Table 4.3.2.3c. Comparison of Alternatives S1 and S2 Standards and Guidelines for Vegetation and Fuels Mechanical Treatment.

Canopy Retention	40 to 50 percent - remove trees less than 6 in dbh. 50 to 59, retain at least 50 percent canopy cover	50 percent canopy cover goal. Retain 40 percent minimum canopy cover.
Untreated areas within stands	10, 15, 25 percent of each stands area	Retain 5 percent or more of the post-treatment canopy in trees between 6 and 25 in. dbh
Diameter limits	Trees at 6, 12, and 20 in. dbh can be removed. Retain trees greater than 30 in. dbh	Retain 40 percent basal area. Retain tree larger than 30 in. dbh
Canopy Reduction	10 to 20 percent reduction in dominant and co-dominant	30 percent canopy reduction
Eastside Pine	Maintain 30 percent canopy cover, Retain trees greater than or equal to 24 in. dbh	Maintain 30 percent basal area, Retain trees greater than or equal to 30 in. dbh. No canopy cover retention standards
Affected PACs	No more than 5 percent of PACs per year and 10 percent of PACs per decade	No more than 5 percent of PAC acres per year and 10 percent PAC acres per decade

The acreage of wildfire is projected to remain about the same as current levels under Alternative S1. With Alternative S2, habitat projections benefit from reductions in large number of wildfire and stand-replacing wildfire 50 years into the future.

Alternative S1: The abundance and distribution of suitable environments for the spotted owl is expected to increase above current conditions for the following reasons:

- This alternative includes provisions addressing the distribution of habitat within owl home range core areas, providing a higher probability of maintaining occupancy and productivity of spotted owl sites.
- This alternative includes provisions ensuring retention of important structural elements of owl habitat, particularly canopy cover and layering, across all portions of the landscape except urban core areas.
- Forty-nine percent of owl activity centers occur in allocations where less intensive vegetation treatments are permitted to occur.

Considering these factors, Alternative S1 provides a higher degree of certainty that vegetation treatments will not adversely affect the distribution or abundance of owl habitat over the next 20 years as compared to Alternative S2. However, projections indicate that thus alternative would produce slightly less suitable owl habitat by the end of the second decade. There is uncertainty as to what effect Alternative S1 would have on spotted owl habitat in the long term.

Alternative S2: The abundance and distribution of suitable nesting habitat for the spotted owl is expected to decline from current conditions in the short term while overall suitable owl habitat is expected to increase. These trends occur for the following reasons:

- This alternative lacks provisions addressing the distribution of habitat within owl home range core areas, sufficient to maintain occupancy and productivity of spotted owl sites. The alternative would increase the impacts, over Alternative S1, to owl habitat components such as lowering canopy closure to 40% from 50% in S1, removes multi-storiness, and stand complexity and structure.
- Four percent of owl activity centers occur in allocations where less intensive vegetation treatments are permitted to occur. This percentage is actually higher for the first 4-5 years because of the

HFQLG off-base/deferred and PAC guidelines (approximately 35% of owl activity centers for the life of the pilot project). After the pilot project, these land allocations will then be managed as per Alternative S2 as applied across the SNFPA SEIS landscape.

- This alternative provides for adjustment or movement of PACs to compensate for PAC acres treated. There will be no net loss of PAC acreage for treatments in the defense zone.

As with Alternative S1, there is uncertainty as to what effect Alternative S2 would have on spotted owl habitat in the long term.

Table 4.3.2.3d. Summary of effects analysis.

Assessment Factor	Measure	20 Years	130+ years	S2 @ 20 Years compared to present	HFQLG
1. Distribution of sites among land allocations	**(% where veg. treatments limited)**			**S1 = 49%** **S2 = 4% (alt 7) or 35% (4% from Alt 7 plus 31% from HFQLG)**	**S2: Until 2007/09 no entry into: Off Base-Deferred, 5M,5D,6 stands in LSOGS 4 and 5, PACs (411 PACS)**
2. Protection of known or potential nest stands					
a. Survey requirements	Owls surveys for all activities occurring in suitable nesting habitat			**S1**= Yes **S2** = Yes	**S2**: Surveys required
b. Proportion protected	Establishment of new PACs #PACs not entered # PACs entered			**S1** a. 1322 updated PACs b. 83% c. 17% in Defense = 225 PACs. **S2** a. 1322 b. 49% c. 51% in WUI	**S2:** 411 PACs/SOHAs b. 411 c. 0
c. Size of PACs	Target acre = 300			S1 and S2 = 300	S2: 300 acre PACS & 1000 acre SOHAs
d. Mgt within PACs	Amount of vegetative treatment			**S1:** No more than 10% of PACs/Decade. **S2:** No more than 10% of Acres within PACs/decade	No treatment of PACS (light under burning)
3. Habitat abundance at landscape and home range scale					
a. Modeled habitat abundance	Suitable nesting habitat Acres (5M, 5D, 6)	S2 = 96,868 less acres than S1	S2= 335,343 more acres than S1	By 6th decade S1=S2	7% decline in nesting habitat by 2007.

Assessment Factor	**Measure**	**20 Years**	**130+ years**	**S2 @ 20 Years compared to present**	**HFQLG**
	Total suitable habitat* (4M, 4D, 5M, 5D, 6)	S2 = 59,287 more acres than S1	S2 = 184,606 more acres than S1	S2 always > S1	8.5% decrease in foraging habitat
	CWHR 4M	S2 = 5,952 more than S1	S2 = 41,316 less than S1	S2 exceeds S1 decades 4-10. S1 exceeds S2 after 11th decade	
	CWHR 4D	S2 = 22,027 less than S1	S2 = 49,697 less than S1	S2 lower than S1 for first five decades; exceeds S1 decades 6-11;	
	CWHR 5M	S2 = 30, 252 more acres than S1	S2 = 127,200 more than S1	S2 has more acres than S1 decades 2-13	
	CWHR 5D	S2 = 21,948 more than S1	S2 = 190,999 more than S1	S2 has fewer acres than S1 decade 2-7; starts exceeding decade 8-13.	
	CWHR 6	S2 = 99,441 less than S1	S2 = 152, 413 more acres than S1	S2 has less acres decades 2-6; S2 has more decades 7-13.	
b. Habitat provided in home ranges	1000 acres: 700 = HRCA + 300 acres PAC	S1 = OFEA Rx S2 = Forest wide prescription (311,144 in Threat Zone)	same	S1= 1,046,249 acres in HRCA S2 = 756,176 (-HFQLG acres)	No HRCA in HFQLG (290,073 less acres)
	Acres **intensive** + veg. treatment in HRCA (within WUI)	S1 & S2: 42,299 acres in defense, 311,144 in threat	same		WUI implementation delayed until 2007
	Acres at risk from pest/drought within HRCA			S1 & S2: 737,216 acres (70% of total HRCA)	
c. Habitat within owl home ranges in AOC's	Risk of declining owl sites	S1= low risk of declining owl sites S2 = resembles Alt 7 in SNFPA. (higher risk of declining owl sites)	Higher risk of loss due to wildfire		S2 = higher risk of declining owl sites
d. Habitat for prey species	Change in habitat suitability (NOFS) Change in suitable acres	S2 = 2,301 less acres than S1	S2 = 152,914 more acres than S1	**S1** = + 11.9% in HSI (50 years) **S2** = +19.5% in HSI (50 yrs)	

Assessment Factor	Measure	20 Years	130+ years	S2 @ 20 Years compared to present	HFQLG
4. Levels of Forest Mgt. Activities					
a. Acres of mechanical veg. treatments**	Number of acres treated/year	**S1** =Mod 8 (70,000 acres/yr **S2** = 70,000 + HFQLG (8700 GS, 50,000 acres DFPZ)= 128,700		450 PACs in threat (135,000 PAC acres) now available under S2	8,700/year in GS = 43,500; 40-60,000 per year DFPZ; total over 5 years is 350,000 acres. No treatment in PACs
b. Fragmentation	Likelihood of creating discontinuous habitat and isolation	**S1** = no treatments create habitat gaps; low likelihood. **S2** = high likelihood of increasing habitat gaps.			226,000 acres of linear DFPZ and 43,500 acres group selection create high likelihood of fragmentation, by 2007.
c. Veg. treatments in AOCs	Likelihood of contributing to habitat fragmentation within AOC	**S1** = no treatments create habitat gaps; low likelihood. **S2** = high likelihood of increasing habitat gaps. Potentially affect 52 PACs within AOC's. (4%)			226,000 acres of linear DFPZ and 43,500 acres group selection create high likelihood of fragmentation, by 2007 in 3 AOC's. 18 PACs in HFQLG in AOC's can be entered post HFQLG FRA (4%).
5. S&Gs on elements of habitat quality					
a. Canopy Cover	% canopy cover retention	S1 maintains more canopy cover for first 3 decades than S2. **S1** maintains an average of 52% **S2** after decade 3, maintains an average of 54% canopy cover		**S1:** Stands>50% canopy cover are maintained at 50%; (OFE & HRCA no reduction in dominant & co-dominant by more than 10% & 20% in General Forest. **S2:** 50% is canopy cover goal, but 40% minimum in all allocations. Can reduce by 30%	DFPZ= reduce canopy cover to 40% (allowable in stands >40%).

Assessment Factor	**Measure**	**20 Years**	**130+ years**	**S2 @ 20 Years compared to present**	**HFQLG**
b. Structure	Retention of stand attributes	**S1:** a) patches of 5M, 5D, 6 >1 acre in size maintained. b) 10-25% stand retention standard for different allocations. **S2:** a) 5M, 5D and 6 treated with universal thinning Rx. B) 5% stand retention standard for allocations.			5M, 5D, 6 within LSOGs not treated.
	Number of Hardwoods >15" dbh	S1 > S2 for first 3 decades. S2 > S1 decade 5-13.		S1 = S2 in decade 4. By decade 6, oaks start a 3 decade decline	Retain 25-35% basal area in oaks over 15" where oaks occur
c. Large, old trees	# acres with >6 trees per acre over 30" dbh.	**S1:** 27,731 (2% increase) in PP acres; 238,056 (4% increase) in MC acres than S2.	**S2:** 1.8 million (30% increase) in PP acres; 2.4 million (17% increase) in MC acres than S1	**S1:** retains all trees over 30" and 24" in eastside; retains all trees over 20" in OFEA. **S2:** Westside and eastside: retains all trees over 30";	Retain all over 30".
d. Snags/Down Wood	# snags >15" /acre	S2 declines in all decades from S1 because of increase in upper diameter limit for tree retention (from 20 to 30); less trees to recruit snags, plus thinning improve health of residual.	S1 and S2 models indicate both over 5/acre in all decades.	S1=S2 standards for snags and down woody.	4-8/acre of largest up to 20 sq.ft/acre in CASPO: Eastside = 3/acre of largest
e. Duff Layer	Acres Treated	S1 treats less acres with mechanical treatments than S2 due to HFQLG (see 4a above)			See 4a above.
6. Levels of disturbance including change in area affected by stand replacement fire	**# acres changed by wildfire and treatment. See 2.d.**	**S1 = averages 62,000 acres/decade.** **S2 = averages 84,000 acres/decade plus HFQLG**			**HFQLG total of 226,000 acres of linear DFPZ and 43,500 acres group selection by 2007.**

**model must create foraging habitat from nesting habitat, as well as protect more total habitat from fire.*

+Intensive = implementation of S&G's for WUI as described in S2. S1 = OFE Rx in WUI

4.3.2.4. Northern Goshawk

Factors Used to Assess Environmental Consequences

The primary threat to northern goshawks at the present time concerns the effects of vegetation management on the distribution, abundance, and quality of habitat (Bloom et al. 1986, Keane and Morrison 1994, Kennedy 1997, Smallwood 1998, DeStefano 1998). Therefore, past and current Forest Service management direction, and vegetation and northern goshawk management strategies developed within this SEIS, have and will continue to significantly contribute to the status and trends of northern goshawk populations in the Sierra Nevada.

This assessment uses two general categories of measures to evaluate the effectiveness of the alternatives to meet the goal of providing the habitat or ecological conditions to support a viable population of northern goshawks well distributed throughout the project area.

4. Risk relative to the distribution and abundance of northern goshawk territories in the Sierra Nevada:
    a. survey requirements
    b. protection of known and newly discovered breeding territories
    c. size and configuration of Protected Activity Centers (PACs)
    d. management within PACs
    e. management of unoccupied PACs
    f. management of disturbance in PACs
5. Risk relative to the overall distribution and abundance of northern goshawk habitat throughout the Sierra Nevada:
    a. habitat elements (e.g. large trees, snags, coarse woody debris)
    b. change in nesting and foraging habitat
    c. change in habitat suitability for prey species

Environmental Consequences

1. Risk relative to the distribution and abundance of northern goshawk territories in the Sierra Nevada

Survey Requirements:

Survey efforts to inventory northern goshawks throughout the Sierra Nevada are incomplete to date and some unknown number of breeding territories has not been documented. The likelihood of locating (and subsequently protecting) these additional goshawk territories is higher when appropriate surveys are implemented. Alternatives S1 and S2 have identical standards requiring goshawk surveys to protocol for all activities that occur in suitable nesting habitat. The proportion of goshawk breeding territories and nest stands known, and subsequently protected, would be the same under both alternatives.

Proportion of Northern Goshawk Breeding Territories Protected

Both alternatives establish 200-acre Protected Activity Centers around all known and newly discovered breeding territories. All PACs are maintained regardless of goshawk occupancy status unless habitat is rendered unsuitable by a catastrophic stand-replacing event and protocol surveys confirm non-occupancy.

Size and Configuration of Protected Activity Centers

Both alternatives require PAC delineation to include known and suspected nest stands and the best available 200 acres of forested habitat in the largest contiguous habitat patches that are possible based on aerial photography. A PAC size of 200 acres is based on criteria reported by Woodbridge and Detrich (1994). They reported that territory occupancy rates were correlated with the amount of available nesting habitat such that occupancy rates of approximately 100 percent were associated with clusters of available nest stands totaling 150-200 acres.

Management within Protected Activity Centers

The type and intensity of vegetation management activities that can occur within PACs differs between alternatives. The main issue concerning vegetation treatments in PACs is the uncertainty that exists related to the trade-off between treating PACs, with the goal of reducing their susceptibility to stand replacing fires, versus the potential negative or positive effects of treatments on northern goshawk occupancy and habitat quality.

Alternative S1 limits treatments in PACs located outside of the Defense Zone to the use of prescribe fire and hand clearing to reduce surface and ladder fuels. Vegetation treatments can occur in up to 5% of PACs per year or 10% per decade unless a formal monitoring and adaptive management approach is developed with the PSW Research Station. Limited operating periods can be waived in up to 5% of PACs per year per forest to allow for early-season prescribed burning. PACs within the Defense Zone receive a 500-foot buffer around the nest trees, with mechanical treatment allowed in the remainder of the PAC.

Alternative S2 limits treatments in PACs located outside of the wildland urban intermix (both defense and threat zones) to the use of prescribed fire and hand clearing to reduce surface and ladder fuels. PACs within the defense and threat zones receive a 500-foot buffer around the nest trees, with mechanical treatment allowed in the remainder of the PAC. Vegetation treatments can occur in up to 5% of the acreage in PACs per year or 10% per decade until a formal monitoring and adaptive management approach is developed in coordination with the PSW Research Station. Limited operating periods can be waived in up to 5% of PACs per year per forest to allow for early-season prescribed burning.

The primary difference between the two alternatives is that mechanical treatment of PACs is allowed within the threat zone under Alternative S2 and not under Alternative S1. Mechanical treatments are allowed in PACs only where prescribed fire is not feasible and when avoiding PACs would significantly compromise the overall effectiveness of the landscape fire and fuels strategy. Although the standard for vegetation treatments within PACs located in the threat zone suggests that mechanical treatments be designed to “maintain habitat structure and function” there are no specific standards or guidelines to define this. Therefore, there is some uncertainty and associated risk that local land managers will interpret this requirement differently.

Approximately 590 northern goshawk breeding territories are known to exist on Sierra Nevada national Forests (FEIS Ch. 3, part 4.4, pg. 114). Protected activity centers have been established for a portion of these territories, encompassing 93,850 acres. Using the relative proportion of PAC acreage in each land allocation and the total number of breeding territories known, it is possible to extrapolate the number of potential PACs in each land allocation (Table 4.3.2.4a).

Table 4.3.2.4a. Protected Activity Center acreage by land allocation.

	Urban Core	Defense Zone	Threat Zone	General Forest and Old Forest Emphasis Area	Totals
Acres	345	4,395	22,765	66,345	**93,850**
Percent	0.3%	4.7%	24%	71%	**100%**
Extrapolated number of breeding territories	1	28	142	419	**590**

It is reasonable to hypothesize that, given historic fire patterns in the Sierra Nevada, light underburns similar to those that occurred prior to the late 1800s would not result in territory abandonment provided that high canopy cover and high densities of large trees in nest stands were not affected. Treatments such as prescribed burning, that maintain high canopy cover and the high densities of large trees in nest stands would be expected to have lower effects on northern goshawks than mechanical thinning that might remove trees in the 12-20” or 20-30” diameter-at-breast-height (dbh) size classes depending on the conditions of the nest stand. However, no empirical data are available to address the effects of various fuels treatments on northern goshawk occupancy, survival and reproduction in PACs.

Alternative S1 allows vegetation treatments in up to 5% of PACs per year and 10% per decade. S2 has a similar standard, however the limitation is based on total acres as opposed to the absolute number of PACs treated. Under Alternative S2 it is possible that a larger number of individual PACs would receive some level of fuels treatment each year, but the total number of acres treated annually would likely be similar.

Management of Unoccupied Protected Activity Centers

Management of unoccupied PACs is the same under both alternatives; all PACs are maintained regardless of goshawk occupancy status unless habitat is rendered unsuitable by a catastrophic stand-replacing event and protocol surveys confirm non-occupancy.

Management of Disturbance in PACs

Both alternatives require surveys to establish or confirm the location of the nest when activities are planned within or adjacent to a PAC. Both alternatives establish a limited operating period (LOP), prohibiting vegetation treatments within approximately ¼ mile of the nest site during the breeding season (February 15 through September 15) unless surveys confirm that northern goshawks are not nesting. The LOP may be waived for vegetation treatments of limited scope and duration when a biological evaluation determines that such projects are unlikely to result in breeding disturbance considering their intensity, duration, timing and specific location. Alternative S1 prohibits “activities” other than vegetation treatments during the LOP, however it is unclear whether this provides additional protection from disturbance. Existing Forest Service policy for biological evaluations (FSM 2672.4) would assure that these activities are adequately analyzed under Alternative S2 and that LOPs would be established if necessary to protect nest sites from disturbance.

2. Risk relative to the overall distribution and abundance of northern goshawk habitat throughout the Sierra Nevada

Habitat Elements (e.g. large trees, snags, coarse woody debris)

Large trees

Under both alternatives, habitat changes suggests general increases in CWHR classes of mature and late-seral forests, and increases in the numbers of large trees ($\geq$ 30” dbh) and very large trees ($\geq$ 50” dbh) over time. There is a concern surrounding the amount of uncertainty about large tree density since it is not possible to analyze the different fuels treatments that would occur across the bioregion for both alternatives.

Snags

Under both alternatives, the number of snags greater than 15 inches diameter at breast height (DBH) is projected to increase gradually for approximately 70 years, and then remain relatively constant. Comparison of snag densities between alternatives indicates that implementation of Alternative S2 could result in fewer (approximately 10 percent) overall snags than Alternative S1 in both the short and long term. However, snag retention requirements are similar in Alternative S1 and S2 and adequate numbers of snags to meet desired conditions are provided for in both alternatives.

Course Woody Debris (CWD)

Projected levels of coarse woody debris (greater than 15 inches) were not modeled empirically. Two factors regulate levels of coarse woody debris within a forest stand, recruitment and loss. Coarse woody debris is recruited from large snags, so it can be assumed that the management schemes that increase the number of snags will also increase recruitment of coarse woody debris. Coarse woody debris can be lost from the landscape through mechanical removal, consumption by fire or natural decay.

Alternative S1 represents a lower level of risk for coarse woody debris. Both alternatives contain similar Standards and Guidelines for snag and coarse woody debris retention, however Alternative S2 grants local land managers the discretion to deviate from these standards on a project-by-project basis. Therefore, Alternative S2 results in less certainty that coarse woody debris goals will be met. Both alternatives project a gradual increase in the number of snags across the landscape, however this projected increase is more rapid under Alternative S1. If fewer snags were present under Alternative S2, levels of recruitment of coarse woody debris would likely also be lower over time. Alternative S1 emphasizes the use of prescribed fire that could generate snags, but could also consume an unknown proportion of large snags and coarse woody debris. Wildfire affects coarse woody debris levels in a similar fashion. Immediate impacts include a short-term reduction in the amount of CWD as logs and other ground-fuels are consumed. Wildfire may also create snags, which could increase eventual recruitment of CWD. The number of acres projected to be affected by both lethal and non-lethal wildfire is significantly less under alternative S2.

Change in Nesting and Foraging Habitat

Overall, it is projected that highly suitable nesting and foraging habitat for goshawk (CWHR classes 5M, 5D) will slightly to moderately increase over time for both alternatives with greater short-term increases projected under S1 and greater long-term increases under S2. Generally, the increase in trend towards more late-seral habitat is attributed to classes 4M, 4D, and 6 transitioning into classes 5M and 5D through growth (FEIS Vol. 3, Chapter 3, part 4.4, page 130). The mix of CWHR classes would change similarly under both alternatives with a short and long-term reduction in 4M and 4D and a commensurate increase in 5M and 5D.

Foraging habitat preferences of northern goshawks are poorly understood, although limited information from studies in conifer forests indicate that northern goshawks seem to prefer to forage in mature forests (summarized in Squires and Reynolds 1997). Hargis et al. (1994) reported that telemetry points within home ranges of northern goshawks had greater basal area, canopy cover, and trees in larger diameter classes compared to random plots within eastside pine vegetation in eastern California. In the eastside pine type, there is a substantially higher risk under Alternative S2 that nesting and foraging habitat conditions would not be maintained. Alternative S2 allows removal of up to 70 percent of the basal area within a treatment unit and has no lower limit for canopy cover retention. Under this scenario, it would be possible to remove all suitable nesting and foraging habitat outside of PACs. The intent of S2 is to limit vegetation treatments to approximately 25% of the landscape so complete removal of nesting and foraging habitat is unlikely. However, treatment of interstitial spaces between SPLATs is not precluded and a moderate level of risk exists under this alternative.

When comparing alternatives, protection of habitat from wildfire is an important consideration for goshawk. Under Alternative S1, projected wildfire acreage per year is expected to remain constant or increase slightly over the long term. Conversely, the total number of acres expected to experience wildfire each year is projected to decrease under Alternative S2, relative to both the current situation and Alternative S1. The number of acres projected to experience lethal or stand-replacing wildfires follows a similar trend for both alternatives.

Change in Habitat Suitability for Prey Species

Projected changes in overall habitat suitability for select northern goshawk prey species were estimated using CWHR habitat suitability ratings and vegetation projections (Table 4.3.2.4b). Under both Alternative S1 and S2, habitat suitability for approximately 60% of prey species is projected to decrease in the short tem (20 years). In the long term (140 years), habitat suitability for the majority (approximately 90%) of prey species is projected to increase. Under Alternative S1 the reduction is prey habitat suitability is projected to be higher initially relative to S2, then lower in the long term. In other words, relative to Alternative S1, Alternative S2 is projected to maintain more habitat for northern goshawk prey species in the short term and less in the long term.

Table 4.3.2.4b. Projected changes in CWHR habitat suitability for select northern goshawk prey species from the current time to year 140 across alternatives.

SPP ID	Species Name	Acres of Habitat (2004)	Acres of Habitat (S1 – 2024)	Acres of Habitat (S2 – 2024)	Acres of Habitat (S1 – 2144)	Acres of Habitat (S2 – 2144)	S2/S1 (2024) Percent	S2/S1 (2144) Percent
B308	Pileated Woodpecker	1,798,571	1,953,456	1,892,494	2,528,500	1,898,205	-3.1%	-25
M079	Douglas Squirrel	2,683,991	2,798,936	2,859,770	3,342,573	3,525,841	2.2	5.5
B134	Blue Grouse	3,660,139	3,782,755	3,738,346	4,573,016	4,460,759	-1.2	-2.5
B386	Hermit Thrush	291,913	323,311	307,327	378,763	373,399	-5.0	-1.4
B306	Black-Backed Woodpecker	665,731	653,868	659,354	643,908	627,783	0.1	-2.5
B350	Clark's Nutcracker	1,198,238	1,207,143	1,209,372	1,240,569	1,250,652	ND	0.1
B346	Stellar's Jay	4,094,797	3,952,366	4,020,916	4,551,701	4,543,667	1.7	-0.2
B307	Northern Flicker	3,460,407	3,290,264	3,356,755	3,963,451	3,983,195	2.0	0.5
B251	Band-Tailed Pigeon	2,423,461	2,307,402	2,365,897	2,812,093	2,876,432	2.5	2.3
B141	Mountain Quail	4,024,498	3,777,261	3,839,262	4,334,943	4,214,568	1.6	-2.8
B471	Western Tanager	3,798,761	3,614,739	3,694,580	4,079,832	4,154,226	2.2	1.8
B299	Red-Breasted Sapsucker	3,503,232	3,338,130	3,409,324	3,837,977	3,810,780	2.1	-0.7

Results of the Assessment for the Northern Goshawk

This section summarizes the environmental consequences to derive the environmental and population outcomes that would occur at 20 and 130 years for the northern goshawk under each alternative.

Alternative S2 does not apply standards and guidelines based on emphasis areas or reserves in its old forest strategy; most lands are managed as “General Forest” where active vegetation management (i.e. mechanical treatment) is used to move landscapes toward desired conditions. The FEIS states that assigning outcomes, while inherently subjective, was based on reasoned thought and the best available information (FEIS, Vol. 3, Ch. 3, part 4.4, page 136). The environmental outcome addresses the capability of the environment on Forest Service lands to support population abundance and distribution. The population outcome addresses environmental conditions on all lands within the bioregion and other risk factors that may affect population abundance and distribution.

Outcomes

Environmental: The current condition is such that suitable environments are either broadly distributed or of high abundance across the range of the species: however, there are temporary gaps where suitable environments are absent or only present in low abundance. Disjunct areas of suitable environments are typically large enough and close enough to permit dispersal and interaction among subpopulations across the species range. Alternative S1 provides for some improvement by maintaining stand complexity over time along with better condition for prey species. Alternative S2 maintains nearly the same conditions as the status quo over time.

Population: The current condition is such that the combination of environmental and population condition provides the opportunity for the species to be broadly distributed and of high abundance across its historical range, but there are gaps where populations are potentially absent or only present in low density. However, the disjunct areas of higher potential population density are typically large enough and close enough to other subpopulations to permit dispersal among subpopulations and potentially to allow the species to interact as a metapopulation across its historical range. Alternatives S1 and S2 vary slightly for the current condition.

Rationale

The following criteria were used and assessed to arrive at the environmental outcome for each alternative: (1) CWHR habitat projections; (2) anticipated effects of Standards and Guidelines relative to management of individual northern goshawk territories; and (3) the anticipated effects of the Standards and Guidelines relative to the designation and management of the major land allocations. Details relative to these criteria and the alternatives are discussed throughout the risk factor and environmental consequences section of this species account. Two additional factors were factored into the assessment of the population outcome: (1) assumed continued growth of the human population in the Sierra Nevada leading to increased development, infrastructure and recreation; and (stable or increasing timber harvest levels on private lands.

The northern goshawk is associated with mature conifer and deciduous forests with complex forest structure. Nesting habitat is characterized by timber stands with dense closed canopies and open understories. Northern goshawks forage in stands with moderately open to dense overstories as well as in habitat mosaics of forest stands with open understories interspersed with riparian areas, meadows or other openings. The northern goshawk has a nearly continuous distribution throughout its range in the Sierra Nevada. Because of the broad distribution of northern goshawks throughout their range in the Sierra Nevada and their dispersal capabilities, suitable environments are likely to be sufficiently abundant and broadly distributed to permit dispersal and nearly continuous interaction among subpopulations across the planning area at the current time. Because they use a greater diversity of habitats and are more broadly distributed, likely outcomes for the northern goshawk are generally higher than those for the California spotted owl.

Model projections of some CWHR strata rated as high suitability habitat for northern goshawks (5D, 5M) suggest a trend toward increasing amounts across both alternatives. Conversely, other important strata (4M, 4D, 6) are projected to decrease. Alternative S2 is projected to result in greater acreage of both CWHR strata 5M and 5D relative to Alternative S1 and a greater number of large and very large trees.

Greater uncertainty is associated with Alternative S2 regarding management of breeding territories in the threat zone and maintenance of both foraging and potential nesting habitat in the eastside pine type. While both alternatives establish PACS for all breeding territories, Alternative S2 does not differentiate vegetation treatments between PACs located in the defense zone and threat zone of the wildland urban intermix. Up to 25% more PACs could receive some level of mechanical treatment under this alternative relative to Alternative S1. This would increase the uncertainty regarding northern goshawk occupancy, survival and reproduction in PACs due to the lack of empirical data on the effects of mechanical treatments. Alternative S2 incurs greater uncertainty than Alternative S1 because of the lack of certainty regarding spatial allocations of treatments, greater proportions of the landscape managed as General Forest and lower canopy cover retention requirements. Under Alternative S1 the standards and guidelines for old forest emphasis areas and forested stands of large trees with moderate to dense canopy cover would likely ensure the broad distribution of some landscapes with suitable foraging habitat on both the east and west side of the Sierra Nevada. California spotted owl and fisher management would likely ensure that mid- and late-seral forests would be broadly distributed on westside Sierra Nevada forests and eastside forests where owls occur. Alternative S2 does not have canopy cover retention requirements for eastside pine so more uncertainty exists regarding retention of foraging and potential nesting habitat outside of PACs. Alternative S2 incurs a reduced risk of habitat loss to wildfire; total wildfire acreage is projected to decrease relative to Alternative S1.

Future development, and possible resultant effects (e.g. increased fire ignitions) associated with the projected human population growth in the Sierra Nevada and continued or increased timber harvest on private lands are assumed to lead to a greater potential for creating future permanent or temporary gaps in the distribution of habitat across the Sierra Nevada across both alternatives.

4.2.3.5. Willow Flycatcher

The following discussion of environmental consequences is based primarily upon a comparison of the effects of Alternatives S1 and S2 in addressing key management issues that pertain to the willow flycatcher (*E. t. adastus* and *E. t. brewsteri*) population and their habitat in the planning area. The consequences of the management direction of the Herger Feinstein Quincy Library Group Forest Recovery Act Pilot Project on the willow flycatcher are also evaluated.

Where applicable, information on effects to willow flycatchers found in the FEIS were utilized for this analysis. Additional sources used to evaluate the environmental consequences on the willow flycatcher population and their habitats primarily include peer-reviewed journal articles, books, professional meetings and symposia, unpublished reports and data, field knowledge and preliminary spatially-explicit analyses of GIS data.

Factors used to assess Environmental Consequences of Alternatives S1 and S2

The key factors used to evaluate the environmental consequences of each of the alternatives for the willow flycatcher population and their habitat in the planning area are listed below in order of management concern and priority:

1. Levels of direct and indirect effects of livestock grazing (season of use, duration, methods, and utilization) on willow flycatcher populations and their habitat;
2. Requirement to implement a monitoring program that includes annual surveys of willow flycatcher breeding success and habitat conditions;
3. Direction to restore degraded areas to desired conditions for willow flycatcher nestinghabitat in order to increase opportunities for willow flycatcher population expansion in the Sierra Nevada bioregion;

4. Management actions to lessen the influence of brown-headed cowbird brood parasitism on the willow flycatcher population (includes livestock and recreation facilities).

Definitions of Willow Flycatcher Site Occupancy

Alternative S1 – The definitions (known, occupied, unoccupied) for willow flycatcher sites as defined in the SNFP FEIS remain the same for this alternative. The SNFP FEIS defined known willow flycatcher sites as meadows or riparian areas with documented willow flycatcher presence during the breeding season, specifically, either:

1. willow flycatcher observed between June 15 and August 1; or
2. willow flycatcher observed between June 1 - June 14, or August 2 - August 15, unless willow flycatcher was:
    - absent during surveys conducted between June 15 and July 15 in the same year,
    - absent during June 15 to July 15 surveys in multiple subsequent years, or
    - detected at a site that is clearly outside of known habitat requirements.

Data compiled for the SNFPA FEIS analyses identified 135 known Willow Flycatcher sites in the SNFPA planning area. The SNFPA FEIS identifies 82 known Willow Flycatcher sites that occur entirely within or were at least centered on Forest Service land. The FEIS analysis does not include 17 sites that occurred on other public and private ownerships but overlapped to some extent onto Forest Service lands. Because any subsequent Forest Service analysis of the Willow Flycatcher and its habitat should incorporate all 99 of these sites, the discussion and definitions that follows for Alternative S2 applies to all 99 of these sites and not just to the 82 sites identified in the SNFPA FEIS analysis.

Alternative S2 - The SNFPA Review Team has proposed new standards and guidelines that require a database to be created that identifies and establishes the distinction between "Occupied Willow Flycatcher Sites" and "Unoccupied Willow Flycatcher Sites." Moreover, these new standards and guidelines require a set of criteria for determining when an "Occupied" site will revert to an "Unoccupied" site. The following definitions (excerpts from Definition of Willow Flycatcher Site Occupancy for Use Within the SNFPA DSEIS , Robinson and Stefani 2003) are used for the evaluation of Alternative S2:

- **Occupied Willow Flycatcher Site.** Definition: A site where Willow Flycatcher(s) have been observed sometime during the breeding season since 1982. For a site to be designated as an Occupied Site, it must meet the following criteria:
    - Observation date(s) between 1982 and 2000:
        - Willow Flycatcher observed since 1982 between 15 June and 1 August; or
        - Willow Flycatcher observed since 1982 between 1-14 June or 2-15 August, unless the Willow Flycatcher was:
            - Absent during surveys conducted between 15 June and 15 July in the same year
            - Absent during 15 June – 15 July surveys in multiple subsequent years; or
            - Detected at a site that is clearly outside of known habitat requirements.
        - For inclusion as an Occupied Willow Flycatcher site, Willow Flycatcher(s) must be identified by the *Fitz-bew* song or in-hand examination. Museum skins that are identified as Willow Flycatchers may also be used if the collection date falls within the range of dates listed above. Nests and egg sets in museum collections infer site occupancy, regardless of collection date. All sites where Willow

Flycatchers were identified using these criteria are included in the dataset, unless the site is known to have undergone an extreme site conversion rendering it incapable of supporting Willow Flycatchers currently or in the future (e.g., wetland conversions or inundation by reservoir). In the past, Willow Flycatchers records without a specific date were assumed to be breeding season occupants until more information became available to indicate otherwise (e.g., there are 3 Willow Flycatcher sites that occurred on Forest Service land where the month and day of detection were not specified in the records); these sites will henceforth be considered to represent Historically Occupied Sites (see below) unless subsequent information collected for these sites confirms occupancy by Willow Flycatchers.

    - Observation date(s) in 2001 or later:
        - Willow Flycatcher site occupancy will be determined based upon the presence of Willow Flycatchers according to standardized protocol.

- **Historically Occupied Willow Flycatcher Site.** Definition: A site that has been surveyed for at least six years over a 10-year period and consistently found to contain no Willow Flycatchers during the breeding season. For a site to be designated as Historically Occupied, it must meet the following criteria:
    - Surveys across a minimum of six separate years during a 10-year period must have been performed (alternatively, surveys may be conducted annually for six years within a six- to 10-year period). See Rationale for explanation.
    - Surveys conducted since June 2000 must be in compliance with the current standardized Willow Flycatcher survey protocol guidelines.
    - All other sites previously identified in the SNFPA ROD as “Known” sites (as well as validated Willow Flycatcher site records that are discovered after the SNFPA ROD was signed) that do not meet the definition of an “Occupied Willow Flycatcher Site” (see above) will by default be classified as Historically Occupied (unless subsequent information collected for these sites confirms occupancy by Willow Flycatchers) and be subject to the 4-year survey cycle that is part of the proposed standards and guidelines for Willow Flycatcher in the DSEIS.
    - If a Historically Occupied site is determined as occupied, the site is upgraded to Occupied status until or unless the site meets the definition of Historically Occupied again.

The following table displays how the available willow flycatcher site data would be categorized using the above definitions.

Table 4.3.2.5a. SNFPA DSEIS Willow Flycatcher site data for Alternative S2.

OWNERSHIP	Historically Occupied	Occupied	Proposed for Elimination	Grand Total
Bureau of Land Management		2		2
County/city	1	2	1	4
Forest Service	10	66	5	81
National Park Service	2	8		10
Private	3	27		30
State	2	6		8
Grand Total	**18**	**111**	**6**	**135**

Alternative S1 requires that suitable habitat for willow flycatchers be maintained at 81 "known" willow flycatcher sites while Alternative S2 requires that suitable habitat be maintained on 66 "occupied" willow flycatcher sites. Meadow utilization standards, willow browse utilization standards and streambank chiseling standards approved in the FEIS ROD still apply, all of which were designed to meet willow flycatcher habitat needs.

Alternative S1 restricts grazing to late-season (after August 30) for meadows where willow flycatchers were at one time documented during the breeding season (data utilized 1900-2000 = 81 sites), even though recent surveys may find the site not currently occupied by the willow flycatcher. This standard is based on the potential that these sites could be occupied in future years. When a site is occupied, this alternative requires the entire meadow not be grazed until after August 30 in order to protect the hydrologic function of the meadow, reduce the potential for brown-headed cowbird parasitism, and reduce the chance for grazing to occur in spite of efforts to exclude cattle from the breeding habitat.

Alternative S2 requires that managers either: 1) restrict grazing to late-season (after August 15) in the entire meadow where willow flycatchers were at one time documented during the breeding season (data utilized 1982-2003 = 66 sites); OR 2) develop a management strategy that ensures livestock are excluded from the willow flycatcher occupied sites (as defined by the new definitions previously described for Alternative S2).

The final difference between alternatives is in how willow flycatcher emphasis habitats are surveyed. Alternative S1 requires that willow flycatcher emphasis habitats (suitable habitat within 5 miles of the known willow flycatcher sites) be surveyed to protocol every three years to determine if willow flycatcher populations are expanding into these areas. Under Alternative S1, if surveys are not conducted for all emphasis habitats within three years, only late season (after August 30) livestock grazing is permitted. Alternative S2 allows the line officer to determine priorities for surveying emphasis habitat. Alternative S2 also requires that emphasis habitat surveys be conducted to protocol as part of any project planning process (i.e. if a project is proposed that could potentially affect emphasis habitat surveys would be conducted). Surveys can be conducted wherever emphasis habitat occurs, regardless of its status relative to future planning efforts.

All of the other standard and guidelines (meadow utilization standards, willow browse utilization standards, streambank chiseling standards, and cowbird parasitism standards) that were approved in the FEIS ROD (Alternative Modified 8) apply to both Alternative S1 and S2.

1) Levels of direct and indirect effects of livestock grazing (season of use, duration, methods, and utilization) on willow flycatcher populations and their habitat

Livestock Grazing: Season of Use, Duration, and Methods

The primary difference between Alternatives S1 and S2 is that Alternative S1 requires that late-season grazing only be allowed in 82 (since revised to 81) “known” willow flycatcher sites while Alternative S2 allows for the option of implementing a site specific management strategy in partnership with the livestock permittee who operates in a given occupied willow flycatcher site (as defined by this alternative’s new definition for an occupied site).

Under Alternative S2, it is not known how many willow flycatcher sites may be included in the “management strategy” option. It is unlikely that all would be included because cost/benefit analyses would indicate that it would not be economically feasible to develop a site specific management strategy in many cases. The “management strategy” option directs that the strategy objectives must focus on protecting habitat during the breeding season and the long-term sustainability of suitable habitat at breeding sites.

Under both alternatives early season grazing would be permissible in meadows not “historically occupied” or “occupied” by willow flycatchers. While Alternative S1 does not allow grazing to occur prior to August 30 in willow flycatcher sites, Alternative S2 could allow for early season grazing if a management strategy is approved. It is assumed that management strategies designed to allow for early season grazing in occupied willow flycatcher sites would include requirements for site specific monitoring to ensure livestock do not utilize forage within or near willow flycatcher nesting areas. Although a management strategy might increase the potential for livestock contact with nesting willow flycatchers, and livestock contact with willow flycatcher nesting areas increases the risk of nest disruption, it is unlikely that this would occur given the goal of protecting nesting willow flycatchers and habitat.

Potential Effects of Late Season Grazing on Willow Flycatcher Populations

Most willow flycatcher nests are located in the lower branches of willow or other shrubs that are within reach of livestock (Flett and Sanders 1987, Valentine et al. 1988, Allen-Diaz et al. 1999, Bombay 1999, Western Foundation of Vertebrate Zoology unpubl. nest records in Stefani et al. 2001). Although not directly witnessed, six instances of nests disturbed by livestock have been reported (King 1955 in Stefani et al. 2001, Valentine et al. 1988). A recent compilation of multiple years of Sierra-wide willow flycatcher nesting data reveals that willow flycatchers fledge young between approximately July 15 and August 31 and fledglings remain in territories for 2 to 3 weeks post-fledging (158 nests; Stafford and Valentine 1985, Sanders and Flett 1989, H. Bombay and M. Morrison unpublished data). Prior to the compilation of these nesting data, and based on an earlier recommendation by Valentine (1987), Valentine et al. (1988) and Harris et al. (1987, 1988), some Sierra Nevada meadows were grazed using a limited operating period (LOP) intended to correspond with the end of the willow flycatcher nesting period and set to end annually on August 15 (in other words, to eliminate risk of direct disturbance to nest sites). The more recent analysis incorporates all available willow flycatcher nesting data for the Sierra Nevada and indicates that the willow flycatcher nesting period throughout the Sierra extends from June 1 to August 31. The period of August 15 to August 30 potentially incorporates up to 10 percent of successful nesting attempts.

The limited operating period (LOP) as defined under Alternative S1 protects up to 10 percent of all nests that on average fledge after August 15th and also may allow for extreme years when nesting is delayed. In addition, these analyses reveal that the latest annual willow flycatcher fledging date cannot be known with certainty because willow flycatcher arrival dates, snowpack, summer weather, nest predation, and brown-headed cowbird brood parasitism influence the length of the nesting season. Weather, predation, and brood parasitism can result in multiple re-nesting attempts. As many as three nesting attempts in one breeding season have been documented for willow flycatcher territories in the Sierra Nevada (Morrison et al. 1999). Alternative S2, with the proposed August 15 LOP, would increase risk for disturbance of up to 10 percent of all nests that on average fledge after August 15. The LOP of August 15 (vs. August 30) does not allow for extreme years when nesting is delayed. However, the livestock on date may be delayed if, in a given year, extreme weather indicates that willow flycatcher nesting phenology has been delayed.

To address some of the uncertainty in the short-term, in willow flycatcher sites receiving late-season grazing under Alternatives S1 and S2, annual utilization and 3-year willow flycatcher habitat condition monitoring is required to detect changes in habitat condition with assessment data to be included in GIS meadow coverage. The Rangeland Analysis and Planning Guide (R5-EM-TP-004) describes annual utilization monitoring and see Appendix U for a description of willow flycatcher habitat condition monitoring techniques. If habitat conditions are not supporting the willow flycatcher or are trending downwards, then grazing will be suspended or modified. Under Alternatives S1 and S2, standards are proposed that ensure habitat conditions in known but "unoccupied", as well as occupied emphasis habitat meadows, will be maintained or improved to support willow flycatchers. These assurances do not extend to potential willow flycatcher habitat, because these sites may be monitored. The difference between Alternative S1 and S2 is that S1 includes willow flycatcher detections that were recorded prior to 1982, while S2 includes all known data from 1982 to present.

2) Requirement to implement a monitoring program that includes annual surveys of willow flycatcher breeding success and habitat conditions

Both Alternative S1 and S2 require that the Region continue to study the demographics of the willow flycatcher in the Sierra Nevada. Alternative S1 requires that surveys be conducted automatically every two years in emphasis habitats, whereas Alternative S2 only requires that emphasis habitats be surveyed if projects are proposed that would warrant surveys.

3) Direction to restore degraded areas to desired conditions for willow flycatcher nesting habitat in order to increase opportunities for willow flycatcher population expansion in the Sierra Nevada bioregion

Alternative S2 proposes a new standard and guideline that requires willow flycatcher habitat suitability be assessed once a site is determined to be "unoccupied." If the habitat at the site is determined to be degraded, this guideline requires the development of restoration objectives and implementation of appropriate actions (such as physical restoration of hydrological components, limiting or re-directing grazing activity) to move the meadow toward desired conditions.

4) Management actions to lessen the influence of brown-headed cowbird brood parasitism on the willow flycatcher population (includes livestock and recreation facilities)

There are no differences between S1 and S2.

Herger-Feinstein Quincy Library Group Forest Recovery Act Pilot Project

There is no difference between Alternatives S1 and S2 for management of willow flycatcher habitat within the HFQLG project area.

4.3.2.6. Great Gray Owl

Factors Used to Assess Environmental Consequences

The risk factors identified for the great gray owl in chapter 3 of the SEIS focus on two primary areas: providing quality nesting habitat and maintenance of prey species. This assessment further measures the effectiveness of the alternatives against the following specific factors:

1. Maintaining existing suitable nesting habitat in occupied territories and improving the quality of suitable habitat where occupancy is unknown.
    a. Survey requirements
    b. Protection of known and newly discovered breeding territories
    c. Management activities within Protected Activity Centers (PACs)
    d. Risk of loss to wildfire
2. Maintaining and improving habitat for voles (*Microtus* spp.) and pocket gophers (*Thomomys* spp.) adjacent to PACs.
    a. Management practices, including aquatic and meadow management practices

Environmental Consequences

Maintaining existing suitable nesting habitat in occupied territories and improving the quality of suitable habitat where occupancy is unknown.

Survey requirements

The FEIS ROD only required surveys to established protocols to follow up reliable sighting of great gray owls (ROD, Appendix A, page A-38). However, requirements under Forest Service Manual 2670 for the Biological Evaluation of activities would be considered during project planning and additional surveys may be undertaken where occupancy is suspected. This requirement applies to both alternatives. In addition, a survey protocol for great gray owls has been developed which applies to both alternatives and improves consistency and reliability of surveys.

Protection of known and newly discovered breeding territories

The direction to delineate a Protected Activity Center (PAC) that provides at least 50 acres of the highest quality nesting habitat available in the forested area surrounding the nest in addition to the meadow or meadow complex that supports the prey base for nesting owls applies to both alternatives. To date, approximately 103 great gray owl PACs have been delineated. This number is an approximation based upon preliminary GIS analysis. It is unknown how many additional breeding territories may be discovered in the future.

Management activities within Protected Activity Centers (PACs)

Direction in both alternatives regarding management within PACs is limited to evaluating nest sites for disturbance effects from roads, trails, off highway vehicle routes, recreation, and other developments. There is no explicit direction regarding maintenance of great gray owl habitat components within PACs and there are no explicit limitations on the amount and intensity of vegetation treatments (mechanical treatments and prescribed burning) allowed within great gray owl PACs, except that grazing standards are provided as discussed in the next section. Limited operating periods are required around nest sites in both alternatives. Alternative S2 proposes a clarification to the limited operating period that applies it explicitly to vegetation treatments, which retains the same intent as in Alternative S1. At the project level, limitations may be developed depending upon site-specific conditions during the Biological Evaluation and project design stages.

Since great gray owl nest sites are located adjacent to montane meadows, typically at mid- to high-elevations and away from human activity and given that great gray owl PACs are relatively small in size, it is a reasonable assumption that most PACs can be avoided during the planning for fuels treatments (SPLAT placement) in both alternatives. Although no specific direction is provided to preferentially avoid great gray owl PACs, it is assumed that this behavior would occur to the extent possible during project planning because of it's Sensitive species status. Since few great gray owl nest sites occur on national forest lands, it is also assumed that treatments within PACs in both alternatives would strive to retain preferential habitat features (large snags, large diameter trees, high canopy cover) within the PAC in order to avoid adverse effects to the species.

Risk of loss to wildfire

Both alternatives strive to reduce the acreage and intensity of all wildfires. This could have an indirect bearing on great gray owls to the extent that wildfire losses to habitat show a commensurate reduction. Both alternatives focus treatments initially in the WUI, which likely reduces the indirect benefit to great gray owls as they primarily occur outside the WUI. Alternative S2 allows more flexibility to treat areas outside the WUI and allows treatments to be more effective at changing fire behavior, which is modeled to result in fewer acres burned each year, and at lower severity compared to Alternative S1.

Maintaining and improving habitat for voles (*Microtus* spp.) and pocket gophers (*Thomomys* spp.) adjacent to PACs.

Management practices, including aquatic and meadow management practices

Alternative S1 includes the provision that maintains herbaceous meadow vegetation at least 12 inches in height and covering at least 90 percent of the meadow in meadow areas of great gray owl PACs. In addition, there are standards and guidelines that address streambank trampling and utilization by livestock. Where other managed wildlife species occur (willow flycatcher and various amphibians), additional standards and guidelines apply. These standards and guidelines serve to limit adverse impacts from livestock grazing on meadows and riparian vegetation.

Alternative S2 replaces the 12 inches herbaceous height requirement for meadows associated with great gray owl PACs with the requirement to maintain herbaceous vegetation at a height commensurate with site capability and habitat needs of prey species. This level is set site-specifically while considering regional guidance and habitat relationships of key prey species. Given that there is little research on foraging habitat requirements of great gray owls or on habitat relationships of their key prey species specific to Sierra Nevada ecosystems, it is unknown how this change in requirements will affect great gray owls other than herbaceous retention levels will be lower for those meadows that are incapable of attaining 12 inches of height. Since additional study and active monitoring of great gray owl populations may be needed to determine habitat needs of prey species in meadows that meet that criteria, this may be an area suitable for adaptive management. The additional standards and guidelines described for Alternative S1 also apply to Alternative S2.

The opportunity to salvage dead and dying trees in response to insect and disease outbreaks and following catastrophic events differ between the alternatives which can affect the availability of large diameter snags used for nesting. Alternative S1 has more limitations on the removal of dead trees and would retain most dead trees in the Old Forest Emphasis Areas. Alternative S2 allows local decisions to remove dead and dying trees for a variety of purposes, including responding to widespread insect and disease events and following catastrophic events. The creation and continual supply of large diameter snags adjacent to suitable nesting habitat and in great gray owl PACs is important to maintaining nesting potential. At the time of a planned project, local managers will need to balance the need to provide snags for nesting substrates with the overall fuel levels and risk of future wildfire losses to snags and habitat as no specific direction is provided. It is assumed that the existing Biological Evaluation process will ensure adverse effects that may lead to a trend toward listing the great gray owl as threatened or endangered will be avoided.

The control of gophers for protection of plantations is not directly addressed in either alternative. The need for this practice is locally determined and evaluated. This practice has occurred on forests with great gray owls (e.g. Stanislaus NF) and management practices have been developed and implemented to reduce the risk of adverse effects to great gray owls. It is assumed that these local practices would continue to be applied where appropriate under either alternative.

Outcomes

Environmental: The current condition is such that suitable environments are frequently isolated and exist at very low abundance across NFS lands. While some of the subpopulations associated with these environments may be self-sustaining, there is limited opportunity for population interactions among many of the suitable environmental patches. Both Alternatives lead to a recognized improvement from the existing condition. Alternative S2 tends to lead to greater improvement over time.

Population: The combination of environmental and population conditions restrict the potential distribution of this species, which is characterized by patchiness and areas of low natural abundance. Gaps, where the likelihood of population occurrence is low, are large enough that some subpopulations are isolated, limiting opportunity for species interactions. There is opportunity for subpopulations in most of the species range to interact as a metapopulation, but some subpopulations are so disjunct that they are essentially isolated from other populations. There is no discernible difference between Alternative S1 and Alternative S2.

Rationale

Environment: Habitat for this species appears dependent upon mature forest adjacent to large montane meadows with specific habitat characteristics that support high prey populations. Montane meadows that meet these criteria are a limited resource across the Sierra Nevada and do not occur in an even distribution across the 11 national forests. Past and recent land management, primarily grazing, has likely reduced habitat capability in otherwise suitable meadows by: (1) reducing the residual herbaceous height below prey species habitat requirements in grazed meadows, (2) changing meadow hydrology, (3) salvage of large snags and green tree harvest around large meadows, and (4) increased recreation.

Alternative S1 provides for maintenance of residual herbaceous plant material in meadows used by great gray owls to support key prey species and requires a review of potential human disturbance from roads, trails, and recreation. Application of standards and guidelines and the Aquatic Management Strategy should help to improve degraded meadow conditions. Large trees and large snags are retained within treatment areas and treatment areas are more restricted than in Alternative S2. The risk of loss of habitat from wildfires is reduced from current trends.

Alternative S2 provides for the maintenance of residual herbaceous plant material as in Alternative S1, but allows adjustment of the exact height based upon local ecological conditions. Potential human disturbance from roads, trails, and recreation are reviewed as in Alternative S1. Standards and guidelines to protect the aquatic resources, including meadow ecosystems are the same as in Alternative S1. Alternative S2 has a greater potential that some large trees and snags could be removed compared to Alternative S1, however, there is no requirement to remove these features and the project Biological Evaluation process will act to moderate the potential differences. The modeling for this alternative shows a greater reduction in annual acres burned and reduced fire severity compared to Alternative S1. Under this alternative, more treatments could occur outside the WUI than in Alternative S1, which may indirectly benefit great gray owl habitat by reducing wildfire risk.

Population: Great gray owl populations are naturally disjunct as a direct result of the scattered availability of suitable meadow habitats. Large gaps are likely to be a natural function of meadow availability and suitability. Given the dispersal ability of the species, it is not likely that populations are completely isolated, even if disjunct. Alternatives S1 and S2 are assumed to slightly improve the population outcome by requiring follow-up survey of reliable sightings which increases the potential for identifying and protecting new territories. Both alternatives are expected to continue to support breeding at known sites and to allow development of suitable habitat at other sites.

4.3.2.7. Foothill Yellow-Legged Frog

The Foothill yellow-legged frog (FYLF) has several specific habitat requirements and can be affected by modifications to these habitats. FYLF has been positively correlated to abundance of riffle mesohabitats. Species breeding is noted at depositional areas, cobbles and boulders at tails/outlets of pools. Breeding behavior appears to be influenced by air and water temperature. Adults congregate at breeding sites and affects are potentially greatest for that lifestage during this period of concentration and exposure. However, egg masses and tadpoles are considered more vulnerable lifestages. Sustained high-flows subsequent to egg mass deposition may dislodge masses or wash tadpoles downstream. Declining water levels may expose egg masses or leave tadpoles vulnerable to desiccation. Recruitment is noted as being more successful in streams with stable channels; low bed mobility; and a coarse surface texture. Other key habitat elements identified are >20% and <90% stream shading; lack of riparian vegetation encroachment; and lack of introduced predators or competitors.

Activities that affect stream channel stability; geomorphology; stream shading; water temperatures; or provide sudden changes in stream flow can modify habitat utilized the FYLF. The primary impacts identified for FYLF in the FEIS are activities that affect water flow and sediment regimes, which could alter oviposition and rearing habitats. Additionally, habitat changes may favor introduced competitor or predator species. Activities identified in the FEIS that can be influenced by the Forest Service that might alter one or both of these regimes are dams/diversion, vegetation management, mechanical fuel treatment, roads, livestock grazing and mining. Other potential direct impacts include; increases in fine sediment; recreation (trampling), and toxins (pesticides, herbicides, and fertilizers).

Alternative S1 (FEIS Alternative MOD 8) was identified as one of three alternatives providing lowest risk and most effective management approach to species persistence and recovery in the FEIS for the Sierra Nevada Forest Plan Amendment. That evaluation noted that water development has been the most significant limiting factor for the species. The Forest Service has the opportunity to address the effects of water development on agency lands through the relicensing of Federal Energy Regulatory Commission (FERC) projects. There are no differences between Alternatives S1 and S2 concerning Forest Service objectives during the relicensing of FERC projects. Other Forest Service activities relating to vegetation management; mechanical fuel treatment, roads, livestock grazing, mining, recreation, and toxins are identical between the alternatives. All these activities require NEPA analysis, biological evaluations, and a Riparian Conservation Objective Analysis prior to implementation. The primary difference between the two alternatives for this species is in regard to management of livestock grazing.

Outcomes

Environmental: The current condition is such that suitable environments are distributed frequently as patches and exist at low abundance. Gaps, where suitable environments are either absent, or present in low abundance, are large enough that some subpopulations are isolated, limiting opportunity for species interactions on national forest system lands. There is opportunity for subpopulations in most of the species range to interact as a metapopulation, but some subpopulations are so disjunct or at such low density that they are essentially isolated from other populations. There is no discernible difference between implementation of Alternatives S1 and S2 from the current condition.

Population: The current condition is such that the combination of environmental and population conditions restrict the potential distribution of this species, which is characterized by high levels of isolation and very low potential abundance. Gaps, where the likelihood of population occurrence is low, are large enough there is little or no possibility of interactions, strong potential for extirpations, and little likelihood of recolonization. There will be significant and likely improvements in population outcomes with the implementation of either Alternative S1 or Alternative S2.

Rationale

Environmental: There is little difference between Alternatives S1 and S2 with regards to the effects relative to the current condition. Both alternatives provide measures to protect the species and it's habitat at the site specific, project level assessment. Critical Aquatic Refuges CARs) have been established for isolated populations of foothill yellow legged frog within the southern end of the species range. As additional populations are identified, additional CARs will be added to the system. Habitat for foothill yellow-legged frog can be maintained or improved through implementation of Riparian Conservation Areas (part of Aquatic Management Strategy). Both alternatives limit streambank disturbance to 10% of any reach within critical aquatic refuges and important bird areas and limit streambank disturbance to 20% of any reach in general. Disturbance of streambanks (habitat alteration) is one of the major contributing factors affecting this species. The Aquatic Management Strategy, which is common to both alternatives, sets goals for the maintenance and restoration of aquatic systems. Habitat for foothill yellow-legged frog can be maintained or improved through implementation of Riparian Conservation Areas (part of Aquatic Management Strategy), again common to both S1 and S2.

Amounts of prescribed fire are the same for both alternatives. Spring and fall burning periods may overlap with the dispersal period for this species and therefore may affect the foothill yellow-legged frog.

Mechanical treatments may affect Foothill yellow-legged frogs in two ways: 1) mechanical treatment to reduce hazardous fuels may change the microclimate of upland stands utilized by Foothill yellow-legged frogs during period of movement and 2) mechanical treatment to reduce hazardous fuel will reduce the amount of large woody debris used by Foothill yellow-frog for resting or hiding cover. There is a negligible difference in the number of acres of mechanical treatment planned under Alternative S1 and S2. The intensity of treatment leading to potential habitat alteration is greater in Alternative S2. Alternative S2 proposes to treat some unknown number of acres outside the SPLATs system for forest health reasons. It is difficult to project the impacts resulting from the unknown factor. However, budget limitations and past history suggest that the number of acres treated each year for forest health purposes will be small (+/- 1,000 acres).

Population: The foothill yellow-legged frog occurs primarily in lower elevation riparian ecosystems. This species has been extirpated from an estimated 66 percent of its historic range due principally to water and hydroelectric development, grazing, and urbanization that adversely affect sediment and stream flow regimes. Suitable habitats for this species generally exist at low abundance and are highly isolated or occur in patches. Continued expansion of human presence within the foothills of the Sierra Nevada and its associated water use patterns couple with agriculture within it historic range will continue to limit this species.

4.3.2.8. Mountain Yellow-Legged Frog

Effects of alternatives on mountain yellow-legged frog

Information reviewed as part of this analysis: Draft species information (proposed Affected Environment for SEIS); Sierra Nevada Forest Plan Amendment FEIS (Chapter 3, Part 4, 4.4.3.1); Sierra Nevada Forest Plan Amendment FEIS ROD; Standards and Guidelines for Alternatives S1 and S2; and DRAFT SEIS Chapters 1 and 2.

The mountain yellow-legged frog (MYLF) has several specific habitat requirements that can be affected by land management activities. MYLF live in high mountain lakes, ponds, tarns, and streams. MYLF may use different sites to overwinter, breed, and forage. Since MYLF larvae (tadpoles) must overwinter at least once before metamorphosis, it is important for breeding sites to have adequate water depth so that they do not dry in the summer and freeze through in the winter. It is also favorable for breeding sites to have some shallow areas with warm water temperatures for optimal larvae development and feeding. Larvae are a very sensitive life stage for this species. They are vulnerable to habitat changes, both desiccation and freezing, and high levels of predation. Exotic predators such as fish have been correlated to declines and local extinctions of this species. Mountain yellow-legged frogs throughout most of their range did not evolve with fish. As a result, they have low survivorship in waters where they are trapped with fish when the frogs are in their larval life stage. Subadults and adults may use several sites for feeding and then overwintering. Cover is important for movement between and within habitats.

Activities that affect water levels, geomorphology, water temperature, availability of cover, and introduction of exotic predators can affect habitat utilized by MYLF. The primary impacts identified for MYLF in the FEIS are activities that may favor introduced predator species or result in direct trampling of species or habitat by humans, pack stock or livestock. Disease is also a concern with this species and it is thought that fish could be vector s of disease. Humans also can also be vectors of disease, including chytrid fungus, into a population. It is likely that pesticides, herbicides and fertilizers are risk factors to this species.

For the MYLF, management activities identified in the FEIS that can be influenced by the Forest Service include: exotic fish stocking, pack stock and livestock use and access, recreation, and locally applied chemical toxins (e.g. pesticides and herbicides).

Alternative S1 (FEIS Alternative MOD 8) was identified as one of three alternatives providing the lowest risk and most effective management approach to species persistence and recovery in the FEIS for the Sierra Nevada Forest Plan Amendment. In general, implementation of the Aquatic Management Strategy (AMS), which is included in both Alternative S1 and S2, should provide protection to MYLF and their habitat. There is some discretion at the project level to implement management activities including vegetation treatments in Riparian Conservation Areas (RCAs). Treatments in RCAs would be designed to meet Riparian Conservation Objectives (RCOs), however, there may be short-term trade-offs to meet long-term goals for habitat conditions. Within the range of the MYLF (4,500 – 12,000+ feet in elevation) treatments in the RCAs would probably be limited because fuels concerns are a higher priority at lower elevations. The required RCO analysis should ensure all treatments would provide for the MYLF and its habitat both in the short-term and in the long-term.

For the duration of the Pilot Project, the Scientific Assessment Team (SAT) guidelines for riparian areas would apply in the Herger-Feinstein Quincy Library Group Pilot Project Area. These guidelines would provide protection for aquatic and riparian habitats. At the end of the Pilot Project, the AMS would be applied to these areas.

Other Forest Service activities relating to vegetation management, mechanical fuel treatment, recreation, exotic fish stocking, and toxins are identical between Alternative S1 and S2. All of these activities require NEPA analysis, biological evaluations, and a Riparian Conservation Objective Analysis prior to implementation.

Where Yosemite toad and MYLF habitat overlap, the restrictions in grazing activities under both alternatives would benefit MYLF. Alternative S1 excludes livestock and pack stock from occupied or essential Yosemite toad habitat. Alternative S2 includes an option to either exclude livestock and pack stock from occupied or essential Yosemite toad habitat or to develop a site-specific management plan.

Twenty-one Critical Aquatic Refuges (CARs) were established on the Sierra Nevada National Forests for MYLF. Goals and Objectives within CARs are consistent between Alternatives S1 and S2.

Outcomes

Environmental: The current condition is such that suitable environments are distributed frequently as patches and exist at low abundance. Gaps, where suitable environments are either absent, or present in low abundance, are large enough that some subpopulations are isolated, limiting opportunity for species interactions on NFS lands. There is opportunity for subpopulations in most of the species range to interact as a metapopulation, but some subpopulations are so disjunct or at such low density that they are essentially isolated from other populations. There is no discernible difference between implementation of Alternatives S1 and S2 from the current condition.

Population: The current condition is such that the combination of environmental and population conditions restrict the potential distribution of this species, which is characterized by high levels of isolation and very low potential abundance. Gaps, where the likelihood of population occurrence is low, are large enough there is little or no possibility of interactions, strong potential for extirpations, and little likelihood of recolonization. There are significant and likely improvements in population outcomes with the implementation of either Alternative S1 or Alternative S2.

Rationale

Environment: Habitat is available for this species across its' range, however, the presence of introduced fish has greatly reduced populations of MYLF and limits recovery and/or re-population of suitable habitats. Alternatives S1 and S2 specifically call for cooperative efforts between Forest Service and California department of Fish and Game to remove fish from some sites occupied by MYLF. Also, both alternatives call for the development of a conservation assessment and strategy for MYLF. Physical habitat characteristics such as water depth and water temperature would not change due to implementation of Alternative S1 or S2. Cover for frogs may be slightly reduced by livestock and pack stock grazing activities under both alternatives, however, this affect would be insignificant across the range of the species.

Population: The mountain yellow-legged frog was the most common amphibian in high-elevation aquatic ecosystems in the Sierra Nevada. Currently populations are highly isolated, metapopulations are lacking throughout the range of the species. Alternatives S1 and S2 would encourage cooperative efforts between Forest Service and California department of Fish and Game to remove fish from some sites occupied by MYLF. Also both alternatives call for the development of a conservation assessment and strategy for MYLF. In addition, at the project scale, implementation of the Aquatic Management Strategy, which includes a Riparian Conservation Objective analysis when treatments are planned in Riparian Conservation Areas, will help to ensure mountain yellow-legged frogs and their habitats are protected under both Alternative S1 and S2. The Aquatic Management Strategy sets goals for the maintenance and restoration of aquatic systems. Under both alternatives, Critical Aquatic Refuges have been established for several mountain yellow-legged frog populations throughout their range.

4.3.2.9. Yosemite Toad

Environmental Consequences

Assumptions and Limitations

1. There is a lack of published research about the effects of all land uses on Yosemite toads and their habitat. The following assessment of the effects of livestock grazing in Yosemite toad habitat is based on researcher and manager observations, unpublished data, and extrapolation and inference from published studies on the effects of livestock grazing on riparian habitats in the Sierra Nevada and other landscapes. This collection of information allows for a subjective analysis of the effects of various activities on the Yosemite toad and its habitat. The effects of

recreation such as hiking and camping, and trails in toad habitat are similarly extrapolated from studies on the effects of these activities to riparian meadows.

2. The standards and guidelines in Alternatives S1 and S2, together with the Biological Evaluation process at the project level, provide substantial direction and review to implement conservation actions for the Yosemite toad. Implementation of management measures are discretionary and are not subject to specific timeframes so it is difficult to assess how the standards and guidelines translate to actual conservation actions through time.

3. There is a high degree of uncertainty as to how well either alternative can maintain the viability of the species because a number of affectors beyond the control of the Forest Service (such as pesticide drift, air pollution, climate change, and disease) may be adversely affecting the viability of the species far more profoundly at the bio-regional scale.

Effects of Alternatives

Chemical Toxins (Locally Applied Pesticides and Herbicides). Alternatives S1 and S2 contain direction to avoid pesticide/herbicide application within 500 feet of known Yosemite toad sites as well as at other TES species sites. While this approach addresses local applications, it does not address possible drift or downstream movements of these chemicals. This direction addresses protective measures for Yosemite toad populations on lower elevations outside of wilderness. Both alternatives also include prohibition of livestock pesticides in riparian areas which would likely lower risk to amphibians.

Exotic fish stocking. Both Alternatives S1 and S2 include Aquatic Management Strategy (AMS) goals to focus on the development of a Conservation Assessment/Strategy for the mountain yellow-legged frog, including direction that emphasizes removal (with CDFG cooperation) of exotic fish from some mountain yellow-legged frog areas. While these standards and guidelines are not specifically directed at Yosemite toads, the overlap in these two species elevational ranges and habitat associations may result in benefits for Yosemite toads as well. Alternatives S1 and S2 provide a process for the Forest Service to work with appropriate State and Federal agencies to eliminate exotic fish stocking when it negatively impacts aquatic species. This could result in improved survival for the Yosemite toad if fish are demonstrated to be predators on the species.

Livestock Grazing. Alternatives S1 and S2 are designed to provide protection for the breeding and rearing season (as determined locally) by excluding livestock grazing (including pack and saddle stock) from standing water and saturated soils in wet meadows and associated stream channels and springs. If physical exclusion of livestock is impractical, then livestock are to be excluded from the entire meadow until the meadow has been dry for two weeks. Alternative S2 allows for this exclusion to be waived if a plan is developed to minimize impacts to the Yosemite toad by managing the movement of livestock around the wet areas.

The interpretation of "rearing season" is narrowly defined to include protection for the egg and tadpole life stages until the tadpoles emerge out of the breeding pools and metamorphose into terrestrial juveniles (metamorphs).

The analysis of implementation of Alternatives S1 and S2 across several hundred meadows in the high Sierra ranging in elevation from approximately 7,000 feet to 11,350 feet is problematic. The effects of livestock and packstock grazing on the egg and tadpole lifestages of Yosemite toads and their habitat may vary dramatically from one year to the next. Effects will vary based on yearly weather patterns and the timing of livestock grazing along with the unpredictable timing and pattern of commercial and recreational packstock grazing from one year to the next. The implementation of the grazing exclusion standards for S1 and S2 are complicated by these variables as well as dramatic elevational differences in the timing of metamorphosis of tadpoles to juvenile terrestrial toads. Tadpoles can metamorphose anywhere from mid-July at the lowest elevations in the driest years to late August in wetter years at the highest elevations. Metamorphosis dates will vary from one breeding pool to the next, depending on when eggs were laid.

There is a high degree of risk and uncertainty associated with the implementation of either alternative in successfully excluding livestock from Yosemite toad breeding and rearing habitats. Attempting to assign specific annual turn-on dates to each meadow or cluster of meadows within 71 active livestock allotments and several hundred meadows that are grazed by packstock in the wilderness within the range of the toad will be extremely difficult in practice. This approach is likely to succeed in protecting some wet meadow areas while failing to exclude livestock from other wet meadow areas where metamorphosis may be taking longer than expected based on previous dates of metamorphosis for an area. Alternative S2 includes an option to waive this exclusion and develop a management plan to steer livestock away from wet areas. This option is more problematic and difficult to implement because livestock can easily drift into the wet meadow portions of the meadows they are grazing in. Many meadows are a complex mosaic of dry, moist and wet portions that complicate any strategy to keep livestock out of wet portions. Livestock also graze at night when there is a high probability they will drift into the wet portions of the meadow. Many allotments and virtually all of the several hundred high country meadows where packstock graze in Yosemite toad habitat have no fences associated with them to keep livestock from drifting into the wet portions of meadows.

The consequences of implementing Alternative S1 based on this assessment is that there is a reasonable probability that some percentage of Yosemite toad breeding and rearing areas will have livestock grazing and moving through them. The direct effect to the Yosemite toad is that there is a probability that some egg masses and tadpoles may be trampled in the shallow portions of the ponds and that they may suffer mortality as a result. It is anticipated that most egg masses will have hatched by the time livestock enter the meadows so the potential effect is mostly at the tadpole stage. Alternative S2 is likely to have a higher percentage of wet meadows where this effect may occur. Neither Alternatives S1 nor S2 provide management direction for the protection of direct trampling by livestock of metamorphs, juveniles, or adult toads outside of the breeding and rearing season. There is a high degree of probability that some percentage of all of these life stages will experience direct trampling mortality as a result of livestock grazing the dry, moist and wet portions of the meadows after the breeding and rearing season has ended. The highest probability of trampling impact is likely to the metamorph life-stage that is 10 millimeters in length. Metamorphs move very slowly or freeze in place when approached and there is a likelihood that they may be trampled when an animal moves to their location. This overlap of livestock use of the meadows with occupancy of these life stages will likely occur between the months of July through October depending on elevation and weather. Other direct effects that have been reported include entrapment of metamorph toads in deep livestock hoofprints, toads being buried by livestock fecal matter, and possible entrapment of toads in rodent burrows that have collapsed from livestock hoof punching.

Indirect effects which are likely with implementation of Alternatives S1 and S2 include modification of breeding and rearing pool structural features from livestock hoof punching and chiseling. This effect can lead to egg masses sinking into deeper water where the probability of mortality is increased. There may be a higher probability of such events occurring under Alternative S2. Under both alternatives, trampling and matting of vegetation will reduce cover for metamorphs, juveniles, and adults and may increase their vulnerability to predation from birds and snakes. Unpublished data (D. Martin pers. comm. 2002) suggests livestock fecal matter contamination of breeding and rearing pools may delay metamorphosis of tadpoles and result in smaller metamorphs compared to habitats where livestock are absent. Livestock grazing and trailing can alter meadow hydrology that can affect the likelihood breeding and rearing pools will have sufficient water to allow Yosemite toads to successfully complete metamorphosis before the pools dry. These effects have not been evaluated within the occupied range of the Yosemite toad.

Alternative S2 provides monitoring and adaptive management direction for each meadow where the grazing exclusion has been waived and a management plan developed to steer livestock around wet areas of the meadow. It requires an assessment of habitat conditions, and an assessment of Yosemite toad occupancy and population dynamics. Every three years from the date of the plan, the monitoring data will be evaluated and adaptive management applied that can include modification or suspension of grazing if Yosemite toad conservation is not being accomplished. This direction will increase the probability that any adverse effects from livestock grazing to the toad or its habitat will be noted through monitoring and potentially corrected.

There are a number of complex issues associated with attempting to determine population dynamics for any particular meadow and correlate the results with livestock grazing management. Yosemite toads may or may not breed in any particular meadow in any given year. Adult female toads do not breed each year. Yosemite toads do not all arrive at the same time in one location for any easy count, and it is difficult to determine by year when the toads will be at a breeding pool if a count were to take place. Metamorphs are 10 millimeters (mm) long at emergence from pools and remain small for twoyears. Any impact from trampling is likely to go un-noticed since toads may be crushed and buried in the mud or grass where they cannot be observed. These aspects of toad ecology and survey difficulty are likely to confound the results of any short-term (3 year) monitoring effort.

There is no research at this time that would allow a more in-depth analysis of the direct and indirect effects of implementation of Alternatives S1 and S2 to make conclusions about the overall effect of livestock grazing on the viability of the Yosemite toad. Grazing has occurred throughout Yosemite toad habitats for well over 150 years, yet hundreds of toad populations persist to this day where livestock grazing continues. The effects of grazing across the Sierra Nevada landscape have been moderated dramatically in recent years through allotment management plans and special use permits that limit impacts to wet meadows and by extension the Yosemite toad. The direct and indirect effects listed add to the host of other affectors that cause mortality, principally weather, disease and predation. In combination with the other factors mentioned above, the livestock grazing in specific meadows where the numbers of adult toads are at very low levels already from undetermined causes may contribute to localized extirpations.

Alternative S1 and S2 both provide for survey requirements of suitable unoccupied habitat to be completed within a specific timeframe. Both alternatives provide direction to survey all unoccupied suitable habitats. Alternative S1 specifies that if surveys are not completed by 2004, the standards and guidelines for livestock restriction would apply to all unsurveyed suitable meadows. Alternative S2 requires surveys but does not require application of the standards and guidelines in unsurveyed suitable habitat.

Effects of Other Land Use Activities on Yosemite Toad Populations and Habitat

Alternative S1 and S2 provide similar direction for ensuring hazard tree removal, mine reclamation, salvage logging, commercial fuelwood cutting, prescribed fire activities and fire suppression activities do not have adverse effects on amphibians. No substantive direct or indirect effects to the Yosemite toad and its habitat are anticipated since there is little overlap with these activities. There are cases where roads course through or adjacent to meadows occupied by Yosemite toads. Both Alternatives provide direction as part of the Riparian Conservation Area (RCA) standards and guidelines to assess impacts associated with roads and take corrective action as necessary. The number of Yosemite toad occupied meadows where roads may be an affector is small relative to the total occupied meadows that are largely in unroaded and wilderness landscapes.

Trials used by hikers, packstock and livestock are commonly associated with occupied Yosemite toad meadows. Alternatives S1 and S2 provide direction to assess trails as part of implementing the RCA S&G's and take correction action where problems occur. The direct effect of use of trails by hikers and livestock is some level of trampling of adults, juveniles and metamorphs will occur across the range of the species. Metamorphs have been observed to cluster on moist or wet trail segments in and on the edges of meadows (G. Milano pers comm.). Occasionally, juveniles and adults have also been observed on trail-tread. As an example, a trail was relocated on the Inyo National Forest in 2001 as a result of a situation where one metamorph was found trampled by packstock while many others were observed in the stock hoofprints (G Milano pers. comm.). The system trail coursed directly through a breeding and rearing area of the meadow. Metamorphs at 10 mm. long are barely visible to the trained observer walking on trails. The casual hiker is unlikely to even notice them. Indirect effects of poor trail location in Yosemite toad habitat include snowmelt, spring, and stream water diversion to or away from breeding pools, accelerated sediment input into pools, and adverse hydrologic drying out of wet and moist portions of habitats where trails are diverting water away from meadows. The overall effect of these affectors on Yosemite toad viability is unknown.

Off-highway vehicle use and mountain biking may also directly and indirectly affect Yosemite toads similar to the issues described for trails. Alternatives S1 and S2 provide sufficient direction to correct any adverse effects that may be occurring from these activites. The overlap of these activities with Yosemite toad populations is small and mostly at lower elevations. Most Yosemite toad populations are in unroaded and wilderness areas.

Environmental Outcome: Under both Alternative S1 and S2, suitable environments are either broadly distributed or of high abundance across the historical range of the species across national forest system lands. However, there are gaps where suitable environments are absent or only present in low abundance. The disjunct areas of suitable environments are typically large enough and close enough to permit dispersal among subpopulations and potentially to allow the species to interact as a metapopulation across its historical range.

Rationale: Ongoing surveys, initiated with the FEIS ROD, continue to identify many new meadows with current Yosemite toad occupancy, as well as a numerous suitable meadows that have structural characteristics suitable for toad occupancy. As surveys continue, it is hypothesized that many additional new sites will be found in the next few years. It appears from survey results to date that habitats are well distributed, suitable, and provide for interaction of populations on National Forest Lands.

Alternatives S1 and S2 provide for habitat maintenance of all known Yosemite toad occupied habitats, and surveys of suitable unoccupied habitats to determine occupancy Both alternatives also provide direction for restoration of wet meadow habitats as part of the Aquatic Management Strategy.

Climate change, or short-term weather variability may affect the distribution of habitats over the period of this analysis. There is a hypothesis that lower elevation habitats may be drying through time and possibly becoming less suitable for occupancy by toads. Research or monitoring will be needed to evaluate this hypothesis. It is possible that lower elevation habitats may be trending away from the environmental outcome described above if this hypothesis is proven to be true.

Population Outcome: Over the last decade, the results of presence/absence surveys in suitable habitat throughout the range of the species suggest that population outcomes for the species will be similar for both alternatives. Based on survey results to date, it appears that a combination of environmental and population conditions has restricted the distribution of the species, to the point where some areas have a high potential for population isolation and/or very low potential abundance. While some of these subpopulations may be self-sustaining, gaps where the likelihood of population occurrence is low or zero are large enough that there is limited opportunity for interactions among them. Because only limited information is available about historical population densities and distribution, the degree to which current populations compare to the historical range for the species is not certain.

Surveys that have been conducted to date have documented low numbers of adult Yosemite toads per occupied site. The hypothesis in the literature is that there are significantly fewer toads per site today than in historical times. The hypothesis is impossible to test in many areas of the range of the species since there is little to no historical information about adult toad numbers per site over the entire range of the species. Some of the work that suggests this hypothesis is true was limited to only portions of the species range and did not have long-term historical data from which to evaluate the numbers changes. However, it is true that low numbers of adult toads are being found in current survey efforts. This may be a function of bias in survey effort, or timing when toads have left the wet meadows or are in burrows. The U. S. Fish and Wildlife Service Notice of 12-month petition finding determined the species is warranted for listing and that declines in the distribution and abundance of Yosemite toads was one reason for the determination. The overall threat to the species is moderate.

Assuming that more occupied sites are found, as additional surveys are completed and monitoring of toad populations continues, the expected population outcomes under both alternatives may improve somewhat. Additional occupied habitat could reflect a species distribution characterized by patchiness and/or areas of low abundance. Gaps where the likelihood of population occurrence is low or zero, may still be large enough that some subpopulations are isolated, limiting opportunity for species interactions. Under these conditions, there may be opportunities for subpopulations in most of the species range to interact as a metapopulation, but some populations would be so disjunct or of such low density that they would essentially be isolated from other populations.

Cumulative Effects

The U. S. Fish and Wildlife Service stated in their 12-month petition finding that declines in the distribution and abundance of Yosemite toads are primarily attributed to the cumulative effects of habitat degradation, airborne contaminants, and drought.

The scope and magnitude of the effect of livestock grazing across the range of the Yosemite toad and its habitat is yet to be determined because survey work is still continuing.. It may take several years to begin to adequately assess the current situation. Preliminary indications are that a few hundred meadows occupied by the Yosemite toad are also grazed by livestock of all types for varying times during the summer season when toads are active in the meadows. There is no historical data from which to assess past effects of grazing practices of the late 19th and early to mid 20th centuries to understand how Yosemite toads populations were affected. What is known is that thousands of sheep and cattle were grazing in portions of Yosemite toad range and meadow degradation was documented in photos and agency reports. It is likely that Yosemite toad habitats were adversely affected during this period and current conditions of toad habitats may still be recovering where stream channel incisement, and meadow dessication and loss occurred. Livestock grazing today is still contributing to habitat degradation through the effects on meadow hydrology, and vegetative structure reduction as well as an unknown level of direct effect on toad populations from trampling. The cumulative effect of past and present grazing as well as other Forest Service, other Federal and State agencies and private land management activities and uses is unknown and remains to be investigated.

Multiple factors that have been adversely affecting Yosemite toad populations historically, currently, and likely to do so in the foreseeable future include pesticide drift, airborne industrial and automotive pollution, all forms of livestock grazing, disease and parasites, dams and water diversions, timber harvesting as it affects streams and meadows, recreational and other human disturbance activities in toad breeding areas, off-highway vehicles, UV-B radiation, introduced fish, extreme weather patterns, and climate change. These factors are likely to operate synergistically at multiple scales from a local breeding pool to range-wide, and in different combinations to extirpate populations of the species, lower population numbers, and decrease habitat suitability. A thorough review of these factors can be found in the U. S. Fish and Wildlife Service 12-month petition to list finding report published in the Federal Register Vol. 67, No. 237 December 10, 2002.

Conservation Measures

The Yosemite toad is a Forest Service Region 5 Sensitive Species. All NEPA or permit renewal driven land use, or land management proposals must be evaluated through the Biological Evaluation process.

The evaluation is designed to determine if approval, and implementation of the action or permit as proposed will adversely affect the viability of the species, or contribute to a trend toward federal listing under the Endangered Species Act. Through this process, appropriate management measures are identified to prevent or mitigate adverse determinations on the species or its habitat. Management measures to avoid adverse effects to the species from land uses may be implemented at the discretion of the decision maker such as a District Ranger, Forest Supervisor, or higher level decision maker.

Alternatives S1 and S2 have direction to implement recovery plans for listed species as funds allow, and to conduct a Conservation Assessment for the Yosemite toad. The conservation assessment is not a conservation action per se, but a review of the status of the species and factors affecting its viability. It is a precursor to a conservation strategy that is not part of the direction of either alternative. Both S1 and S2 alternatives provide for the establishment of Critical Aquatic Refuges (CAR's) for several known populations of Yosemite toads on Forest Service lands and the alternatives allow for the addition of new CAR's as more information is gained (FEIS Appendix I). The designation of a CAR is also not a conservation measure by itself. The standard and guidelines s for Alternative S1 and S2 specific to CARs are designed to manage hazard tree removal, salvage harvest, commercial fuelwood cutting, prescribed fire and fire suppression, mine reclamation, and sediment delivery from compaction effects related to roads, skid trails and landings, or other activities to avoid adverse effects to amphibians.

Alternatives S1 and S2 have the same standards and guidelines under Aquatic/Riparian: Amphibians, Range, and Riparian Conservation Areas subsections (Pages 1-12 SEIS Appendix A) except for one standard and guideline that relates to livestock grazing and meadow utilization. Standards and guidelines that apply to both alternatives provide direction to minimize, or eliminate effects to amphibian species and their habitats from management activities such as mechanical ground disturbing fuels treatments, hazard tree removal, salvage harvest, commercial fuelwood cutting, application of herbicides and pesticides, road building and maintenance, location of livestock handling facilities, mining activities, storage of fuels and toxic materials, culvert and stream crossings, FERC relicensing and exempt hydroelectric projects, fire suppression, prescribed fire, and mine reclamation.

4.3.2.10. Northern Leopard Frog

The northern leopard frog (NLF) has several specific habitat requirements that can be affected by land management activities. NLF uses a variety of habitats throughout the year. Breeding occurs in ponds with a high degree of vegetative cover, both in the water and along the water's edge. Cover, including vegetation, downed logs and leaf litter, is very important for all life stages of this species (larvae (tadpole), subadult and adult). Lack of predators such as fish is also important in breeding sites. This species will travel overland (often up to 1 mile) from overwintering sites to breeding sites and cover from predators is important during times of movement. After breeding, NLF will move to a variety of habitats nearby including but not limited to meadows, pastures, and roadside ditches. Summer habitat needs to provide available food, adequate cover and moisture. During the fall and winter NLF move to overwintering sites such as larger lakes and streams that do not freeze completely.

Land management activities that affect availability of cover, water depth, water temperature, and introduction of exotic predators can affect habitat utilized by NLF. The primary impacts identified for NLF in the FEIS are activities that may favor introduced predator species or result in direct trampling of species or habitat by humans, pack stock or livestock. Application of pesticides and herbicides is also a concern with this species because these chemicals are thought to disrupt endocrine systems in amphibians at low concentrations.

For the NLF, management activities identified in the FEIS that can be influenced by the Forest Service include: livestock grazing, exotic fish stocking, and locally applied chemical toxins (e.g. pesticides and herbicides).

Alternative S1 (FEIS Alternative MOD 8) was identified as one of three alternatives providing the lowest risk and most effective management approach to species persistence and recovery in the FEIS for the Sierra Nevada Forest Plan Amendment. In general, implementation of the Aquatic Management Strategy (AMS), which is included in both Alternative S1 and S2, should provide protection to NLF and their habitat. There is some discretion at the project level to implement management activities including vegetation treatments Riparian Conservation Areas (RCAs). Treatments in RCAs would be designed to meet Riparian Conservation Objectives (RCOs), however, there may be short-term trade-offs to meet long-term goals for habitat conditions. The required RCO analysis should ensure all treatments would provide for the NLF and its habitat both in the short-term and in the long-term.

For the duration of the Pilot Project, the Scientific Assessment Team (SAT) guidelines for riparian areas would apply in the Herger-Feinstein Quincy Library Group Pilot Project Area. These guidelines would provide protection for aquatic and riparian habitats. At the end of the Pilot Project, the AMS would be applied to these areas.

Other Forest Service activities relating to vegetation management, mechanical fuel treatment, recreation, exotic fish stocking, and toxins are identical between Alternative S1 and S2. All of these activities require NEPA analysis, biological evaluations, and a Riparian Conservation Objective Analysis prior to implementation. For riparian/meadow management, the primary difference between the two alternatives is in regards to livestock and pack stock grazing. S1 excludes livestock and pack stock from occupied or essential Yosemite toad habitat. S2 includes an option to either exclude livestock and pack stock from occupied or essential Yosemite toad habitat or develop a site-specific management plan. Since NLF and Yosemite toad do not substantially overlap, standards to protect toads will not provide much benefit NLF under either alternative. At this time no Critical Aquatic Refuges (CARs) have been established on the Sierra Nevada National Forests for NLF. CARs can be added if determined important for this species in the future.

Outcomes

Environmental: The current condition is such that suitable environments are distributed frequently as patches and exist at low abundance. Gaps, where suitable environments are either absent, or present in low abundance, are large enough that some subpopulations are isolated, limiting opportunity for species interactions on NFS lands. There is opportunity for subpopulations in most of the species range to interact as a metapopulation, but some subpopulations are so disjunct or at such low density that they are essentially isolated from other populations. There is no discernible difference between implementation of Alternatives S1 and S2 from the current condition.

Population: The current condition is such that the combination of environmental and population conditions restrict the potential distribution of this species, which is characterized by high levels of isolation and very low potential abundance. Gaps, where the likelihood of population occurrence is low, are large enough there is little or no possibility of interactions, strong potential for extirpations, and little likelihood of recolonization. There is no discernible difference between implementation of Alternatives S1 and S2 from the current condition.

Rationale

Environment: This species has experienced significant declines in the Sierra Nevada portion of its range. Alternatives S1 and S2 contain an Aquatic Management Strategy that should result in improved aquatic and riparian conditions in the future. In addition both alternatives call for a conservation assessment for this species. However, because there are a few, widely separated, populations in the bioregion and there are both local and regional affectors on habitat quality, current environmental conditions for the species are likely to persist.

Population: Currently there are no populations of this species on National Forest land in the Sierra Nevada. If a population is discovered, a Critical Aquatic Refuge (CAR) could be established.

4.3.2.11. Cascades Frog

The Cascades frog is associated with both permanent and ephemeral streams and ponds, although permanent water bodies are probably required for larval survival. Possible factors contributing to the species decline identified in the Sierra Nevada Forest Plan Amendment FEIS include: livestock grazing, exotic predatory fish, loss of breeding habitat due to drought, and loss of wet meadows possibly as a result of fire suppression. Additionally, closely related species in other regions have show sensitivity to numerous pesticides, herbicides, and fertilizers. For the Cascades frog the key management activities that the Forest Service can influence are: livestock grazing, exotic fish stocking, fire suppression, and locally applied chemical toxins (e.g. pesticides and herbicides).

In the FEIS for the Sierra Nevada Forest Plan Amendment, Alternative S1 (FEIS Alternative MOD 8) was identified as one of three alternatives providing lowest risk and most effective management approach to species persistence and recovery. Forest Service activities relating to fire suppression; livestock grazing, and exotic fish stocking, and toxins are identical between Alternatives S1 and S2. Fuels management, livestock grazing, and application of toxins require NEPA analysis, biological evaluations, and a Riparian Conservation Objective Analysis prior to implementation. Concerns regarding stocking of exotic fish can be addressed through coordination with state agencies. Two Critical Aquatic Refuges (CARs) were established around the two known reproducing populations on the Lassen National Forest. Goals and Objectives within CARs are consistent between Alternatives S1 and S2.

Outcomes

Environmental: The current condition is such that suitable environments are distributed frequently as patches and exist at low abundance. Gaps, where suitable environments are present in low abundance are large enough that some subpopulations are isolated, limiting opportunity for species interaction on national forest system lands. Alternative S1 and Alternative S2 lead to no change from the current condition.

Population: The current condition is such that the combination of environmental and population conditions restrict the potential distribution of this species, which is characterized by patchiness and low abundance. Gaps, where the likelihood of population occurrence is low, are large enough that some subpopulations are isolated, limiting the opportunity for species interactions. There is opportunity for subpopulations in most of the species range to interact as a metapopulation, but some subpopulations are so disjunct that they are essentially isolated from other populations. There is no discernible change from the current condition by implementing either Alternative S1 or Alternative S2.

Rationale

Environmental: Cascades frogs historically were known to occur within the project area on the western part Lassen National Forest. Even within the Forest, the species was isolated to Deer Creek, Butte Creek, Mill Creek and Battle Creek. Additional populations were noted on the West Branch Feather River and Upper, Middle, and Lower North Fork Feather River. Habitat within these drainage still remains, along with varying population levels. CARs have been established for known reproducing populations of Cascade frogs on the Lassen. At one site, grazing has not occurred for 15 years while at the other site grazing was eliminated five years ago.

In addition a number of conservation measures are common to both alternatives. The Aquatic Management Strategy sets goals for the maintenance and restoration of aquatic systems. Habitat for Cascades frog can be maintained or improved through implementation of Riparian Conservation Areas (part of Aquatic Management Strategy). Streambank disturbance is limited to 10 per cent of any reach within critical aquatic refuges and important bird areas and 20 percent of any reach in general. Disturbance of streambanks (habitat alteration) is one of the major contributing factors affecting this species. Measures to protect Cascades frogs and habitat for the species can be identified site-specially at the project level. Habitat for Cascades frog may benefit by fuels reduction activities. There is no difference between the implementation of either alternative and their relative effects on this species within the project area.

Population: The Cascades frog remains distributed throughout the Cascade Range from northern California to northern Washington. Population levels appear to vary from historical levels with some isolation occurring. Where grazing has been limited and where exotic fish species have been excluded or eliminated, populations remain healthy. However, where habitat has been and continues to be influenced by heavy grazing, populations are at low levels or have been extirpated. This same trend holds true where exotic fish species have been introduced.

4.3.3. Management Indicator Species

A number of species were not carried forward in the analysis. These species fell in three primary habitat assemblages, Riparian (Wetland), Aquatic (lakes and streams) and pinyon-juniper. The non-fish species in the Aquatic habitat assemblage include Great blue heron, Canada goose, buffle head, wood duck, mallard, and cinnamon teal. Species not carried forward which are associated primarily with the Riparian assemblage include Wilson's warbler, and Lincoln's warbler. There is one species within the pinyon-juniper habitat assemblage, pronghorn.

This assessment is limited to the comparison of projected, model changes in habitat utility acreage and percent change in habitat utility.

The California Wildlife Habitat Relationships personal computer database (CA Dept. Fish and Game, 2002) was used to analysis and compare the incremental differences in projected habitat utility acreage and percent change in habitat utility between implementation of Alternative S1 and Alternative S2. The differences are displayed in Table 4.3.3a below at year 20 (the year of project completion) and year 150. For assessing changes in habitat utility reference SNFPA Chapter 3, Part 4.2 pages 34 to 38, pages 42 to 47, Part 4.4, pages 95 and 138.

Table 4.3.3a. 20 year and 150 year comparison of changes from Alternative S1 to S2.

Species	CWHR Identifier	Change in acreage from S1 to S2 yearl 20	Percent change from S1 to S2 year 20	Change in acreage from S1 to S2 year 130	Percent change from S1 to S2 year 130	Percent change from current (0 – 130 years S2/S1)
Ensatina	A012	28,527	2.37	12,857	0.85	26.0/25.9
Pacific Tree Frog	A039	48,442	1.68	-68,061	-2.04	9.9/12.2
Black-throated Gray Warbler	B436	43,531	2.72	-16,085	-0.81	16.4/17.3
Band-tailed Pigeon	B251	58,496	2.5	64,339	2.2	18.7/16.0
Black-headed Grosbeak	B475	30,639	1.5	13,470	0.5	6.9/6.4
Blue Grouse	B134	-44,409	-1.02	-112,257	-2.5	21.9/24.9
Brown Creeper	B364	67,528	2.08	136,471	3.75	14.7/10.5

Species	CWHR Identifier	Change in acreage from S1 to S2 yearl 20	Percent change from S1 to S2 year 20	Change in acreage from S1 to S2 year 130	Percent change from S1 to S2 year 130	Percent change from current (0 – 130 years S2/S1)
Cassin's Finch	B537	64,266	7.81	-27,074	-2.82	-2.8/0.5
Downy Woodpecker	B303	-1,910	-0.17	-44,752	- 30	9.34/13.1
Golden Eagle	B126	58,762	1.44	-177,677	-3.71	5.9/10.0
Golden-crowned Kinglet	B362	53,223	1.61	84,257	2.31	8.4/5.9
Hairy Woodpecker	B304	85,101	2.29	17,555	0.42	7.8/7.4
Hammond's Flycatcher	B317	41,359	2.44	144,230	6.91	33.6/24.9
House Wren	B369	289	4.45	1,218	14.06	21.5/6.5
Mountain Bluebird	B381	-941	0.04	-179,230	2.84	60.5/57.7
Mountain Quail	B141	62,001	1.6	-120,375	-2.9	4.7/7.7
Northern Flicker	B307	6,491	2.0	19,744	0.5	15.1/14.5
Northern Oriole	B532	27,505	8.91	-16,940	-4.90	12.6/18.4
Osprey	B110	81,282	2.48	50,904	1.30	10.0/8.5
Pacific-slope Flycatcher	B320	15,156	15.15	25,424	2.75	32.7/29.2
Pileated Woodpecker	B308	80,248	3.08	177,992 7	7.0	50.4/40.6
Prairie Falcon	B129	42,052	1.2	-101,119	-2.6	11.1/14.0
Red Crossbill	B539	27,707	2.19	40,360	2.93	10.0/6.5
Red-breasted Nuthatch	B361	100,056	3.41	131,301	3.81	18.3/13.9
Red-breasted Sapsucker	B299	71,194	2.13	-27,196	-0.71	8.8/9.6
Red-naped Sapsucker	B298	-3,432	-4.13	-7,219	-7.63	-12.2/-5.0
Sharp-shinned Hawk	B115	55,060	1.66	-1,295	-0.03	14.4/14.4
Song Sparrow	B505	47,231	7.64	-144,303	-16.31	16.0/38.5
Three-toed Woodpecker	B306	5,484	0.01	-16,125	-2.6	-5.7/3.3
Townsend's Warbler	B437	0	0	0	0	0
Violet-green Swallow	B340	85,101	2.2	17,555	0.4	7.8/7.4
White-breasted Nuthatch	B362	53,223	1.81	84,257	2.31	8.4/5.9
White-crowned Sparrow	B510	-2,361	-2.05	-23,472	-14.51	4.6/22.4
White-headed Woodpecker	B305	91,575	2.8	44,143	1.2	5.6/4.3
Williamson Sapsucker	B300	33,786	2.1	56,085	3.2	4.3/0.9
Wilson's Warbler	B463	34,364	1.87	-110,136	-5.70	-7.9/-2.3
Yellow Warbler	B430	56,998	2.83	-82,531	-3.74	-3.7/0.05
Black Bear	M151	70,179	2.36	23,437	0.66	15.8/15.0
Bobcat	M166	32,896	1.17	-214,271	-6.72	-4.2/2.8

Species	CWHR Identifier	Change in acreage from S1 to S2 yearl 20	Percent change from S1 to S2 year 20	Change in acreage from S1 to S2 year 130	Percent change from S1 to S2 year 130	Percent change from current (0 – 130 years S2/S1)
Douglas Squirrel	M079	60,834	2.1	183,286	5.2	31.7/24.5
Dusky Shrew	M004	17,130	3.51	11,354	2.28	5.2/2.9
Dusky-footed Woodrat	M127	23,778	3.07	-23,992	-2.50	14.0/17.0
Elk	M177	541	1.22	-3,800	-8.62	-11.8/-3.5
Mountain Beaver	M052	26,986	1.91	-224,907	-15.38	-23.6/-9.7
Mountain Lion	M165	52,488	1.42	-108,513	-2.78	-3.0/-0.05
Mule Deer	M181	40,143	1.2	-144,771	-4.4	-4.9/-0.7
Northern Flying Squirrel	M080	25,063	0.9	137,225	4.0	33.5/28.1
Ornate Shrew	M006	8,443	7.47	3,340	2.42	10.7/8.1
Raccoon	M153	49,581	1.49	58,916	1.47	21.1/19.4
Water Shrew	M010	21,523	1.5	94,287	5.56	32.9/25.9
Western Gray Squirrel	M077	36,333	2.0	22,678	1.1	8.4/7.2
Western Jumping Mouse	M143	47,317	3.37	-72,224	-4.39	8.1/13.1
CA Mountain Kingsnake	R059	59,769	3.82	-6,395	-0.33	16.8/17/1
Gopher Snake	R057	-128,231	-6.08	-383,806	-12.15	40.3/59.7
Western Aquatic Garter Snake	R063	-11,481	-2.76	-16,725	-3.20	2.4/5.8
Western Skink	R036	23,259	3.55	-94,617	-10.54	8.2/12.1
Western Terr. Garter Snake	R069	-153	-3.50	-972	-17.22	-37.2/24.1

**The species are primarily meadow aquatic and were carried forward due to their association with snags as nesting structures.*

Species showing negative projected, modeled acreage or percent change from S1 to S2 can be interpreted as Alternative S1 providing better habitat conditions than Alternative S2. Those showing positive outcomes in projected, modeled acreage or percent change from S1 to S2 can be interpreted as Alternative S2 providing better habitat conditions than S1. Alternative S1 is projected to have positive changes in the 20 year period for only 7 species, while Alternative S2 is project to have positive changes in the 20 year period for 48 species. Because of the limited habitat identified for the Townsend's warbler, neither Alternative seem to affect the species. There were significant differences on projected changes in habitat utility in year 150. Alternative S1 is projected as providing better habitat conditions for 30 species while Alternative S2 is projected as having better habitat conditions for 25 species. Again, there were no significant changes for Townsend's warbler. Figure xx compares the number of species and relative change in experiencing habitat utility score from Alternative S1 to Alternative S2.

The relative significance in the change in habitat utility between Alternative S1 and Alternative S2 also varied between the two projected time periods. The species projected having positive changes in habitat utility at year 150 for Alternative S1 is 30 species while those having positive changes in habitat utility in the same time frame are 25. Again, there are no changes for Townsend's warbler. Table 4.3.3b compares the number of species from Alternative S1 to Alternative S2 having projected positive outcomes in habitat utility for the 20 year and 150 year assessment periods.

Table 4.3.3b. Comparison of species having positive habitat utility score from Alternative S1 to S2.

Alternative	20 years	150 years
S1	7	30
S2	48	25

**Townsend's warble had to habitat utility score change between S1 and S2.*

Relative changes and the number of species experiencing those changes in 150 year assessment period between Alternative S1 and S2 they are displayed in Table 4.3.3c.

Table 4.3.3c. Number of species and relative changes in 150 year assessment period between Alternative S1 and S2.

< 1 percent	11 species
1 – 5 percent	31 species
5 – 10 percent	7 species
> 10 percent	7 species

Both Alternative S1 and Alternative S2 had the same relative number of species having project positive trends in suitable acres over the 150 assessment period. Alternative S1 had 49 species experiencing positive increases in projected suitable habitat acres while Alternative S2 had 45 species experiencing positive increases in projects suitable acres from the current condition out to 150 years. Alternative S1 had 6 species experiencing decreases in projected suitable habitat acres while Alternative S2 had 10 species showing project suitable habitat decreases over the same time period.

The 6 common species showing decreases in suitable habitat including 2 birds species and 4 mammalian species. The two birds were red-naped sapsucker and Cassin's finch. The 4 mammalian species include Mountain beaver, Mountain lion, elk and deer.

4.3.3.1. Mule Deer (*Odocoileus hemonius*)

As described in the SNFPA FEIS, the California Wildlife Habitat Relationships (CWHR) model calculates 2.3 million acres of existing suitable mule deer habitat on national forest lands in the planning area. This is considerably lower than the State of California's Deer Assessment Unit (DAU) figures (CDFG 1998), which sum to over 12 million acres. However, the DAU acreage figures focus on national forest lands, and some of the acreage occurs outside the planning area for this FEIS. Additionally, not all of these acres can be expected to provide habitat.

Prescribed fires, as well as low-intensity wildland fires, generate dense understories of shrubs, forbs, and grasses that provide deer foraging habitat. Mechanical thinning treatments, such as thinning, biomass, and salvage logging, do not typically create these dense understory conditions. It is uncertain whether other timber harvesting practices, with or without prescribed fire, have similar effects.

Habitat Utility

For the SNFPA FEIS, deer habitat utility scores were calculated for each alternative based on CWHR models for the 2.3 million acres. These scores predict the changes in relative utility of habitats for deer fawning, foraging, cover, and winter range. The model is limited in that a number of structural and landscape features important to deer are not well evaluated. These features include the number and species of shrubs, shrub foliage volume, and forest openings. The model is also not able to evaluate spatial distribution of habitat elements, such as level of continuity and presence and design of migration corridors. In general, the value and contribution of hardwoods to habitat is not well captured, due mainly to lack of Forest Service inventory data about the number, location, and distribution of hardwoods across the landscape.

As for the nine alternatives analyzed in the SNFPA FEIS, mule deer habitat utility values are expected to decline slightly under both Alternatives S1 and S2. Alternative S2 would show a slightly lower magnitude of decline, as mechanical treatments under this alternative would be expected to open forest canopies to a greater extent than mechanical treatments under Alternative S1. Both alternatives rely on a similar mix of mechanical thinnings and prescribed fire treatments to manage fuels and vegetation. However, as discussed above, open canopies created by mechanical treatments may not contribute equally to species fitness when compared to openings created by fire.

Sustainability of Foothill Hardwood Habitats

The hardwood component of the deer habitat produces mast for forage, especially important in the low elevation winter ranges. Alternatives S1 and S2 provide direction for promoting regeneration of montane hardwoods, increasing the likelihood of hardwood habitat sustainability. Both alternatives emphasize maintaining large hardwood trees as well as a distribution of age classes that serves to perpetuate hardwood species. Alternatives S1 and S2 recognize the importance of retaining a mixture of mast producing species where they exist within both foothill hardwood stands and montane hardwood stands.

Spatial Arrangement of Open Canopy Areas

Alternatives S1 and S2 could begin to “stratify” the landscape with respect to deer foraging opportunities. It is possible that predators could learn to preferentially hunt in strategically placed area fuel treatments. Alternative S2 also provides for the construction of the DFPZ network in the HFQLG Pilot Project Area. DFPZs are typically linear features, and these features would provide increased visibility, making it more difficult for deer to avoid predators and access cover. Locating DFPZs on ridgetops could help to reduce concentrations of dead and down wood or windfall that might impede deer movement through saddles or across ridges.

Summary of Effects

Overall, deer habitat utility would be expected to decline under both alternatives. Deer habitat decline would vary within the range projected for the nine alternatives analyzed in the SNFPA FEIS (only a 1 percent range between all alternatives (from –5.6 to –6.6) over a five-decade period), which is so small that it may be insignificant. Since mule deer are a common species still occupying their historic range in the Sierra Nevada, it appears unlikely that the small decline in habitat utility values under the two alternatives would outweigh either natural environmental variations or risk factors beyond the control of the Forest Service to result in the loss of viable, well-distributed populations.

4.4. Land and Resource Uses

4.4.1. Commercial Forest Products

Allowable Sale Quantity [ASQ]

Under both Alternatives S1 and S2, only the Big Valley Sustained Yield Unit of the Modoc National Forest produces regulated timber yields. The ASQ is 53.8 million board feet per decade. Under Alternative S2, regeneration harvest is also allowed in the Herger-Feinstein Quincy Library Group Act Pilot Project Area for the life of the project.

Sawtimber Production

Table 4.4.1.a illustrates average sawlog volumes harvested from national forests in the Sierra Nevada under Alternatives S1 and S2 for the first and second decades. Sawtimber harvest volumes are slightly higher than projected in the FEIS for Alternative Modified 8, the alternative carried forward in the SNFPA ROD. Alternative Modified 8 was modeled to typically locate treatment areas on the upper two-thirds of the slope, on south and west aspects, in mid- and low-elevation vegetation types. Field experience and the analysis supporting the findings of the Sierra Nevada Review Team has revealed that the concept of concentrating fuels treatments on the upper two-thirds of south-facing slopes is not practical in wide-spread application. Thus, both Alternative S1 and S2 were modeled using an optimized treatment layout pattern that more evenly covers entire landscapes. As currently modeled, treatments occur on acres with a slightly higher average volume per acre and, as a result, the green timber volume projected to be harvested under the no action alternative (Alternative S1) is slightly higher than projected in the FEIS.

Table 4.4.1a. Average Annual Sawtimber Harvest (million board feet).

	Alternative S1			Alternative S2		
	Green	**Salvage**	**Total**	**Green**	**Salvage**	**Total**
First Decade	127	30	157	358	90	448
Second Decade	66	30	96	287	90	377

Sawtimber harvest under Alternative S2 is almost three times the level harvested under S1. There are two primary reasons for this difference. First, Alternative S2 provides for full implementation of the Herger-Feinstein Quincy Library Group (HFQLG) Act Pilot Project. Alternative S1 limits group selection in the Pilot Project Area to 11, 700 acres included in an administrative study. Alternative S2 allows for completion of the 39,200 acres of group selection originally planned for the Pilot Project Area. Second, the standards and guidelines for vegetation treatments under Alternative S2 allow for more and larger trees to be removed from any given treatment area. Thus, although both alternatives are modeled using the same treatment pattern, the volume removed within each treatment is greater under Alternative S2.

As shown in Figure 4.4.1a, both Alternative S1 and S2 project a decline in the volume of sawtimber harvested after the second decade. This circumstance derives from the fact that both alternatives embody the same underlying fuels treatment patterns and strategy. Once the treatment areas are completed over a period of 20 years, timber is only removed as necessary to maintain the same treated acres over time. A consequence of both alternatives will be a significant reduction in the output of sawtimber of a diameter and quality suitable for lumber production in future years. By the fifth decade, timber removals are limited to salvage and minor volumes derived from treatment unit maintenance activities.

The additional timber volume generated from the HFQLG Act Pilot Project is limited to the time period authorized (and recently extended) in the legislation. The second decade harvest projections also reflect the termination of this project. The effect is more pronounced under Alternative S2 because the HFQLG Act Pilot Project accounts for a larger share of the harvest volume in this alternative.

Figure 4.4.1a. Projected Sawtimber Harvest for National Forests of the Sierra Nevada

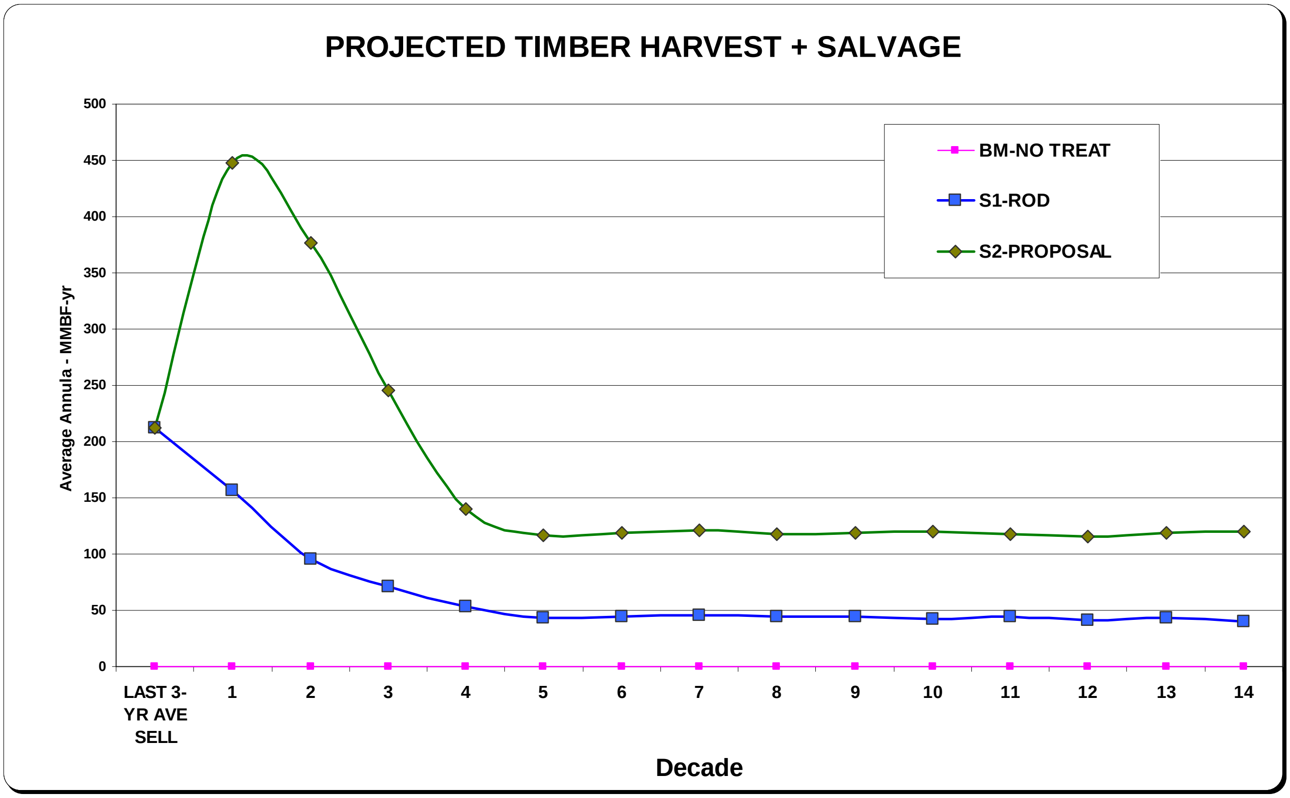


Table 4.4.1b shows the projected harvest by forest under Alternative S1 and S2 for the first decade. For both alternatives, the Plumas, Lassen and Tahoe national forests account for a disproportional amount of the harvest volume, reflecting a focused effort to implement and complete the HFQLG Pilot Project. Forests implementing the Pilot Project are projected to account for a larger share of the total regional harvest volume under Alternative S2, where the acres treated and the intensity of treatments are increased within the HFQLG Pilot Project area.

Table 4.4.1b. Average Annual Green Timber Harvest Volume by National Forest.

	S1		S2	
	MMBF	% of total	MMBF	% of total
Eldorado	14	11%	18	5%
Inyo	3	2%	2	1%
Lassen	21	17%	81	23%
Modoc -minus BVFSYU	6	5%	1	0%
Modoc-Big Valley FSYU	5	4%	5	2%
Plumas	25	19%	147	41%
Sequoia	7	5%	18	5%
Sierra	12	9%	17	5%
Stanislaus	10	8%	18	5%
Tahoe	16	13%	44	12%
Lake Tahoe Basin Mgt. Unit	2	2%	4	1%
Humbolt-Toiyabe	6	4%	2	1%
Total	**127**		**358**	

Timber Inventory

Timber inventory on the Sierra Nevada national forests is expected to continue to increase with time under both Alternative S1 and S2. After 50 years of growth, harvest, and mortality, the net increase in sawtimber (i.e. trees greater than 9.9 inches dbh) inventory is estimated at 93 billion board feet under Alternative S1 and 91 billion board feet under Alternative S2.

At the national forest or bioregional scale, the total growth of sawtimber substantially exceeds the harvest rate under S1 and S2 for at least the first 50 years. Over the last ten years, the net growth in timber inventory has been 7.5 times the volume harvested. As shown in Table 4.4.1c, growth is projected to outpace harvest under S1 by factors of 12.8, 26.4 and 36.6 for the first, second and third decades respectively and for S2 by factors of 4.7, 6.5 and 11.2.

Table 4.4.1c. Timber Inventory, Growth and Removal (million board feet).

	Last 10 Years	First Decade	Second Decade	Third Decade
Inventory				
S1	113,500	146,206	162,144	179,414
S2	113,500	146,190	158,780	175,500
Growth				
S1	15,900	16,264	17,412	15,099
S2	15,900	16,730	18,816	17,398
Harvest (Green)	(Based on 1999-2002 avg. harvest)			
S1	2,120	1,270	660	412
S2	2,120	3,580	2,870	1,560

Potential Commercial Biomass Supply

Tables 4.4.1d shows the volume in bone-dry tons of biomass generated from Sierra Nevada national forest harvests under Alternatives S1 and S2. This material is primarily generated from mechanical treatments to reduce understory fuel loads. Alternative S2 provides a somewhat greater opportunity for generating biomass, given that it provides for a number of management objectives to be achieved within a given treatment unit and imposes fewer restrictions on the use and intensity of mechanical treatments. In both alternatives, the Lassen and Plumas National Forests are the greatest potential suppliers to regional biomass markets. As discussed in the FEIS, Chapter 3, part 5.9, pp. 524-527, there are a number of options for commercial use of this material. However, at the present time, the potential supply of raw material far exceeds regional market demand.

Table 4.4.1d. Potential Commercial Biomass Output by Decade (bone-dry tons)

	First Decade		**Second Decade**	
	Alt S1	**Alt S2**	**Alt S1**	**Alt S2**
Eldorado	367,000	565,000	359,000	571,000
Inyo	88,000	114,000	86,000	115,000
Lassen	1,096,000	1,532,000	1,071,000	1,499,000
Modoc -minus BVFSYU	567,000	734,000	605,000	811,000
Modoc-Big Valley FSYU	0	0	0	0
Plumas	1,030,000	1,465,000	953,000	1,376,000
Sequoia	225,000	315,000	219,000	315,000
Sierra	438,000	625,000	425,000	624,000
Stanislaus	331,000	491,000	335,000	510,000
Tahoe	631,000	881,000	558,000	844,000
Lake Tahoe Basin Mgt. Unit	78,000	106,000	59,000	83,000
Humboldt-Toiyabe	153,000	195,000	152,000	201,000
Total	**5,005,000**	**7,021,000**	**4,851,000**	**6,948,000**

Wood Products Employment and Income

The economic analysis in the FEIS provides the analytical basis for assessing the employment and earnings effects of Alternatives S1 and S2 (FEIS, Volume 2, Chap. 3, part 5.1, pp. 387-395.) In this analysis, employment and income supported by timber harvested from the Sierra Nevada national forests are directly linked to projections of sawtimber harvest by alternative. For purposes of this analysis, it is assumed that the basic economic structure of the region has not changed significantly and that the modeled relationships between harvest volumes, employment and earnings are still valid. The input-output model used to estimate economic effects in the FEIS is based on linear relationships. This means that there is a direct relationship between input variables and model projections. Once an array of outcomes have been developed, it is relatively easy to estimate the effects of additional scenarios without systematically completing each step in the analysis process.

As mentioned previously, total timber harvest and the distribution of harvest volumes across forests under Alternative S1 is approximately the same as under Alternative MOD 8 in the FEIS. Specifically, timber outputs under Alternative S1 are 84 percent of those projected in the FEIS for the comparable alternative. Similarly, Alternative S2 most closely approximates the timber output and distribution of Alternative 4 in the FEIS. Timber harvest under S2 is 88 percent of that projected under Alternative 4. It is important to note that, although the timber outputs are of the same order of magnitude, the standards and guidelines, management intents, and themes of the alternatives differ significantly.

Based on the ratios between timber harvest projections for Alternative S1 and S2 and the FEIS alternatives described above, the employment and earnings effects from the FEIS alternatives were adjusted to reflect the lower timber outputs of alternatives S1 and S2 (Table 4.4.1e). Note that these estimates are for the first decade only. As documented in the above section on sawtimber production, harvest volumes decline throughout the planning period, most sharply in the second and third decades. Unless substitute timber volumes can be acquired from private lands or imports, it follows that there will be a corresponding drop in wood product industry employment.

Table 4.4.1e. Average Annual Employment and Earnings. Generated from Forest Service Commercial Logging, Hauling and Sawmilling in the Sierra Nevada Region (2004-2013)

	S1	S2
Employment (Direct, Indirect, Induced)	957	1,894
Earnings (thousands $1995)	$38,344	$57,159

4.4.2. Grazing

The effects to grazing from Alternative S1 were assessed in very general terms for the FEIS (FEIS, Volume 2, Chapter 3, part 5.3, pp. 404-407). When that work was completed, information was lacking about the distribution of occupied habitat for species such as the Yosemite toad and certain standards and guidelines were dependent upon surveys yet to be completed (such as for the willow flycatcher). Much of the field survey work has since been done and this new information provides a better foundation from which to evaluate effects.

Criteria Used to Categorize Effects

The effects reported here are based on professional judgment, given some basic information about allotment size and available forage, the number and location of critical habitat areas within the allotment, and other situational and operational factors. For allotments affected by the standards and guidelines, the following rationale was used to categorize the effects to the associated permittee as “low”, “medium,” or “high:”

Low impacts to grazing permittees – allotments include one or two habitat areas. Areas may be occupied or not depending on species (willow flycatcher unoccupied habitat assumes impact). Presence of habitat areas will require permittee to employ extra effort to avoid areas without affecting available forage for livestock.

Medium impacts to grazing permittee – allotments include two to four habitat areas. The amount of effort required by the permittee to avoid areas and/or maintain extra fence would create some hardship. The ability to continue to graze without affecting livestock numbers or season of use is achievable but may substantially increase overhead costs.

High impacts to grazing permittee – allotments include four or more habitat areas. The amount of effort required to avoid areas or maintain fencing would require substantial effort. Even with the substantial effort there may not be sufficient available forage to sustain permitted numbers and season of use.

Very high impacts to grazing permittee - even with substantial effort by the permittee the amount of available forage remaining may not be worth the value gained by grazing the allotment.

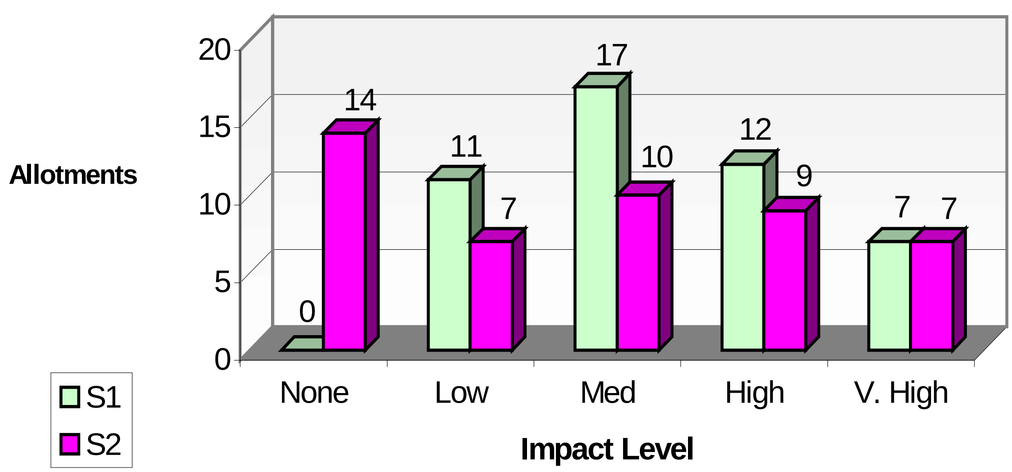
Assumptions

Following are some basic assumptions used to evaluate the effects of Alternative S2.

- About ten percent of the permittees will take advantage of the adaptive management strategy option provided under Alternative S2 for testing alternative utilization standards. The results afforded to those permittees will be limited unless the affected allotment has other impacts related to critical habitat areas. In those cases, there is assumed to be a 15 percent reduction in impacts to permittees.
- Fifty-six allotments with known unoccupied willow flycatcher sites (under Alternative S1) would no longer have a September 1st late-season grazing requirement. This would eliminate all grazing impacts from the willow flycatcher standards and guidelines for 18 allotments.
- Fifteen allotments with known occupied willow flycatcher sites (under Alternative S1) would have a late season meadow grazing opportunity after August 15th rather than total exclusion. This would lessen the impact to permittees for these allotments.
- For the three to four allotments most critically impacted by the existing standards and guidelines for willow flycatcher (Alternative S1), it is assumed that permittees would choose Alternative S2's option for developing and implementing a meadow management strategy.
- Of the 24 allotments impacted by the existing standards and guidelines for Yosemite toad (Alternative S1), it is assumed that permittees of the five most impacted allotments would develop site specific management plans (allowed under Alternative S2) to provide some flexibility in grazing around critical habitat. This is expected to provide slight reductions in impacts for these permittees.

Figure 4.4.2a shows the number of permittees affected by the alternatives and the relative degree of impact. The chart summarizes information from 47 allotments on seven of the 11 national forests within the bioregion. These are the allotments most affected by the standards and guidelines for willow flycatcher, Yosemite toad, and great gray owl habitat. They represent 11 percent of the active allotments within the Sierra Nevada Forest Plan area. Effects on the Modoc, Lake Tahoe Basin Management Unit, Eldorado, and Inyo national forests were minor and are not reported here.

Figure 4.4.2a. Grazing Impacts Summary.



Alternative S1 was evaluated as having a low impact on 11 permittees, a medium impact on 17 permittees, and a high impact on 12 permittees. Fourteen of the allotments showing low, medium or high impacts under S1, would not be impacted under Alternative S2. Both alternatives are expected to cause a very high impact to 7 grazing permittees.

The differences in impacts between the alternatives are attributed mostly to willow flycatcher standards and guidelines for unoccupied sites. Under Alternative S2, permittees would be allowed to continue grazing in unoccupied willow flycatcher habitat. This difference between the alternatives affects 18 of 47 allotments.

Figure r also reflects differences in impacts to permittees with allotments containing occupied willow flycatcher habitat. Because Alternative S2 allows grazing in occupied willow flycatcher habitat after August 15, permittees can use the allotment for 4-6 weeks at the end of the season. Alternative S1 does not provide for this use.

Because there is little difference in the standard and guidelines for Yosemite toad habitat in Alternatives S1 and S2, little change between the impacts associated with those standards and guidelines is anticipated. It is unknown whether the option of developing site-specific management strategies for grazing on allotments with multiple occupied Yosemite toad habitat sites will reduce impacts to permittees. For this analysis, this option was assumed to reduce impacts slightly under Alternative S2. Because the habitat surveys for Yosemite toad are only two thirds (2/3) complete, there will likely be some increase in impacts to permittees under both alternatives as more occupied habitat is discovered.

Great gray owl habitat appears on five of the 47 allotments analyzed. Two of the allotments also had willow flycatcher and/or Yosemite toad habitat and no change in impact was assumed under Alternative S2. A reduction in impacts was assumed to occur under Alternative S2 for the three allotments that included only great gray owl habitat.

4.4.3. Roads

Alternative S1 would represent no change in road-related effects from existing management in the HFQLG area.

Alternative S2 involves full implementation of HFQLG, which was estimated in the HFQLG Final EIS to result in an additional 11 miles of road construction, 110 miles of road reconstruction, 43 miles of temporary road construction and 640 miles of road maintenance per year during the period of full HFQLG implementation. Full implementation would also involve an increased level of decommissioning of roads in areas of planned projects. Experience in recent years has shown that more miles of roads are decommissioned in project areas than are newly constructed. Road reconstruction and maintenance include upgrading of drainage and drainage structures that can result in reductions of road-related impacts to soil erosion and related impacts to water quality.

Road-related effects from alternatives in the SNFPA FEIS remain unchanged and are included by reference.

4.4.4. Recreation

Standards and guidelines to address the five problem areas identified in the SNFPA FEIS placed some restrictions on recreation activities and infrastructure development in support of those activities. The section below describes the primary differences between Alternative S1 and S2 with regard to recreation. Under Alternative S2, the proposed changes to standards and guidelines for sensitive species will have a limited effect on recreation activity, land use and development in the Sierra Nevada bioregion. In general, the changes allow the management direction for recreation activities to be developed at the local level.

Effects of Limited Operating Periods for Sensitive Species

Alternative S1 contains standards and guidelines that apply limited operating periods to all new activities in the vicinity of California spotted owl and northern goshawk nest sites and furbearer den sites. Some limited operating periods (LOPs) coincide with periods of peak recreation activity in the Sierra Nevada. In addition, the LOPs overlap with the construction season for winter sports operations, recreation resorts and campgrounds. Although there are no known effects on recreation activities at his time, there could be seasonal restrictions in the future.

Under Alternative S2, limited operating periods apply only to vegetation management activities and there would be no effect to recreation.

Effects of Standards and Guidelines for Willow flycatcher and Yosemite toad

Alternatives S1 and S2 both include direction for managing livestock (including packstock) around suitable habitat for the willow flycatcher and Yosemite toad and require surveys of suitable habitat to be completed for these species.

Yosemite toad

Under Alternative S1, livestock are to be excluded from wet areas occupied by Yosemite toad during the toad breeding and rearing season. If physical exclusion is impossible or impractical, livestock are to be excluded from the entire meadow. Alternative S2 contains the same provision, but allows the exclusion to be waived if a site-specific management plan is developed to minimize grazing impacts to the Yosemite toad and its habitat.

The breeding and rearing season for Yosemite toads may extend into mid-summer, overlapping with a peak period of use for commercial packers in the high country of the Sierra Nevada. It is difficult to estimate the effects of the standards and guidelines for Yosemite toad on this type of recreational activity, because packstock grazing is more random and dispersed than grazing regulated through cattle and sheep allotments. Commercial packers have a number of meadows they can use for grazing and to some extent, can alter itineraries and shift use from one meadow to another if grazing restrictions are imposed. Ultimately, if large sections of key drainages become unavailable for grazing because of restrictions for Yosemite toad, packers will incur additional operating costs from packing feed. Because wilderness management plans limit the number of stock allowed per trip, packing feed may displace paying customers when large groups are being transported. Should this situation materialize, the economic impacts will vary by operator, depending upon the flexibility each packer has to respond to operational constraints.

Alternative S2 provides an opportunity to mitigate impacts by allowing for a management plan to be developed to manage stock to avoid sensitive habitat. As a practical matter, reliance on this option is likely to be limited because many meadows are a complex mosaic of dry, moist and wet portions that complicate any strategy to keep livestock out of wet portions.

Under Alternative S1, surveys of potentially suitable Yosemite toad habitat are to be completed by 2004. Areas not surveyed by this date, will be subject to the grazing restriction described above. Sixteen commercial pack stations operate during the summer in the high country of the Sierra Nevada. This standard and guideline may impact the grazing associated with packers operating on the Sierra National Forest. The forest has a substantial acreage of suitable toad habitat to survey and best estimates are that by

2004, roughly 3,200 acres in the wilderness will remain to be completed (SNFPA Review Team Report, 2003, pg. 70). As noted above, closures of entire watersheds may create an economic hardship for some packers. The magnitude of effect is difficult to determine because of the high degree of variability in the itineraries and operating efficiencies of individual businesses.

Alternative S2 would not impact recreation uses in suitable Yosemite toad habitat that has not been surveyed.

Willow flycatcher

Alternative S1 and S2 both contain direction for managing meadows occupied by willow flycatchers that may have some effect on commercial packstock operations. Under Alternative S1, when new detections of willow flycatcher occur, grazing is restricted until after August 31. Under Alternative S2, grazing is restricted until after August 15. In the event of new detections of willow flycatchers, the additional two-week grazing period allowed under Alternative S2 may allow use of some higher elevation meadows that otherwise would not have been available under Alternative S1.

4.5. Environmental Consequences for Alts. S3 and F2 through F8

Alternative S3: Staged Implementation of Proposed Action (S2) and Focused Adaptive Management Strategy

Under Alternative S3, fuels treatments are confined to the Defense Zone for the first 10 years. If information from adaptive management studies becomes available, work could be expanded to the Threat Zone after five years. This effects analysis assumes treatments will only occur in the Defense Zone for ten years. There are 260,000 acres in the Defense Zone needing treatment. This would result in approximately 26,000 acres of treatment (both mechanical and prescribed fire) per year. This is in contrast to 106,000 acres of treatment per year in Alternative S2. This level of annual treatment is similar to Alternative F2, which treats approximately 23,000 acres per year. The effects analysis for Alternative F2, found in the FEIS and supplemented below applies to Alternative S3.

Alternative F2: Establish large reserves where management activities are very limited

With a management emphasis of protection and a low degree of active management and local flexibility, Alternative F2 treats annually (first decade) approximately 7,000 acres mechanically and 15,000 acres by prescribed burning, about 24 percent of the total acreage treated under Alternative S1 (approximately 69,000 acres of mechanical and 25,000 acres of prescribed burning). There is no strategic approach to fuel treatments; fuels treatments are conducted primarily to protect communities and reserves, relying mostly on suppression. The reduced use of prescribed burning (approximately 60 percent of the amount of Alternative S1) would limit the possibility of escaped fires and air quality impacts. The limited amount of fuel treatments would result in the greatest number of acres burned annually at lethal levels by wildfire, a 10 percent increase in annual wildfire acres from the first to fifth decade (confidence is low that treatments would reduce wildfire extent and severity), and thus would not move fire regimes closer to their historic range and condition class 1.

Though Alternative F2 provides the largest amount (approximately 4,900,000 acres) in the short-term of old forest patches with high canopy closure (cover) in large reserves, a low degree of confidence exists that there would be no adverse effect on old forest habitats because wildfire losses are likely to increase and would offset this gain in old forest habitat. Low uncertainty associated with management effects on old forest function exists due to the limited amount of mechanical treatments.

The large amount of reserves, the low degree of flexibility to respond to changing local conditions, e.g., forest health problems such as pests and disease, and catastrophic fire events, and the inability to use timber sales and all silvicultural tools would result in lowered efficiencies and higher treatment costs.

Implementing the HFQLG pilot project to the fullest extent possible would construct 40-60,000 acres per year of Defensible Fuel Profile Zones (DFPZs) and accomplish 8,700 acres per year of Group Selection (GS) harvest, with an average annual timber harvest of 286 mmbf (million board feet) per year. Alternative F2 would accomplish 20 to 30 percent of this total, about 10,000 acres of DFPZs because of conflicts with the Biodiversity Reserves, and about 1,740 acres of GS because very few acres would be available based on the opening limit of less than 1 acre. About 57 mmbf would be produced per year.

Alternative F2 would have the lowest risk to aquatic species (fish and amphibians), primarily due to the amount of area protected by special aquatic areas, such as emphasis watersheds and critical refuges. It also would provide the greatest protection for riparian and meadow plant and animal communities because it limits activities adjacent to watercourses. Due to the low degree of local flexibility to address meadow-specific conditions when managing for livestock grazing, the resultant level of AUMs would be 273,000, a 17 percent reduction from ALTERNATIVE S1, current management, which would produce about 330,000 AUMs (animal unit months).

The FEIS made a strong case for a high level of management concern for the California spotted owl. It stated that “studies strongly suggest population declines” and that “the declines are sufficiently severe to warrant concern”. The viability analysis in the FEIS assumed a significant decline across the range. Low viability ratings were assigned to several alternatives to reflect that trend. New information related to owl populations and their habitat needs along with consideration of owl populations and habitat on private lands has become available since the FEIS. Based on this new information, these low viability ratings would be higher.

Alternative F3: Actively manage to restore ecosystems. Use local analysis and collaboration

The management emphasis of protection and restoration, a moderate degree of active management, and a moderate to high degree of local flexibility for Alternative F3 would result in about 30,000 acres treated mechanically and about 54,000 acres treated by prescribed fire annually in the first decade, about 90 percent of the total of Alternative S1. The fuels strategy would be determined on a watershed rather than a larger landscape scale, and would increase the use of prescribed fire, emphasizing fuels reductions in areas of high fire hazard and risk, focused in urban wildland intermix zones. Uncertainties exist about the effectiveness of treatments in altering the fire regime (confidence is low). The increased use of prescribed fire (double the amount of acres of Alternative S1) increases the risk of escapement and socially unacceptable air quality impacts. The extent of fuels treatments would reduce the number of acres burned annually at lethal levels by wildfire, a 36 percent decrease in annual wildfire acres from the first to fifth decade, and thus would move fire regimes closer to their historic range and condition class 1.

A low to moderate degree of confidence exists that there would be no adverse effect on old forest habitats because of the possible losses to severe wildfire. Alternative F3 would have increases in old forest patches (about 1,300,000 acres of old forest emphasis areas) with high and moderate canopy closure (cover), with a low to moderate level of uncertainty associated with management effects on old forest function.

The protection of old forest emphasis areas, unroaded areas, and ecologically significant areas, the moderate degree of flexibility to respond to changing local conditions, e.g., forest health problems such as pests and disease, and catastrophic fire events, and the limited use of timber sales and all silvicultural tools would result in lowered efficiencies and higher treatment costs.

Implementing the Herger-Feinstein Quincy Library Group (HFQLG) pilot project to the fullest extent possible would construct 40-60,000 acres per year of Defensible Fuel Profile Zones (DFPZs) and accomplish 8,700 acres per year of Group Selection (GS) harvest, with an average annual timber harvest of 286 mmbf (million board feet) per year. Alternative F3 would accomplish 25 to 35 percent of this total, about 12,500 acres of DFPZs because of conflicts with the old forest emphasis areas and desired conditions across the landscape, and about 2,175 acres of GS because very few acres would be available based on the no timber harvest objective. About 72 mmbf would be produced per year.

Alternative F3 would have greater risk to aquatic species (fish and amphibians), mostly due to the possibility of more treatments in riparian areas. It would provide intermediate levels of protection for riparian and meadow plant and animal communities. Due to the moderate to high degree of local flexibility to address meadow-specific conditions when managing for livestock grazing, the resultant level of AUMs would be 344,000, a four percent increase from Alternative S1, which would produce about 330,000 AUMs (animal unit months).

The FEIS made a strong case for a high level of management concern for the California spotted owl. It stated that "studies strongly suggest population declines" and that "the declines are sufficiently severe to warrant concern". The viability analysis in the FEIS assumed a significant decline across the range. Low viability ratings were assigned to several alternatives to reflect that trend. New information related to owl populations and their habitat needs along with consideration of owl populations and habitat on private lands has become available since the FEIS. Based on this new information, these low viability ratings would be higher.

Alternative F4: Develop ecosystems that are resilient to large-scale, severe disturbances

With a management emphasis of maintenance and resiliency and a high degree of active management and local flexibility, Alternative F4 would treat annually about 86,000 acres mechanically and about 47,000 acres by prescribed burning, about 141 percent of the total of Alternative S1, current management. Following landscape analysis, the fire and fuels treatment strategy emphasizes strategically placed area treatments and defensible fuel profile zones. The increased use of prescribed fire (nearly double the amount of acres of Alternative S1) increases the risk of escapement and socially unacceptable air quality impacts. The extensive amount of fuels treatment would reduce the number of acres burned annually at lethal levels by wildfire, a 39 percent decrease in wildfire acres from the first to fifth decade (confidence is high), and thus would move fire regimes closer to their historic range and condition class 1. Because treatments used to achieve management goals would be determined locally, the risk exists that the diversity of management actions employed would not lead to desired conditions.

Alternative F4 would maintain by watershed 20 percent in old forest patches (about 700,000 acres of old forest emphasis areas, less than half the amount of Alternative S1) with high and moderate canopy closure (cover) and the greatest certainty that more old forest patches could be protected from wildfire losses and, thus, the greatest likelihood of maintaining large, live trees with a net increase in large trees in both the short and long term. The amount and distribution would be determined at the project level. These moderately sized blocks would be widely distributed and more limited in providing continuity. A low degree of confidence exists that there would be no adverse effect on old forest habitats because of the concern that extensive reliance on mechanical treatment would damage resource values.

The low amount of reserves and emphasis on resiliency where a high degree of human management is used to create and maintain desired conditions, and the high degree of flexibility to respond to changing local conditions, e.g., forest health problems such as pests and disease, and catastrophic fire events, and the ability to use timber sales and all silvicultural tools would result in higher efficiencies and lower treatment costs.

Implementing the Herger-Feinstein Quincy Library Group (HFQLG) pilot project to the fullest extent possible would construct 40-60,000 acres per year of Defensible Fuel Profile Zones (DFPZs) and accomplish 8,700 acres per year of Group Selection (GS) harvest, with an average annual timber harvest of 286 mmbf (million board feet) per year. Alternative F4 would accomplish 95 to 100 percent of this total, about 45,000 acres of DFPZs in a reduced system, and about 8,265 acres of GS because much of the area would be available for group selection. Approximately 271 mmbf would be produced per year.

Alternative F4 would have greater risk to aquatic species (fish and amphibians), mostly due to the possibility of more treatments in riparian areas. It would provide the lowest levels of protection for riparian and meadow plant and animal communities. Due to the high degree of local flexibility to address meadow-specific conditions when managing for livestock grazing, the resultant level of AUMs would be 357,000, an eight percent increase from Alternative S1, which would produce about 330,000 AUMs (animal unit months).

The FEIS made a strong case for a high level of management concern for the California spotted owl. It stated that “studies strongly suggest population declines” and that “the declines are sufficiently severe to warrant concern.” The viability analysis in the FEIS assumed a significant decline across the range. Low viability ratings were assigned to several alternatives to reflect that trend. New information related to owl populations and their habitat needs along with consideration of owl populations and habitat on private lands has become available since the FEIS. Based on this new information, these low viability ratings would be higher.

Alternative F5: Preserve existing undisturbed areas and restore others to achieve ecological goals. Limit impacts from active management through range-wide management standards and guidelines

Alternative F5’s management emphasis is protection and restoration, with a low to moderate degree of active management and a low degree of local flexibility. Annual mechanical and prescribed burning treatments would be about 10,000 acres and 39,000 acres, respectively, about 52 percent of the total of Alternative S1, current management. The priority of the fire and fuels treatment strategy is to reduce hazard in the urban wildland intermix zone; treatment emphasis is prescribed fire with some mechanical treatment. The increased use of prescribed fire (about half again the amount of acres of Alternative S1) increases the risk of escapement and socially unacceptable air quality impacts. Annual wildfire acres from the first to fifth decade are projected to increase by 4 percent because of the lack of strategic placement of fuels treatments (confidence is low that treatments would reduce wildfire extent and intensity), and thus would not move fire regimes closer to their historic range and condition class 1. Confidence is low that there would be no adverse effect on old forest habitats because of the increased losses to wildfire.

Alternative F5 could provide a large increase in old forest patches (about 1,700,000 acres of old forest emphasis areas) with high and moderate canopy closure (cover) in the short term; however, because of restrictive or less effective fuel treatments these increases could be offset by increased future losses to severe wildfire. This alternative would have high likelihood of connectivity between large blocks dedicated to old forests, and low uncertainty associated with the potential effects of mechanical treatment on old forest function.

The amount of reserves and old forest emphasis areas where natural processes shape desired conditions, the low degree of flexibility to respond to changing local conditions, e.g., forest health problems such as pests and disease and catastrophic fire events, and the low level of timber sales and silvicultural tools would result in lowered efficiencies and higher treatment costs.

Implementing the Herger-Feinstein Quincy Library Group (HFQLG) pilot project to the fullest extent possible would construct 40-60,000 acres per year of Defensible Fuel Profile Zones (DFPZs) and accomplish 8,700 acres per year of Group Selection (GS) harvest, with an average annual timber harvest of 286 mmbf (million board feet) per year. Alternative F5 would accomplish 30 to 40 percent of this total, about 15,000 acres of DFPZs and about 2,610 acres of GS because of conflicts with old forest emphasis areas and fixed vegetative structure requirements across the landscape. About 86 mmbf would be produced per year.

Alternative F5 would have the lowest risk to aquatic species (fish and amphibians), primarily due to the amount of area protected by special aquatic areas, such as emphasis watersheds and critical refuges. It also would provide the greatest protection for riparian and meadow plant and animal communities because it limits activities adjacent to watercourses. Due to the low degree of local flexibility to address meadow-specific conditions when managing for livestock grazing, the resultant level of AUMs would be 241,000, a 27 percent reduction from Alternative S1, which would produce about 330,000 AUMs (animal unit months).

The FEIS made a strong case for a high level of management concern for the California spotted owl. It stated that “studies strongly suggest population declines” and that “the declines are sufficiently severe to warrant concern”. The viability analysis in the FEIS assumed a significant decline across the range. Low viability ratings were assigned to several alternatives to reflect that trend. New information related to owl populations and their habitat needs along with consideration of owl populations and habitat on private lands has become available since the FEIS. Based on this new information, these low viability ratings would be higher.

Alternative F6: Integrate desired conditions for old forest and hardwood ecosystems with fire and fuels management goals. Reintroduce fire into Sierra Nevada forest ecosystems

With a management emphasis of restoration, and a moderate degree of active management and local flexibility, Alternative F6 would treat annually about 33,000 acres mechanically and about 83,000 acres by prescribed burning, about 123 percent of the total of Alternative S1. The fire and fuels treatment strategy emphasizes strategically placed area treatments; landscape-scale structural requirements allow fuel treatments to be fully implemented. With over three times as much prescribed burning than Alternative S1, there is a higher risk of escapement and socially unacceptable air quality and scenic conditions. The extensive amount of fuels treatment would reduce the number of acres burned annually at lethal levels by wildfire, a 33 percent decrease in wildfire acres from the first to fifth decade (confidence is high), and thus would move fire regimes closer to their historic range and condition class 1. However, there is the uncertainty and risk that focal ecosystems and species are at greater risk from fire and fuel treatments than they are from degradation by high severity wildfire.

A moderate to high degree of confidence exists that there would be no adverse effect on old forest habitats because of the extent of fuels treatment and by including emphasis areas to protect special resource values. Alternative F6 would have increases in old forest patches (about 1,600,000 acres of old forest emphasis areas) with high and moderate canopy closure (cover) and the greatest certainty that more old forest patches could be protected from wildfire losses and, thus, the greatest likelihood of maintaining large, live trees with a net increase in large trees in both the short and long term. There is a low to moderate uncertainty associated with the potential effects of mechanical treatment on old forest function.

The amount of old forest emphasis areas where prescribed fire is the preferred tool, the moderate degree of flexibility to respond to changing local conditions, e.g., forest health problems such as pests and disease and catastrophic fire events, and the low level of timber sales and silvicultural tools would result in limited efficiencies and higher treatment costs.

If the Herger-Feinstein Quincy Library Group (HFQLG) pilot project were implemented to the fullest extent possible, it would construct 40-60,000 acres per year of Defensible Fuel Profile Zones (DFPZs) and accomplish 8,700 acres per year of Group Selection (GS) harvest, with an average annual timber harvest of 286 mmbf (million board feet) per year. Alternative F6 would accomplish 60 to 65 percent of this total, about 30,000 acres of DFPZs because they could not be built where they overlap with old forest emphasis areas, and about 5,220 acres of GS because of conflicts with old forest emphasis areas within

Westside forest types, but would be compatible with general forest. About 172 mmbf would be produced per year.

Alternative F6 would have greater risk to aquatic species (fish and amphibians), mostly due to the possibility of more treatments in riparian areas. It would provide the greatest protection for riparian and meadow plant and animal communities because it limits activities adjacent to watercourses. Due to the moderate degree of local flexibility to address meadow-specific conditions when managing for livestock grazing, the resultant level of AUMs would be 341,000, a three percent increase from Alternative S1, existing management direction, which would produce about 330,000 AUMs (animal unit months).

The FEIS made a strong case for a high level of management concern for the California spotted owl. It stated that “studies strongly suggest population declines” and that “the declines are sufficiently severe to warrant concern”. The viability analysis in the FEIS assumed a significant decline across the range. Low viability ratings were assigned to several alternatives to reflect that trend. New information related to owl populations and their habitat needs along with consideration of owl populations and habitat on private lands has become available since the FEIS. Based on this new information, these low viability ratings would be higher.

Alternative F7: Actively manage entire landscapes to establish and maintain a mosaic of forest conditions approximating patterns expected under natural conditions

With a management emphasis of restoration and resiliency, and a moderate to high degree of active management and local flexibility, Alternative F7 would treat annually about 70,000 acres mechanically and about 60,000 acres by prescribed burning, about 138 percent of the total of Alternative S1, current management. Using landscape analysis, the fire and fuels treatment strategy emphasizes high hazard and risk areas and generally strategically placed area treatments. The increased use of prescribed fire (about two and one-half the amount of acres of Alternative S1) increases the risk of escapement and socially unacceptable air quality impacts. The extensive amount of fuels treatment would reduce the number of acres burned annually at lethal levels by wildfire, a 31 percent decrease in wildfire acres from the first to fifth decade (confidence is high), and thus would move fire regimes closer to their historic range and condition class 1. The greatest risk associated with this alternative is not achieving desired conditions across the landscape. A low degree of confidence exists that there would be no adverse effect on old forest habitats because of the concern that extensive reliance on mechanical treatment would damage resource values.

Alternative F7 does not allocate any old forest emphasis areas; rather, the amount and distribution of moderate-sized blocks dedicated to old forests would be determined at the project level. Thus, uncertainty exists about the development or maintenance of old forest patches. There would be a high loss of old forest to high severity fire because this alternative does not emphasize treatments in concentrations of old forests. There are high levels of uncertainty associated with the potential effects of mechanical treatment on old forest function.

The lack of formal reserves and with an emphasis on restoration and resiliency where a high degree of human management is used to create and maintain desired conditions, the high degree of flexibility to respond to changing local conditions, e.g., forest health problems such as pests and disease and catastrophic fire events, the ability to use timber sales and all silvicultural tools would result in higher efficiencies and lower treatment costs.

Implementing the Herger-Feinstein Quincy Library Group (HFQLG) pilot project to the fullest extent possible would result in the construction of 40-60,000 acres per year of Defensible Fuel Profile Zones

(DFPZs) and the accomplishment of 8,700 acres per year of Group Selection (GS) harvest, with an average annual timber harvest of 286 mmbf (million board feet) per year. Alternative F7 would accomplish 95 to 100 percent of this total, about 45,000 acres of DFPZs in a full-built system because all acres are available, and about 8,265 acres of GS because much of the area would be available for group selection. About 271 mmbf would be produced per year.

Alternative F7 would have greater risk to aquatic species (fish and amphibians), mostly due to the possibility of more treatments in riparian areas. It would provide intermediate levels of protection for riparian and meadow plant and animal communities. Due to the moderate to high degree of local flexibility to address meadow-specific conditions when managing for livestock grazing, the resultant level of AUMs would be 357,000, an eight percent increase from Alternative S1, which would produce about 330,000 AUMs (animal unit months).

The FEIS made a strong case for a high level of management concern for the California spotted owl. It stated that “studies strongly suggest population declines” and that “the declines are sufficiently severe to warrant concern”. The viability analysis in the FEIS assumed a significant decline across the range. Low viability ratings were assigned to several alternatives to reflect that trend. New information related to owl populations and their habitat needs along with consideration of owl populations and habitat on private lands has become available since the FEIS. Based on this new information, these low viability ratings would be higher.

Alternative F8: Manage sensitive wildlife habitat cautiously. Develop new information to reduce uncertainty about the effects of management on sensitive species

The management emphasis of protection and restoration, a moderate degree of active management, and a low to moderate degree of local flexibility for Alternative F8 would result in about 14,000 acres treated mechanically and about 69,000 acres treated by prescribed fire annually in the first decade, about 88 percent of the total of Alternative S1. The fuels strategy is strategically placed area treatments, with limited use of mechanical treatments. Stand-level standards for retention of old forest structure may not allow fuels treatments to be fully implemented. The increased use of prescribed fire (over two and one-half the amount of acres of Alternative S1) increases the risk of escapement and socially unacceptable air quality and scenic conditions. The extent of fuel treatments would reduce the number of acres burned annually at lethal levels by wildfire, a 6 percent decrease in annual wildfire acres from the first to fifth decade (confidence is moderate that treatments would reduce wildfire extent and intensity), and thus would not tend to move fire regimes much closer to their historic range and condition class 1. There is a higher short-term risk of high severity wildfire while waiting for the results of studies before implementing fuel reduction. A moderate to high degree of confidence exists that there would be no adverse effect on old forest habitats because of the inclusion of emphasis areas to protect special resource values.

Alternative F8 could provide a large increase in old forest patches (about 2,300,000 acres of old forest emphasis areas) with high and moderate canopy closure (cover) in the short term; these large blocks are dedicated to old forests, with their extent determined through analysis of habitat needs. However, because of restrictive or less effective fuel treatments, these increases could be offset by increased future losses to severe wildfire. The most restrictions on fuel treatments would apply in areas likely to contain concentrations of old forests, which would be subject to loss due to high severity wildfire. Levels of management in old forests are limited in the immediate future, and unclear in the longer term.

The amount of reserves and old forest emphasis areas where natural processes shape desired conditions, the low degree of flexibility to respond to changing local conditions, e.g., forest health problems such as pests and disease and catastrophic fire events, and the low level of timber sales and silvicultural tools would result in lowered efficiencies and higher treatment costs.

Implementing the Herger-Feinstein Quincy Library Group (HFQLG) pilot project to the fullest extent possible would construct 40-60,000 acres per year of Defensible Fuel Profile Zones (DFPZs) and accomplish 8,700 acres per year of Group Selection (GS) harvest, with an average annual timber harvest of 286 mmbf (million board feet) per year. Alternative F8 would accomplish 25 to 30 percent of this total, about 12,500 acres of DFPZs because of the conflict with old forest emphasis system and the difficulty of avoiding areas with 70 percent crown closure, and about 2,175 acres of GS because it would not be allowed in old forest emphasis areas within Westside forest types, and could not occur in suitable owl habitat until the amount of suitable habitat was defined through research. About 72 mmbf would be produced.

Alternative F8 would have the lowest risk to aquatic species (fish and amphibians), primarily due to the amount of area protected by special aquatic areas, such as emphasis watersheds and critical refuges. It also would provide the greatest protection for riparian and meadow plant and animal communities because it limits activities adjacent to watercourses. Due to the low to moderate degree of local flexibility to address meadow-specific conditions when managing for livestock grazing, the resultant level of AUMs would be 303,000, an eight percent reduction from Alternative S1, which would produce about 330,000 AUMs (animal unit months).

The FEIS made a strong case for a high level of management concern for the California spotted owl. It stated that “studies strongly suggest population declines” and that “the declines are sufficiently severe to warrant concern”. The viability analysis in the FEIS assumed a significant decline across the range. Low viability ratings were assigned to several alternatives to reflect that trend. New information related to owl populations and their habitat needs along with consideration of owl populations and habitat on private lands has become available since the FEIS. Based on this new information, these low viability ratings would be higher.

4.6. Other Effects

Unavoidable Adverse Effects

Implementation of any of the alternatives would result in some unavoidable adverse effects. The alternatives were designed to move resources toward desired conditions but to accomplish those goals, some unavoidable adverse effects would result. These effects vary by resource and are discussed in others parts of this chapter.

Relationship between Short-Term Uses and Long-Term Productivity

NEPA requires consideration of "the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity" (40 CFR 1502.16). This includes using all practicable means and measures, including financial and technical assistance, in a manner calculated to foster and promote the general welfare, to create and maintain conditions under which man and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generation of Americans (NEPA, Section 101). Discussion related to short-term uses and long-term productivity can be found in detail in this chapter under individual resource discussions.

All alternatives would implement ground-disturbing activities that would produce short-term effects to soil, water quality and habitat while providing the long-term benefits in terms of prevention of and protection from wildfire and old forest conditions.

Irretrievable and Irreversible Commitment of Resources

Due to the programmatic nature of this Draft SEIS, the proposed action does not make any irretrievable or irreversible commitments of resources.

Civil Rights and Environmental Justice

No disparate or adverse effects are identified to groups of people identified in Civil Rights statutes or Executive Order 12898 (Environmental Justice) from the Proposed Action.

Appendix A: Standards and Guidelines

Alternatives S1 and S2

Table of Contents

Aquatic/Riparian

Core Home Range Areas

Urban wildland intermix defense zones

Forest Wide

Aquatic/Riparian

S1	S2	Objective	Standard & Guideline
Amphibians			
X	X	Ensure that vegetative management activities including fuels reduction actions within RCAs and CARs enhance or maintain physical and biological characteristics associated with aquatic/riparian dependent species. The protection of human life and property must be considered as part of the Conservation Objectives.	Assess and document aquatic conditions following the Regional Stream Condition Inventory protocol prior to implementing ground disturbing activities within suitable habitat for California red-legged frog, Cascades frog, Yosemite toad, foothill and mountain yellow-legged frogs, and northern leopard frog.
X	X	Ensure that vegetative management activities including fuels reduction actions within RCAs and CARs enhance or maintain physical and biological characteristics associated with aquatic/riparian dependent species. The protection of human life and property must be considered as part of the Conservation Objectives.	In suitable habitat for California red-legged frog, Cascades frog, Yosemite toad, foothill and mountain yellow-legged frogs, and northern leopard frog, develop mitigation measures to avoid impacting these species whenever ground disturbing equipment is used within RCAs or CARs.
X	X		Limit application of pesticides and herbicides in RCAs and CARs to cases where project-level analysis indicates their application is consistent with the Riparian Conservation Objectives. Avoid application of pesticides and herbicides to areas within 500 feet of known occupied sites for California red-legged, foothill and mountain yellow-legged, Cascade and northern leopard frogs and Yosemite toads unless environmental analysis documents pesticides are needed to restore or enhance habitat for these amphibian species
Range			
X	X		Locate new livestock handling and management facilities outside meadows and RCAs. Prior to re-issuing grazing permits, assess the compatibility of livestock management facilities with the Riparian Conservation Objectives of the RCA.

Aquatic/Riparian

S1	S2	Objective	Standard & Guideline
X	X	To protect and allow for recovery of mountain and foothill yellow-legged frogs, California red-legged frog, and Yosemite toad populations in previously occupied habitat, and to protect habitats for other riparian dependant species.	Within RCAs and CARs prohibit application of pesticides to livestock.
Riparian Conservation Areas			
X	X	To maintain the ecological integrity of aquatic, riparian, and meadow ecosystems.	Determine which CARs or areas within CARs are suitable for mineral withdrawal and propose them for withdrawn from location and entry under the U.S. mining laws, subject to valid existing rights, for a term of 20 years. In CARs, approve mining-related plans of operation if measures are implemented that contribute toward the attainment or maintenance of aquatic management strategy goals.
X	X	Designation of default riparian conservation area buffer widths	Designate riparian conservation area widths as listed below. RCA widths shown below may be adjusted at the project level if a landscape analysis has been completed and a site-specific RCO analysis demonstrates a need for different widths. Use a peer review process for vegetation treatments or other activities proposed within CARs and RCAs that are likely to significantly affect aquatic resources. Conduct peer reviews for projects that propose ground-disturbing activities in more than 25 percent of the RCA or more than 15 percent of a CAR. STREAM TYPE WIDTH OF THE RIPARIAN CONSERVATION AREA Perennial Streams: 300 feet on each side of the stream, measured from the bank full edge of the stream Seasonally Flowing Streams (includes ephemerals with defined stream channel or evidence of scour): 150 feet on each side of the stream, measured from the bank full edge of the stream Streams In Inner Gorge[1] Top of inner gorge Special Aquatic Features[2] or Perennial Streams with Riparian Conditions extending more than 150 feet from edge of streambank or Seasonally Flowing streams with riparian conditions extending more than 50 feet from edge of streambank: 300 feet from edge of feature or riparian vegetation, whichever width is greater Other hydrological or topographic depressions without a defined channel. RCA width and protection measures determined through project level analysis [1]Inner gorge is defined by stream adjacent slopes greater than 70 percent gradient [2]Special Aquatic Features include: lakes, meadows, bogs, fens, wetlands, vernal pools, and springs

Aquatic/Riparian

S1	S2	Objective	Standard & Guideline
X	X	Ensure identified beneficial uses for the water body are adequately protected. Identify the specific beneficial uses for the project area, water quality goals from the Regional Basin Plan, and the manner in which the standards and guidelines will protect the beneficial uses.	Implement project appropriate Best Management Practices and monitor their effectiveness following protocols outlined in "Investigating Water Quality in the Pacific Southwest Region: Best Management Practices Evaluation Program" (USDA-FS, PSW Region 1992).
X	X	Ensure identified beneficial uses for the water body are adequately protected. Identify the specific beneficial uses for the project area, water quality goals from the Regional Basin Plan, and the manner in which the standards and guidelines will protect the beneficial uses.	Evaluate new proposed management activities within CARs and RCAs during environmental analysis to determine consistency with the riparian conservation objectives at the project level and the ACS goals for the landscape. Ensure that appropriate mitigation measures are enacted to (1) minimize the risk of activity-related sediment entering aquatic systems, and (2) minimize impacts to habitat for aquatic- or riparian-dependent plant and animal species.
X		Ensure identified beneficial uses for the water body are adequately protected. Identify the specific beneficial uses for the project area, water quality goals from the Regional Basin Plan, and the manner in which the standards and guidelines will protect the beneficial uses.	Identify existing uses and activities in CARs and RCAs during landscape analysis. Evaluate existing management activities to determine consistency with RCOs during project-level analysis. Develop and implement actions needed for consistency with RCOs.
	X	Ensure identified beneficial uses for the water body are adequately protected. Identify the specific beneficial uses for the project area, water quality goals from the Regional Basin Plan, and the manner in which the standards and guidelines will protect the beneficial uses.	During landscape analysis, review existing uses and activities in CARs and RCAs and implement actions necessary to attain AMS goals. Where actions, such as increasing education, limiting or redirecting use, adding traffic control devices, increasing maintenance, relocating facilities, and/or closing specific sites, are not effective in meeting AMS goals, eliminate the practice or occupancy.

Aquatic/Riparian

S1	S2	Objective	Standard & Guideline
X	X	Ensure identified beneficial uses for the water body are adequately protected. Identify the specific beneficial uses for the project area, water quality goals from the Regional Basin Plan, and the manner in which the standards and guidelines will protect the beneficial uses.	Ensure management activities do not adversely affect water temperatures necessary for local aquatic- and riparian-dependent species assemblages.
X	X	Ensure identified beneficial uses for the water body are adequately protected. Identify the specific beneficial uses for the project area, water quality goals from the Regional Basin Plan, and the manner in which the standards and guidelines will protect the beneficial uses.	Limit pesticide applications to cases where project level analysis indicates that pesticide applications are consistent with riparian conservation objectives.
X	X	Ensure identified beneficial uses for the water body are adequately protected. Identify the specific beneficial uses for the project area, water quality goals from the Regional Basin Plan, and the manner in which the standards and guidelines will protect the beneficial uses.	Prohibit storage of fuels and other toxic materials within RCAs and CARs except at designated administrative sites. Prohibit refueling within RCAs and CARs unless there are no other alternatives. Ensure that spill plans are reviewed and up-to-date.
X	X	Maintain or restore: (1) the geomorphic and biological characteristics of special aquatic features, including lakes, meadows, bogs, fens, wetlands, vernal pools, springs; (2) streams, including in stream flows; and (3) hydrologic connectivity both within and between watersheds to provide for the habitat needs of aquatic-dependent species.	Maintain and restore the hydrologic connectivity of streams, meadows, wetlands, and other special aquatic features by identifying roads and trails that intercept, divert, or disrupt natural surface and subsurface water flow paths. Implement corrective actions where necessary to restore connectivity.

Aquatic/Riparian

S1	S2	Objective	Standard & Guideline
X	X	Maintain or restore: (1) the geomorphic and biological characteristics of special aquatic features, including lakes, meadows, bogs, fens, wetlands, vernal pools, springs; (2) streams, including in stream flows; and (3) hydrologic connectivity both within and between watersheds to provide for the habitat needs of aquatic-dependent species.	Ensure that culverts or other stream crossings do not create barriers to upstream or downstream passage for aquatic-dependent species. Locate water drafting sites to avoid adverse effects to in stream flows and depletion of pool habitat. Where possible, maintain and restore the timing, variability, and duration of floodplain inundation and water table elevation in meadows, wetlands, and other special aquatic features.
X	X	Maintain or restore: (1) the geomorphic and biological characteristics of special aquatic features, including lakes, meadows, bogs, fens, wetlands, vernal pools, springs; (2) streams, including in stream flows; and (3) hydrologic connectivity both within and between watersheds to provide for the habitat needs of aquatic-dependent species.	Prior to activities that could affect streams, determine if relevant geomorphic characteristics, including bank angle, channel bank stability, bank full width-to-depth ratio, embeddedness, channel-floodplain connectivity, residual pool depth, or channel substrate are within the range of natural variability for the reference stream type as described in the Pacific Southwest Region Stream Condition Inventory protocol. If properties are outside the range of natural variability, implement restoration actions that will result in an upward trend.
X	X	Maintain or restore: (1) the geomorphic and biological characteristics of special aquatic features, including lakes, meadows, bogs, fens, wetlands, vernal pools, springs; (2) streams, including in stream flows; and (3) hydrologic connectivity both within and between watersheds to provide for the habitat needs of aquatic-dependent species.	Prevent disturbance to meadow-associated streambanks and natural lake and pond shorelines caused by resource activities (for example, livestock, off-highway vehicles, and dispersed recreation) from exceeding 20 percent of stream reach or 20 percent of natural lake and pond shorelines. Disturbance includes bank sloughing, chiseling, trampling, and other means of exposing bare soil or cutting plant roots. This standard does not apply to developed recreation sites and designated off-highway vehicle routes. In stream reaches occupied by the Lahonton, Little Kern Golden, and Paiute cutthroat trout, limit streambank disturbance from livestock to 10 percent of the occupied stream reach. Cooperate with State and Federal agencies to develop streambank disturbance standards for threatened, endangered, and sensitive species. Use the regional streambank assessment protocol. Implement corrective action where disturbance limits have been exceeded.
X	X	Maintain or restore: (1) the geomorphic and biological characteristics of special aquatic features, including lakes, meadows, bogs, fens, wetlands, vernal pools, springs; (2) streams, including in stream flows; and (3) hydrologic connectivity both within and between watersheds to provide for the habitat needs of aquatic-dependent species.	Determine if the age class, structural diversity, composition, and cover of riparian vegetation are within the range of natural variability for the vegetative community. If outside the range of natural variability, implement restoration actions that will result in an upward trend. Actions could include restoration of aspen or other riparian vegetation where conifer encroachment is identified as a problem.

Aquatic/Riparian

S1	S2	Objective	Standard & Guideline
X	X	Ensure identified beneficial uses for the water body are adequately protected. Identify the specific beneficial uses for the project area, water quality goals from the Regional Basin Plan, and the manner in which the standards and guidelines will protect the beneficial uses.	For waters designated as "Water Quality Limited" (Clean Water Act Section 303(d)), implement appropriate State mandates for the water body, such as Total Maximum Daily Load (TMDL) protocols.
X	X	Ensure a renewable supply of large down logs that: (1) can reach the stream channel and (2) provide suitable habitat within and adjacent to the RCA.	Determine if the level of coarse large woody debris (CWD) is within the range of natural conditions in terms of frequency and distribution and is sufficient to sustain stream channel physical complexity and stability. If CWD levels are deficient, ensure proposed management activities, when appropriate, contribute to the recruitment of CWD. Burning prescriptions should be designed to retain CWD; however short-term reductions below either the soil quality standards or standards in species management plans may result from prescribed burning within strategically placed treatment areas or the urban wildland intermix zone.
X	X	Ensure a renewable supply of large down logs that: (1) can reach the stream channel and (2) provide suitable habitat within and adjacent to the RCA.	In plantations within RCAs or CARs, determine if the plantation will be able to provide a sufficient supply of standing trees suitable for large wood recruitment. If there is not sufficient wood for recruitment, develop a restoration program that will provide standing trees of the appropriate size in the RCA or CAR. In developing the restoration program, ensure that proposed activities are consistent with the riparian conservation objectives.
X	X	Maintain or restore: (1) the geomorphic and biological characteristics of special aquatic features, including lakes, meadows, bogs, fens, wetlands, vernal pools, springs; (2) streams, including in stream flows; and (3) hydrologic connectivity both within and between watersheds to provide for the habitat needs of aquatic-dependent species.	Cooperate with Federal, Tribal, State and local governments to secure in stream flows needed to maintain, recover, and restore riparian resources, channel conditions, and aquatic habitat. Maintain in stream flows to protect aquatic systems to which species are uniquely adapted. Minimize the effects of stream diversions or other flow modifications from hydroelectric projects on threatened, endangered, and sensitive species as identified in conservation assessments.

Aquatic/Riparian

S1	S2	Objective	Standard & Guideline
X	X	Maintain or restore: (1) the geomorphic and biological characteristics of special aquatic features, including lakes, meadows, bogs, fens, wetlands, vernal pools, springs; (2) streams, including in stream flows; and (3) hydrologic connectivity both within and between watersheds to provide for the habitat needs of aquatic-dependent species.	During relicensing of Federal Energy Regulatory Commission (FERC) hydroelectric projects, evaluate modifications by the project to the natural hydrograph. Determine and recommend in stream flow requirements and habitat conditions that maintain, enhance, or restore all life stages of native aquatic species, and that maintain or restore riparian resources, channel integrity, and fish passage. Provide written and timely license conditions to FERC. Coordinate relicensing projects with the appropriate State and Federal agencies.
X	X	Maintain or restore: (1) the geomorphic and biological characteristics of special aquatic features, including lakes, meadows, bogs, fens, wetlands, vernal pools, springs; (2) streams, including in stream flows; and (3) hydrologic connectivity both within and between watersheds to provide for the habitat needs of aquatic-dependent species.	For exempt hydroelectric facilities on national forest lands, ensure that special use permit language provides adequate in stream flow requirements to maintain, restore, or recover favorable ecological conditions for local riparian- and aquatic-dependent species.
X	X	Ensure management activities, including fuels reduction actions, within RCAs and CARs enhance or maintain physical and biological characteristics associated with aquatic- and riparian-dependent species.	Within CARs, in occupied habitat or "essential habitat " as identified in conservation assessments for threatened, endangered, or sensitive species, evaluate the appropriate role, timing, and extent of prescribed fire. Avoid direct lighting within riparian vegetation; prescribed fires may back into riparian vegetation areas. Develop mitigation measures to avoid impacts to these species whenever ground disturbing equipment is used.
X	X	Ensure management activities, including fuels reduction actions, within RCAs and CARs enhance or maintain physical and biological characteristics associated with aquatic- and riparian-dependent species.	Use screening devices for water drafting pumps. (Fire suppression activities are exempt). Use pumps with low entry velocity to minimize removal of aquatic species, including juvenile fish, amphibian egg masses and tadpoles, from aquatic habitats.

Aquatic/Riparian

S1	S2	Objective	Standard & Guideline
X	no	Ensure identified beneficial uses for the water body are adequately protected. Identify the specific beneficial uses for the project area, water quality goals from the Regional Basin Plan, and the manner in which the standards and guidelines will protect the beneficial uses.	Conduct project-specific cumulative watershed effects analysis following Regional procedures or other appropriate scientific methodology to meet NEPA requirements.
X	X	Ensure management activities, including fuels reduction actions, within RCAs and CARs enhance or maintain physical and biological characteristics associated with aquatic- and riparian-dependent species.	Design prescribed fire treatments to minimize disturbance of ground cover and riparian vegetation in RCAs. In burn plans for project areas that include, or are adjacent to RCAs, identify mitigation measures to minimize the spread of fire into riparian vegetation. In determining which mitigation measures to adopt, weigh the potential harm of mitigation measures, for example fire lines, against the risks and benefits of prescribed fire entering riparian vegetation. Strategies should recognize the role of fire in ecosystem function and identify those instances where fire suppression or fuel management actions could be damaging to habitat or long-term function of the riparian community.
X	X	Ensure management activities, including fuels reduction actions, within RCAs and CARs enhance or maintain physical and biological characteristics associated with aquatic- and riparian-dependent species.	Where catastrophic events, such as drought, fire, flooding, wind, or insect damage, result in degraded stand conditions, allow salvage harvesting and fuelwood cutting in RCAs and CARs consistent with the assessment of the RCOs for the area. Ensure that present and future woody debris needs are met.
X	X	Ensure management activities, including fuels reduction actions, within RCAs and CARs enhance or maintain physical and biological characteristics associated with aquatic- and riparian-dependent species.	Post-wildfire management activities in RCAs and CARs should emphasize enhancing native vegetation cover, stabilizing channels by non-structural means, minimizing adverse effects from the existing road network, and carrying out activities identified by landscape analyses. Post-wildfire operations shall minimize the exposure of bare soil.

Aquatic/Riparian

S1	S2	Objective	Standard & Guideline
X	X	Ensure management activities, including fuels reduction actions, within RCAs and CARs enhance or maintain physical and biological characteristics associated with aquatic- and riparian-dependent species.	Allow mechanical ground disturbing fuels treatments, hazard tree removal, salvage harvest, or commercial fuelwood cutting within RCAs or CARs when the activity is consistent with RCOs. Projects providing for public health and safety, such as the felling of hazard trees or fuel reduction activities within the defense zone of the urban wildland intermix zones, are permitted. Utilize low ground pressure equipment, helicopters, over the snow logging, or other non-ground disturbing actions to operate off of existing roads when needed to achieve RCOs. Prior to removing trees within RCAs or CARs, determine if existing down wood is sufficient to sustain the stream channel physical complexity and stability required to maintain or enhance the aquatic- and riparian-dependent community. Ensure that existing roads, landings, and skid trails meet Best Management Practices. Minimize the construction of new skid trails or roads for access into RCAs for fuel treatments, salvage harvest, commercial fuelwood cutting, or hazard tree removal.
X	X	Ensure management activities, including fuels reduction actions, within RCAs and CARs enhance or maintain physical and biological characteristics associated with aquatic- and riparian-dependent species.	During fire suppression activities, consider impacts to aquatic- and riparian-dependent resources. Where possible, locate incident bases, camps, helibases, staging areas, helispots, and other centers for incident activities outside of RCAs or CARs. During presuppression planning, determine guidelines for suppression activities, including avoidance of potential adverse effects to aquatic- and riparian-dependent species as a goal.
X	no	Ensure management activities, including fuels reduction actions, within RCAs and CARs enhance or maintain physical and biological characteristics associated with aquatic- and riparian-dependent species.	Assess roads, trails, OHV trails and staging areas, developed recreation sites, dispersed campgrounds, special use permits, grazing permits, and day use sites during landscape analysis. Identify conditions that degrade water quality or habitat for aquatic- and riparian-dependent species. At the project level, determine if use is consistent with other standards and guidelines or desired conditions. If inconsistent, modify the use through redesign, rehabilitation, relocation, closure, or re-directing the use to a more suitable location.
X	X	Preserve, restore, or enhance special aquatic features, such as meadows, lakes, ponds, bogs, fens, and wetlands, to provide the ecological conditions and processes needed to recover or enhance the viability of species that rely on these areas.	Assess the hydrologic function of meadow habitats and other special aquatic features during range management analysis. Ensure that characteristics of special features are, at a minimum, at Proper Functioning Condition, as defined in the appropriate Technical Reports: (1) “Process for Assessing PFC” TR 1737-9 (1993), “PFC for Lotic Areas” USDI TR 1737-15 (1998) or (2) “PFC for Lentic Riparian-Wetland Areas” USDI TR 1737-11 (1994).

Aquatic/Riparian

S1	S2	Objective	Standard & Guideline
X	X	Ensure identified beneficial uses for the water body are adequately protected. Identify the specific beneficial uses for the project area, water quality goals from the Regional Basin Plan, and the manner in which the standards and guidelines will protect the beneficial uses.	Implement soil quality standards for ground cover, compaction, soil displacement, and ground disturbance to minimize the risk of sediment delivery to aquatic systems from management activities. Ensure that management-related activities, including roads, skid trails, landings, trails, or other activities, do not result in detrimental soil compaction on more than 5 percent of the RCA or 10 percent of the area in CARs. Measure compaction using the procedures outlined in Appendix F of the FEIS.
X	X	Identify and implement restoration actions to maintain, restore or enhance water quality and maintain, restore, or enhance habitat for riparian and aquatic species.	Recommend restoration practices for: (1) areas with compaction in excess of soil quality standards, (2) areas with lowered water tables, or (3) areas that are either actively down cutting or that have historic gullies. Identify other management practices, for example, road building, recreational use, grazing, and timber harvests, that may be contributing to the observed degradation.
X		Maintain or enhance the abundance, distribution, condition and ecological process needed to sustain species of special aquatic features such as meadows, lakes, ponds, bogs, fens, and wetlands.	Exclude livestock (including pack and saddle stock) from standing water and saturated soils in wet meadows and associated streams and springs occupied by Yosemite toads or identified as "essential habitat" in the conservation assessment for the Yosemite toad during the breeding and rearing season (as determined locally). If physical exclusion of livestock, such as fencing, is impractical, then exclude grazing from the entire meadow until the meadow has been dry for two weeks. Wet meadows are defined as relatively open meadows with moderate to low amounts of woody vegetation that have standing water on June 1st or for more than two weeks following snow melt. Determine if the meadow has standing water and saturated soils after June 1, if the meadows do not have these conditions for more than two weeks, grazing may be allowed only in those portions of the meadow where those conditions do not exist. Within the historic range of the species, surveys of unoccupied suitable habitat to determine presence of Yosemite toads must be completed within 3 years of this Record of Decision. If surveys are not completed for any meadow, occupancy will be assumed and the above restrictions apply.

Aquatic/Riparian

S1	S2	Objective	Standard & Guideline
	X	Maintain or enhance the abundance, distribution, condition and ecological process needed to sustain species of special aquatic features such as meadows, lakes, ponds, bogs, fens, and wetlands.	Exclude livestock (including pack and saddle stock) from standing water and saturated soils in wet meadows and associated streams and springs occupied by Yosemite toads or identified as "essential habitat" in the conservation assessment for the Yosemite toad during the breeding and rearing season (as determined locally). If physical exclusion of livestock is impractical, then exclude grazing from the entire meadow. Exclusions may be waived if an interdisciplinary team has developed a site-specific management plan to minimize impacts to the Yosemite toad and its habitat by managing the movement of stock around wet areas. Such plans are to include a requirement for systematically monitoring on an annual basis a sample of occupied Yosemite toad sites within the meadow to: (1) assess habitat conditions and (2) assess Yosemite toad occupancy and population dynamics. Every 3 years from the date of the plan, evaluate monitoring data and modify or suspend grazing if Yosemite toad conservation is not being accomplished. Plans must be approved by the authorized officer and incorporated into all allotment plans and/or special use permits governing use within the occupied habitat. Wet meadows are defined as relatively open meadows with low to moderate amounts of woody vegetation that have standing water on June 1 or for more than 2 weeks following snow melt. Conduct surveys of unoccupied suitable habitat for the Yosemite toad within this species' historic range to determine presence of Yosemite toads. Complete surveys of these areas within 2 years of the Record of Decision.
X	X	Preserve, restore, or enhance special aquatic features, such as meadows, lakes, ponds, bogs, fens, and wetlands, to provide the ecological conditions and processes needed to recover or enhance the viability of species that rely on these areas.	Locate new facilities for gathering livestock and pack stock outside of meadows and riparian areas. During landscape analysis, evaluate and consider relocating existing livestock facilities outside of meadows and riparian areas. Prior to re-issuing grazing permits, assess the compatibility of livestock management facilities located in RCAs with riparian conservation objectives.
X	X	Identify and implement restoration actions to maintain, restore or enhance water quality and maintain, restore, or enhance habitat for riparian and aquatic species.	Reclaim abandoned mine sites that are degrading aquatic riparian and meadow ecosystems. First priority is to reclaim sites with hazardous or toxic substances located within CARs and RCAs.
X	X	Ensure identified beneficial uses for the water body are adequately protected. Identify the specific beneficial uses for the project area, water quality goals from the Regional Basin Plan, and the manner in which the standards and guidelines will protect the beneficial uses.	Identify existing and potential sources of sediment delivery to aquatic systems. Implement preventive and restoration measures, such as modifying management activities, increasing ground cover, reducing the extent of compacted surfaces, or revegetating disturbed sites to reduce or eliminate sediment delivery from these sources to aquatic systems.

Aquatic/Riparian

S1	S2	Objective	Standard & Guideline
Roads			
X	X	Watershed protection	To provide protection for watershed resources, the following standards should be met for new road construction reconstruction and relocation: (1) design new stream crossings and replacement stream crossings for at least the 100 year flood, including bedload and debris; (2) design stream crossings to minimize the diversion of streamflow out of the channel and down the road in the event of crossing failure; (3) design stream crossings to minimize disruption of natural hydrologic flow paths, including diversion of streamflow and interception of surface and subsurface water; (4) avoid wetlands or minimize effects to natural flow patterns in wetlands; and (5) avoid road construction in meadows.

Aquatic/Riparian

S1	S2	Objective	Standard & Guideline
Willow Flycatcher			
X		Restore degraded meadow habitats so they are able to support willow flycatcher populations.	As part of landscape analysis, give priority to meadow restoration opportunities near or adjacent to willow flycatcher sites.
X	X	Minimize Roads in willow flycatcher habitat.	To the extent possible, construct no new roads in potential willow flycatcher habitat (occupied willow flycatcher habitat, known willow flycatcher sites, emphasis habitat, and small, wet woody meadows).
X	X	Survey known willow flycatcher sites to determine occupancy.	Initiate a 4-year cycle for willow flycatcher surveys in known willow flycatcher sites. Conduct surveys to established protocols in all known sites the first year. The second year surveys will occur in those 82 known sites where willow flycatchers were not found. Surveys will not occur the third and fourth year. The survey cycle will then be repeated.
X	no	Protect known willow flycatcher sites.	If willow flycatcher(s) are detected through the above survey efforts, eliminate livestock grazing in the entire meadow (to the forested or other upland vegetation edge) beginning one calendar year after detection. Use permanent or electrical fencing or otherwise ensure livestock avoid these sites. If willow flycatcher(s) are not detected, then late season grazing may occur at utilization levels assessed according to habitat condition. Beginning in 2003, livestock will not be allowed to graze in meadows where willow flycatcher surveys have not been completed.
	X	Protect occupied willow flycatcher sites.	In meadows with occupied willow flycatcher sites, only allow late-season grazing (after August 15) in the entire meadow unless a site-specific meadow management strategy is developed and implemented in partnership with the affected grazing permittee. The strategy objectives must focus on protecting habitat during the breeding season and the long-term sustainability of suitable habitat at breeding sites. It may use a mix of management tools, including grazing systems, structural improvements, and other exclusion by management techniques to protect willow flycatcher habitat. The management strategy must be feasible and agreeable to both the permittee and the Forest Supervisor, or this option cannot be exercised.

Aquatic/Riparian

S1	S2	Objective	Standard & Guideline
	X	Restore degraded habitat in meadows with unoccupied willow flycatcher sites	When willow flycatcher sites are categorized as unoccupied, assess willow flycatcher habitat suitability within the meadow. If habitat is degraded, develop restoration objectives and take appropriate actions (such as physical restoration of hydrological components, limiting or re-directing grazing activity, etc.) to move the meadow toward desired conditions.
X	X	Monitor willow flycatcher sites receiving late season grazing	In willow flycatcher sites receiving late-season grazing, monitor utilization annually using regional range analysis and planning guide. Monitor willow flycatcher habitat every 3 years using the following criteria: rooting depth cores for meadow condition, point intercepts for shrub foliar density, and strip transects for shrub recruitment and cover. Meadow condition assessments will be included in a GIS meadow coverage. If habitat conditions are not supporting the willow flycatcher or trend downward, modify or suspend grazing.
X	no	Protect known and occupied willow flycatcher sites receiving late season grazing	Grazing will not occur in known and occupied willow flycatcher sites during the willow flycatcher breeding season, which extends from June 1 to August 31, unless multi-year monitoring data support different dates for a particular breeding location.
X	no	Survey potential willow flycatcher sites to determine occupancy and manage accordingly.	Within 3 years, survey emphasis habitat in active grazing allotments within five miles of the 82 known sites to determine willow flycatcher occupancy using established protocols. Emphasis habitat is defined as meadows greater than 15 acres in size with standing water on June 1 and a deciduous shrub component. (A) If willow flycatchers are detected, late season grazing will be implemented at utilization levels assessed according to habitat condition. Subsequent willow flycatcher surveys will follow the protocols for known willow flycatcher sites. Surveys will be conducted of emphasis habitat within 5 miles of these sites. (B) If no detections are made, the season-long grazing standard and guideline applies. Surveys will be repeated every three years. (C) If willow flycatcher surveys are not completed within 3 years, late season grazing will be implemented.
	X	Survey potential willow flycatcher sites to determine occupancy and manage accordingly.	As part of the project planning process, survey emphasis habitat within 5 miles of willow flycatcher sites to determine willow flycatcher occupancy. Use established protocols to conduct these surveys. If these surveys determine willow flycatcher occupancy, add these to the database of willow flycatcher sites and include them in the 4-year survey cycle of willow flycatcher sites described above.
X		Protect known willow flycatcher sites or survey them to determine occupancy and manage accordingly.	Evaluate site condition of known sites and emphasis habitat. Those sites that no longer contain standing water on June 1 and a deciduous shrub component may be removed from the conservation network.

Aquatic/Riparian

S1	S2	Objective	Standard & Guideline
	X	Protect known willow flycatcher sites or survey them to determine occupancy and manage accordingly.	Evaluate site condition of willow flycatcher sites and emphasis habitat. Those sites that no longer contain standing water on June 1 and a deciduous shrub component may be removed from the conservation network.
X	X	Study grazing effects in known and occupied willow flycatcher sites and manage according to experimental protocol	The willow flycatcher grazing standards may be modified to assess the effects of grazing intensity and frequency on willow flycatcher site occupancy or demography, as a formal management study developed in cooperation with the Pacific Southwest Research Station.
X		Maintain or enhance the abundance, distribution, condition and ecological process needed to sustain species of special aquatic features such as meadows, lakes, ponds, bogs, fens, and wetlands.	Monitor a sample of occupied Yosemite toad sites on a periodic basis to assess habitat condition and Yosemite toad occupancy and population dynamics. Based upon monitoring data, modify or suspend grazing it Yosemite toad conservation is not being accomplished. These grazing restrictions may also be modified to assess the effects of grazing intensity and frequency and habitat conditions on Yosemite toad site occupancy as a formal adaptive management study developed in cooperation with the PSW Research Station
	X	Maintain or enhance the abundance, distribution, condition and ecological process needed to sustain species of special aquatic features such as meadows, lakes, ponds, bogs, fens, and wetlands.	Site-specific livestock management plans for occupied Yosemite toad sites and areas defined as “essential habitat” in the Yosemite toad conservation assessment are to include a requirement for systematically monitoring on an annual basis a sample of occupied Yosemite toad sites within the meadow to: (1) assess habitat conditions and (2) assess Yosemite toad occupancy and population dynamics. Every 3 years from the date of the plan, evaluate monitoring data and modify or suspend grazing if Yosemite toad conservation is not being accomplished.

Home Range Core Area

S1	S2	Objective	Standard & Guideline
California Spotted Owl			
X	X	Designation of spotted owl home range core areas	Establish a home range core area surrounding each territorial spotted owl activity center detected after 1986. The core area amounts to 20% of the area described by adding one standard error to the mean breeding pair home range. The core area size is: 2400 acres on the Hat Creek and Eagle Lake Ranger Districts of the Lassen National Forest; 1000 acres on the Almanor Ranger District of the Lassen National Forest, Modoc, Inyo, Humbolt-Toiyabe, Plumas, Tahoe, Eldorado and Stanislaus National Forests; and 600 acres on the Sequoia and Sierra National Forests.
X	X	Designation of spotted owl home range core areas	The core area is delineated based upon aerial photography. Acreage for the entire core area must be identified on National Forest lands and be designed to encompass the best available spotted owl habitat in the closest proximity to the owl activity center (including the 300- acre PAC). The best available habitat should be selected to incorporate (where available): (1) two or more tree canopy layers; (2) trees in the dominant and codominant crown classes averaging at least 24 inches dbh, and (3) in descending order of priority, CWHR classes 6, 5D, 5M, 4D, and 4M and other stands with at least 50% tree canopy cover (including hardwoods). Core areas should be delineated within 1.5 miles of the activity center.
X	X	Designation of spotted owl home range core areas	For Forest Service activities planned adjacent to non-Forest Service lands, delineate a circular core area around activity centers identified on non-Forest Service lands. Designate any portion of the circular area occurring on National Forest System lands as a core area and identify the best available habitat as described above.

Urban Wildland Intermix Defense Zone

S1	S2	Objective	Standard & Guideline
California Spotted Owl			
X	no	Fuel Treatments in Defense Zone of the Urban Wildland Intermix for Forested stands other than plantations	Design mechanical fuels treatments to remove the material necessary to achieve the following outcomes: Stands with <40% canopy cover: over 90 percent of the stand area, achieve an average height to live crown of 15 feet and an average flame length of four feet or less if the stand were to burn under 90th percentile fire weather conditions; Stands with 40 to 70% canopy cover: over 90 percent of the stand area, achieve an average height to live crown of 20 feet and an average flame length of four feet or less if the stand were to burn under 90th percentile fire weather conditions. Stands with >70% canopy cover: over 90 percent of the stand area, achieve an average height to live crown of 25 feet and an average flame length of four feet or less if the stand were to burn under 90th percentile fire weather conditions. Do not mechanically treat the remaining 10% of the stand area to enhance stand heterogeneity.
X	no	Fuel Treatments in Defense Zone of the Urban Wildland Intermix for Forested stands other than plantations:	Achieve the above outcomes by thinning from below to remove surface and ladder fuels.
X		Fuel Treatments in PACs in the Defense Zone of the Urban Wildland Intermix	Mechanical treatments are prohibited within a 500-foot radius buffer around a spotted owl activity center within the designated PAC. Allow prescribed burning within the 500-foot radius buffer. Prior to burning conduct hand treatments, including handline construction, tree pruning, and cutting of small trees (less than 6 inches dbh), within a 1- to 2-acre area surrounding known nest trees as needed to protect nest trees and trees in their immediate vicinity. The remainder of the PAC may be mechanically treated to achieve the fuels reduction outcomes for General Forest outside Core Areas.
	X	Fuel Treatments in PACs in the Defense and Threat Zones of the Urban Wildland Intermix	Mechanical treatments are prohibited within a 500-foot radius buffer around a spotted owl activity center within the designated PAC. Allow prescribed burning within the 500-foot radius buffer. Prior to burning conduct hand treatments, including handline construction, tree pruning, and cutting of small trees (less than 6 inches dbh), within a 1- to 2-acre area surrounding known nest trees as needed to protect nest trees and trees in their immediate vicinity. The remainder of the PAC may be mechanically treated using the forest-wide standards and guidelines for mechanical thinnings.

Forest Wide

S1	S2	Objective	Standard & Guideline
Air Quality			
X	X	Coordination and cooperation on air quality management.	Coordinate and cooperate on air quality management. Conduct prescribed burns when favorable smoke dispersal is forecast, especially away from sensitive or Class 1 areas. Use appropriate smoke modeling software to predict smoke dispersion. Minimize smoke emission by following Best Available Control Measures (BACMs). Avoid burning on high visitor days and notify public before burning. Comply with Title 17 and interim air quality policy, and local smoke management programs Memorandum of Understanding with CARB and Nevada Smoke Management Plan.
Snags, Down Wood, Post-Fire Restoration, Salvage			
X		Provide sufficient amounts of down woody material large clumps of snags, and legacy elements important to future old forests and biodiversity when conducting fuel treatment projects.	Within westside vegetation types, beginning with the largest down logs, sequentially retain pieces of down wood until an average of at least 10 to 20 tons per acre are retained over a treatment unit. Within eastside vegetation types retain at least 3 large down logs per acre. Do not retain pieces smaller than 12 inches in diameter at midpoint to meet this standard. Exempted in the Defense Zone of the Urban Wildland Intermix.
	X	Provide sufficient amounts of down woody material large clumps of snags, and legacy elements important to future old forests and biodiversity when conducting fuels and vegetation treatment projects.	Determine down woody material retention levels on an individual project basis for vegetation treatments. Within westside vegetation types, generally design projects to retain an average of 10 to 15 tons of large down wood per acre over the treatment unit. Within eastside vegetation types, generally design projects to retain an average of three large down logs per acre. Emphasize retention of wood in the earliest decay stages. Consider the effects of follow-up prescribed fire in achieving desired down wood retention levels.
X	X	Provide sufficient amounts of down woody material large clumps of snags, and legacy elements important to future old forests and biodiversity.	As special use permits for areas larger than 40 acres are issued or re-issued, consider site-specific measures to maintain coarse woody material. Permits for areas less than 40 acres are exempt from this standard and guideline.

Forest Wide

S1	S2	Objective	Standard & Guideline
X	no	Provide sufficient amounts of down woody material large clumps of snags, and legacy elements important to future old forests and biodiversity.	Following stand replacing events (wildfire, insects, and disease), conduct no salvage harvest within at least 10 percent or greater of the total area affected by the stand-replacing event. Retain stands in the unsalvaged acreage with California Wildlife Habitat Relationship size classes 6 or 5 (average dbh of overstory trees (snags) greater than 24 inches), Where 5 and 6 size class stands comprise less than 10 percent of the stand replacement area, retain additional acreage in stands that are size class 4 (average dbh of overstory trees (snags) 11 to 24 inches). This standard and guideline does not apply to the Defense Zone of the Urban Wildland Intermix.
	X	Design and undertake projects to manage long-term fuel profiles, restore habitat, and recover commercial value of some of the fire-killed timber following large wildland fires	In post fire restoration projects for large catastrophic fires (contiguous blocks of moderate to high fire severity of 1000 acres or more) do not conduct salvage harvest in at least 10 percent of the total area affected by fire. Where consistent with overall restoration objectives, this un-salvaged acreage should be comprised of vegetation classified as CWHR size class 5 or 6 prior to the burn. If needed, consider using vegetation classified as CWHR size class 4 to reach the 10-percent level. Retention areas should be a minimum of 40 acres in size and strategically located to balance ecological values over the short- and long-term with fire and fuels management objectives and opportunities. The intent is to leave some areas of high-density large snags to meet the needs of post-fire opportunistic species. This standard and guideline does not apply to the defense zone of the wildland urban intermix zone.
	X	Design and undertake projects to manage long-term fuel profiles, restore habitat, and recover commercial value of some of the fire-killed timber following large wildland fires	Design projects to reduce potential soil erosion and the loss of soil productivity caused by the loss of vegetation and ground cover. Examples are activities that would: (1) Provide for adequate soil cover in the short term; (2) Accelerate the dispersal of coarse woody debris; (3) Reduce the potential impacts of the fire on water quality; and (4) Carefully plan restoration/salvage activities to minimize additional short term effects. Design projects to protect and maintain critical wildlife habitat. Examples are activities that would: (1) Avoid areas where forest vegetation is still largely intact; (2) Provide for sufficient quantities of large snags; (3) Maintain existing large woody material as needed; (4) Provide for additional large woody material and ground cover as needed; (5) Accelerate development of mature forest habitat through reforestation and other cultural means; and (6) Provide for a mix of seral stages over time. Design projects to manage the development of fuel profiles over time. Examples are activities that would: (1) Remove sufficient standing and activity generated material to balance short-term and long-term surface fuel loading; and (2) Protect remnant old forest structure (surviving large trees, snags, and large logs) from high severity re-burns in the future. Design projects to recover the value of timber killed or severely injured by the fire. Examples are activities that would: (1) Conduct timber salvage harvest in a timely manner to minimize value loss; (2) Minimize harvest costs within site-specific resource constraints; and (4) Remove material that local managers and interdisciplinary teams determine is not needed for long-term resource recovery needs.

Forest Wide

S1	S2	Objective	Standard & Guideline
	X	Remove and utilize dead and dying trees to recover value and support vegetation management objectives	Use the best available information on determining tree mortality for the purpose of salvage as developed by the Pacific Southwest Region Forest Health Protection Staff. Outside of the defense zone of the wildland urban intermix zone, salvage harvests are prohibited in protected activity centers and known den sites unless a biological evaluation determines these designated areas are rendered unsuitable for the purpose they were intended by a catastrophic stand-replacing event, and surveys conducted to protocol confirm non-occupancy. Surveys need not be conducted if the stand-replacing event has essentially destroyed all vegetation within the PAC or den site.
X		Provide sufficient amounts of down woody material large clumps of snags, and legacy elements important to future old forests and biodiversity.	Retain the following numbers of large snags after fuels treatments except where: (1) snag removal is needed to address imminent safety hazards and (2) snag levels are reduced as a result of incidental loss to prescribed fire. Retain 4 of the largest snags per acre on westside in mixed conifer and ponderosa pine, 6 per acre in red fir, and 3 per acre in eastside pine and mixed conifer, except in Defense Zone of the urban wildland intermix and within developed recreation sites. Evaluate snag density on a 40-acre basis.
X		Maintain and enhance critical wildlife habitat elements.	Where hardwood snags exist, retain 4 of the largest per acre, averaged over 10 acres. Where standing live trees lack dead branches, supplement wildlife need for dead material by retaining 6 of the largest snags per acre, where they exist.
	X	Provide sufficient amounts of down woody material large clumps of snags, and legacy elements important to future old forests and biodiversity.	Snag retention levels shall be determined on an individual project basis for vegetation treatments. Design projects to implement and sustain a generally continuous supply of snags and live decadent trees suitable for cavity nesting wildlife across a landscape. Retain some mid and large diameter live trees that are currently in decline, have substantial wood defect, or that have desirable characteristics (teakettle branches, large diameter broken top, large cavities in the bole) to serve as future replacement snags and to provide nesting structure. When determining snag retention levels, consider land allocation, desired condition, landscape position, and site conditions (such as riparian areas and ridge tops), avoiding uniformity across large areas. General guidelines for large-snag retention are as follows: ▪ In westside mixed conifer and ponderosa pine types, four of the largest snags per acre should be retained. ▪ In the red fir forest type, six of the largest snags per acre should be retained. ▪ In eastside pine and eastside mixed conifer forest types, three of the largest snags per acre should be retained. ▪ In westside hardwood ecosystems, four of the largest snags (hardwood or conifer) per acre should be retained. ▪ Where standing live hardwood trees lack dead branches, six of the largest snags per acre should be retained, where they exist, to supplement wildlife needs for dead material. ▪ Use snags larger than 15 inches dbh to meet this guideline. Snags should be clumped and distributed irregularly across the treatment units. Consider leaving fewer snags strategically located in treatment areas within the wildland urban intermix zone. While some snags will be lost due to hazard removal, or the effects of prescribed fire, consider these potential loses during project planning to achieve desired snag retention levels.

Forest Wide

S1	S2	Objective	Standard & Guideline
Range			
X	X	Protect hardwood regeneration in grazing allotments	To protect hardwood regeneration in grazing allotments, allow livestock browse on no more than 20 percent of hardwood annual growth of seedlings and advanced regeneration. Alter utilization if hardwood ecosystem goals are not being met.
X	X	Protect hardwood regeneration in grazing allotments	In annual grasslands, grazing utilization will maintain a minimum of 60 percent cover. Where in satisfactory condition, manage for 700 pounds per acre residual dry matter (RDM) where annual precipitation is greater than 10 inches, and 400 pounds per acre where less than 10 inches. Where in unsatisfactory conditions, manage for 1000 pounds per acre RDM where precipitation is greater than 10 inches, and 700 pounds per acre where less than 10 inches. -- Lower grazing utilization if ecosystem goals are not being met. This standard and guideline only applies to grazing utilization.
X	X	Maintain suitable habitat for meadow-associated species by using appropriate grazing utilization standards.	Under season-long grazing, livestock utilization of grass and grass-like plants are limited to 30 percent (or minimum 6 inch stubble height) for meadows in early seral status and to a maximum of 40 percent (or minimum 4 inch stubble height) for meadows in late seral status. Ecological status on all key areas monitored for grazing utilization is to be determined prior to establishing utilization levels. Under intensive grazing systems (e.g., rest-rotation, deferred rotation) where meadows are receiving a period of rest, utilization levels can be higher if meadow is maintained in late seral status and meadow-associated sensitive species are not being impacted. Degraded meadows (e.g. early seral, with greater than 10 percent bare soil and active erosion) require total rest from grazing until they have recovered and have moved to mid or late seral status. Determination of ecological status is according to Regional ecological scorecards and range plant list. Every three to five years analyze meadow ecological status, if determined to be in a downward trend, modify or suspend grazing. Available range trend data and annual monitoring data for key areas within allotments will be included in a spatially explicit Geographic Information System (GIS) meadow coverage.
	X	Maintain suitable habitat for meadow-associated species by using appropriate grazing utilization standards.	Where professional judgment and quantifiable measurements find that current practices are maintaining range in good to excellent condition, the grazing utilization standards above may be modified to allow for the Forest Service, in partnership with selected permittees, to rigorously test and evaluate alternative standards.
X	X	Study grazing effects in known and occupied willow flycatcher sites and manage according to experimental protocol	Grazing standards specified above may be modified to assess the effects of grazing intensity and frequency on willow flycatcher site occupancy or demography, as a formal management study developed in cooperation with PSW.

Forest Wide

S1	S2	Objective	Standard & Guideline
X	X	Maintain and restore woody riparian vegetation in meadows and riparian areas, where they naturally occur (some meadows naturally lack woody vegetation). Ensure willow and aspen seedlings are able to be recruited into tree or shrub form	Browsing will not exceed 20 percent of the annual leader growth of mature riparian shrubs (e.g. willows and aspen) No more than 20 percent of the individual seedlings can be browsed. Remove livestock from any area of the allotment when browsing indicates a change in livestock preference from grazing herbaceous vegetation to browsing woody riparian vegetation. Herd sheep away from these plants at all times.
Soils			
X	X	Maintain long-term soil productivity; maintain and improve soil fertility, nutrient cycling, soil porosity, hydrologic function, and buffering capacity; minimize erosion.	Implement soil quality standards (as outlined in Appendix F). Attain standards for ground cover, compaction, and ground disturbance, so that the risk of sediment delivery to aquatic systems from management activities is minimized.
Fire			
X	X	Reduce size and severity of wildland fires.	Strategically place fuel treatments across the landscape to achieve fuel conditions that reduce the size and severity of wildfire. Maintain 30 to 40 percent of the landscape outside of the defense zone in a condition that meets fuels management objectives. Locate fuel treatments to interrupt wildfire spread and reduce fire severity, typically on the upper two-thirds of the slope, on south and west aspects, in mid- and lower-montane vegetation types. Treatments will occur in areas of high fire hazard and risk (see glossary for definition) in the following priority order (1) urban wildland intermix zone (2) old forest emphasis areas where threat from wildfire is greatest, (3) sensitive species habitats, and (4) general forest.
X		Reduce size and severity of wildland fires.	In plantations (timber strata classifications 0x, 1x, 2x, 3x), when applying the necessary silvicultural and fuels reduction treatments to accelerate development of old forest characteristics, increase stand heterogeneity, promote hardwoods, and reduce risk to loss from wildfire. Implement mechanical fuels treatments to remove material necessary to achieve the following outcomes from wildfire under the 90th percentile fire weather conditions: (1) wildfires burn with average flame lengths of 6 feet or less; and (2) rate of spread (ROS) is less than 50 percent of pre-treatment ROS and line production rate is doubled. Treatments should be effective for more than 5 years. Achieve these outcomes by reducing surface and ladder fuels and adjacent crown fuels.

Forest Wide

S1	S2	Objective	Standard & Guideline
	X	Reduce size and severity of wildland fires.	In plantations apply the necessary silvicultural and fuels reduction treatments to: (1) accelerate the development of key habitats and old forest characteristics, (2) increase stand heterogeneity, (3) promote hardwoods, and (4) reduce risk of loss to wildland fire. Use mechanical fuels treatments to remove the material necessary to achieve the following outcomes if the treated plantation was to burn under 90th percentile fire weather conditions: (1) wildland fire would burn with average flame lengths of 2 feet or less, (2) the rate of fire spread would be less than 50 percent of the pre-treatment rate of spread, and (3) fire line production rates would be doubled. Achieve these outcomes by reducing surface and ladder fuels and adjacent crown fuels. Treatments should be effective for more than 10 years. Maintenance of fuels treatments in these areas should ensure that flame lengths remain non-lethal to the species identified above in developing future habitats and old forest.
X	X	Landscape fuel reduction strategy	Incorporate fuel treatment and protection planning into reforestation plans. Ensure that tree stocking levels and silvicultural goals are consistent with fuel reduction objectives in plantations located within areas characterized by moderate to high fire risk and hazard.
	X	Fuel Reduction Standards	Local interdisciplinary teams design fuel reduction projects to achieve the standards below. These are reference standards for the desired flame length and torching index objectives. These surface fuel standards apply to fuels treatment units. Treatment Units in Conifer Forest Types: ▪ Height to live crown base height (feet): 10 feet (minimum), 20 feet (average) ▪ 3-inch and smaller surface fuel load (tons per acre): 5 tons per acre (minimum), 10 tons per acre (average), 12 tons per acre (maximum) Treatment Units in Hardwood and Plantation Vegetation Types: ▪ Height to live crown base height (feet): 4 feet (minimum), 6 feet (average) ▪ 3-inch and smaller surface fuel load (tons per acre): 5 tons per acre (minimum), 10 tons per acre (average), 12 tons per acre (maximum) Crown base height may vary by slope and modeled fire behavior. The numbers shown for live crown base height above were based on the following assumptions: 0 percent slope; mid-flame wind speed of 5 miles per hour; 3 percent fuel moisture for 1-hour fuels; 4 percent fuel moisture for 10-hour fuels; 5 percent fuel moisture for 100-hour fuels; and 70 percent live foliar moisture.
X	no	Management of uses other than fire hazard reduction	Incidental removal of vegetation and coarse woody debris for activities such as administration of special use permits, maintenance of recreation developments, roads, trails, and rights of way, approved resort expansion plans, and removal of trees that represent imminent safety hazards may deviate from these vegetation management standards.

Forest Wide

S1	S2	Objective	Standard & Guideline
X	X	Management of uses other than fire hazard reduction	Exceptions from the vegetation management standards and guidelines may also include restoration activities, such as aspen regeneration, sugar pine management, Sequoia regeneration.
Fisher			
X	X	Minimize old forest habitat fragmentation.	Assess potential impacts of fragmentation on old forest species (particularly fisher and marten) in biological evaluations. Evaluate locations of new landings, staging areas, recreational developments, including trails and other disturbances.
X	X	Ensure and enhance oak regeneration.	Create openings where possible around existing California black and canyon live oaks where necessary to stimulate natural regeneration.
X	X	Ensure old forest habitat is present in sufficient locations and connectivity to sustain viable populations of forest carnivores.	Project level and landscape analysis includes consideration of forested linkages that are interconnected via riparian areas and ridgetop saddles with canopy closure greater than 40 percent.
X	X	Provide opportunities for the expansion of the fisher population beyond the Southern Sierra Fisher Conservation Area	If fishers are detected outside of the Southern Sierra Fisher Conservation Area, evaluate the habitat conditions and take appropriate mitigation measures to retain suitable habitat within the estimated home range and institute project level surveys over the appropriate landscape area.
Sierra Nevada Red Fox, Wolverine			
X		Limit potential impacts to wolverines or Sierra Nevada red foxes	Upon a detection (photograph, track plate, or siting verified by a wildlife biologist), perform an analysis to determine if activities within 5 miles of the detection have a potential to impact wolverines or Sierra Nevada red fox. For a period of two years following the detection, restrict activities from January 1 to June 30 that are determined in the analysis to have an adverse impact.
	X	Limit potential impacts to wolverines or Sierra Nevada red foxes	Detection of a wolverine or Sierra Nevada red fox will be evaluated by a PSW forest carnivore specialist. Conduct an analysis to determine if activities within 5 miles of the detection have a potential to affect the species. Implement a limited operating period from January 1 to June 30 to avoid adverse impacts to potential breeding. Evaluate activities for a 2 year period for detections not associated with a den site.

Forest Wide

S1	S2	Objective	Standard & Guideline
Mining			
X	X	To return specially managed land allocations disturbed by mining-related activities to near pre-mining conditions.	Ensure that plan of operations, reclamation plans, and reclamation bonds address the costs of removing facilities, equipment, and materials; isolating and neutralizing or removing toxic or potentially toxic materials; salvage and replacement of topsoil; seedbed preparation and revegetation to meet the objectives of the land allocation in which the operation is located.
X	X	To maintain and restore the ecological integrity of specially managed land allocations.	Ensure that mine owner and operators limit the construction of new roads, decommission unnecessary roads, and maintain needed roads consistent with Forest Service roads policy and the objectives of the designated area.
X	X	Return specially managed land allocations (riparian areas, critical aquatic refuges, aquatic diversity areas, emphasis watersheds, protected activity centers, and old forest emphasis areas) disturbed by mining-related activities to near pre-mining conditions.	Require reclamation to be conducted in a timely manner.
X	X	To maintain and restore the ecological integrity of specially managed land allocations.	Require inspection and monitoring of mining-related activities on a regular basis to ensure compliance with laws, regulations, and operating plans. The frequency of inspections and monitoring should be based on the potential severity of mining activity impacts.
X	X	Maintain the ecological integrity of specially managed land allocations (riparian areas, critical aquatic refuges, aquatic diversity areas, emphasis watersheds, protected activity centers, and old forest emphasis areas).	During mining related activities, limit the clearing of trees and other vegetation to the minimum necessary. Clearing of vegetation should be pertinent to the approved phase of mineral exploration and development,.

Forest Wide

S1	S2	Objective	Standard & Guideline
X	X	To protect the ecological integrity of aquatic, riparian, and meadow ecosystems from unstable solid mine waste facilities and potentially toxic releases.	Require solid waste facilities (e.g. waste rock and tailings dumps) to be located outside of Riparian Areas. Where no reasonable alternative to locating these mine waste facilities in Riparian Areas exists, locate and design them with the goal of ensuring stability and preventing potentially toxic releases. -- (1) Mine waste material should be analyzed using the best conventional sampling methods and analytic techniques to determine its chemical and physical stability characteristics. (2) Mine waste facilities should be located and designed using best conventional techniques to ensure mass stability and prevent the release of acid or toxic materials. (3) Reclamation and reclamation bonds should be sufficient to ensure long-term chemical and physical stability of mine waste facilities. (4) Waste and waste facilities should be monitored after operations have ceased to ensure that chemical and physical conditions are consistent with Aquatic Conservation Strategy goals.
X	X	To maintain the ecological integrity of aquatic, riparian, and meadow ecosystems.	Allow salable mineral activities such as sand and gravel mining and extraction within riparian areas only if measures that protect the integrity of aquatic, riparian, and meadow ecosystems are implemented.
Oaks/Hardwoods			
X	X	Maintain and enhance hardwood ecosystems	Manage hardwood ecosystems for a diversity of hardwood tree size classes within a stand, such that seedlings, saplings and pole size trees are in sufficient abundance to replace large trees that die.
X	X	Maintain and enhance critical wildlife habitat elements.	Retain the mix of mast producing species where they exist within a stand
X	X	Maintain or enhance distribution of hardwood ecosystems.	Retain all blue oak and valley oak trees except where National Forests have developed stand restoration strategies calling for tree removal, or where lost due to fire, or as needed for public health and safety.
X	X	Maintain and enhance biodiversity in lower westside ecosystems.	Consider risk of noxious weed spread, and minimize impacts to hardwood ecosystem structure and biodiversity in prescribed fire planning documents and in application of mechanical fuel treatments.
X	X	Maintain and enhance critical wildlife habitat elements.	During mechanical vegetation treatments, prescribed fire and salvage operations retain all large hardwood trees on the west side except where trees pose an immediate threat to human life or property, or where losses are incurred due to prescribed or wild fire. Large montane hardwoods are defined as having a dbh 12 inches or greater, blue oak woodland species are defined as having a dbh 8 inches or greater. Removal of larger hardwood trees (up to 20" dbh) would be permitted if research supports that it is necessary for maintenance and enhancement of the hardwood stand.

Forest Wide

S1	S2	Objective	Standard & Guideline
X	X	Maintain or enhance distribution of hardwood ecosystems.	Where commercial and noncommercial hardwood fuelwood and sawlog cutting in hardwood ecosystems are permitted, pre-mark or pre-cut hardwood trees to ensure stand goals are met. Retain a diverse distribution of stand cover classes.
X	X	Improve information base for hardwood species	During or prior to landscape analysis, spatially determine distributions of existing and potential natural hardwood ecosystems (FSH 2090.11). Assume pre-1850 disturbance levels for potential natural community distribution. Work with Province Ecologists or other qualified personnel to map and, or model hardwood ecosystems at the landscape scale (30,000-50,000 acres). Include the following items in the analysis; 1) compare distributions of potential natural and existing hardwood ecosystems, 2) Identify locations where existing is outside the natural range of variability for potential natural community, 3) identify hardwood restoration and enhancement projects.
X	X	Retain role of hardwoods in nutrient cycling and soil building	Include hardwoods in stand exams. Encourage hardwoods in plantations. Promote hardwoods after stand replacing events. Buffer around existing hardwood trees by not planting conifer trees within 20 feet from edge of hardwood crown canopy.
Old Forest Ecosystems and Associated Species			
X	X	Promote habitat connectivity in areas of mixed ownership	During landscape analysis, identify and prioritize areas for acquisition, exchange or conservation easements to enhance connectivity of habitat for old forest associated species.
X	X	Remove hazard trees to provide for public and employee safety.	Along maintenance level roads 3, 4, and 5 and within or immediately adjacent to (tree falling distance) administrative sites, hazard tress may be felled and removed. Along maintenance level 1 and 2 roads hazard trees will be reviewed by an appropriate resource specialist before felling. Trees that are needed to meet CWD will be left.
X	X	Retain and restore habitat connectivity to facilitate movement of fishers and other old forest associated species.	Assess the potential impact of projects on the connectivity of habitat for old-forest associated species.

Forest Wide

S1	S2	Objective	Standard & Guideline
California Spotted Owl			
X	X	Consistent methodology for determining canopy cover	Aerial photography interpretation serves as the basis for determining canopy cover associated with stand retention guidelines for vegetation treatments and serves as the basis against which other methods must be calibrated. Since canopy cover is difficult to estimate with precision, monitoring the implementation of canopy cover standards using stand measurements must anticipate a degree of variation from the standard. Variation is acceptable provided that treatments have been planned and implemented using reasonable methods for estimating pre-treatment and projecting post-treatment canopy cover. Pre- and post- treatment canopy cover estimates from the ground should attempt to exclude trees less than 6 inches dbh since these trees contribute little to useable canopy cover for spotted owls but may substantially contribute to ladder fuels. Canopy cover estimates may be averaged over a treatment area up to 20-40 acres in size unless treated stands are smaller.
X	X	To limit the extent of stand structural changes from mechanical treatments	The structural change to treatment acres by mechanical methods is limited to one per decade. Treatments should be designed to be effective for at least 10 years. When subsequent entries within 10 years are needed to reduce surface fuels, prescribed fire is the preferred method. When burning opportunities are limited, mechanical treatments such as mastication and piling, are allowed.
X		Fuel Treatments in Old Forest Emphasis Areas and Spotted Owl Home Range Core Areas	Retain snags 15 inches dbh or greater except (A) for imminent hazards to human safety, (B) following stand replacing events removal of dead trees may occur to the extent that project analysis recommends removal to benefit landscape conditions for old forest structure and function. Analysis should determine varying snag retention levels considering landscape position and site conditions (riparian areas, ridgetops, etc), avoiding uniformity across large areas.
	X	Fuel and Vegetation Treatments in Old Forest Emphasis Areas	In Old Forest Emphasis Areas the potential for benefit to species associated with old forest conditions from salvage is greatest when large, stand-replacing events are involved. Salvage in disturbed sites of 10 acres or less is usually not appropriate because small forest openings are an important component of old-growth forests.
X	no	Fuel Treatments in Forested patches or stands (greater than one acre in size) identified as CWHR 5M, 5D and 6 (outside the Defense Zone of the Urban Intermix).	Identify stands greater than 1 acre in size classified as CWHR 5M, 5D, and 6.

Forest Wide

S1	S2	Objective	Standard & Guideline
TEPS Plants			
X	X	Maintain long-term viability of threatened, endangered, proposed and sensitive (TEPS) plant species and ensure management activities do not contribute to population declines.	Conduct field surveys for TEPS plant species early enough in the project planning process that the project can be designed to conserve or enhance TEPS plants and their habitat. Conduct surveys according to procedures outlined in the Forest Service Handbook (FSH 2609.25.11). If additional field surveys are to be conducted as part of project implementation, survey results must be documented in the project file.
X	X	Maintain long-term viability of threatened, endangered, proposed and sensitive (TEPS) plant species and ensure management activities do not contribute to population declines.	Minimize or eliminate direct and indirect impacts from management activities to TEPS plants unless project is designed to maintain or improve populations. (FSM 2670)
X	X	To conserve the native biological diversity and adaptive capacity of plant communities, species, and populations, and to avoid displacing native plant species.	All projects involving revegetation (planting or seeding) will adhere to the Regional Native Plant Policy.
X	X	To ensure the persistence of bogs and fens, especially those containing Sphagnum moss, and the rare plants and bryophytes that are associated with these habitats.	Prohibit or mitigate ground-disturbing activities that negatively affect hydrologic processes that maintain water flow, water quality, or temperature critical to sustaining bog and fen ecosystems and the plant species dependent on them. During project analysis, survey, map and protect bogs and fens from activities such as trampling by livestock, pack stock, humans, and from wheeled vehicles. Criteria for defining bogs and fens include, but are not limited to: presence of sphagnum moss (Sphagnum spp.), presence of mosses in the genus Meesia, presence of sundew (Drosera ssp.). Complete initial inventories of fens and bogs within active grazing allotments prior to re-issuing permits.
Roads			
X		Minimize resource impacts from wheeled off-highway vehicle use.	Wheeled vehicle travel is allowed on designated routes, trails, and OHV areas. Unless otherwise restricted by current forest plans or other specific area standards and guidelines, cross-country travel by over-snow vehicles would continue. Each National Forest may designate where OHV use will occur.

Forest Wide

S1	S2	Objective	Standard & Guideline
	X	Minimize resource impacts from wheeled off-highway vehicle use.	Prohibit wheeled vehicle travel off of designated routes, trails, and limited OHV use areas. Unless otherwise restricted by current forest plans or other specific area standards and guidelines, cross-country travel by over-snow vehicles would continue.
X	X		Landscape analysis will include an integrated interdisciplinary transportation analysis. The analysis process will follow the National Roads Analysis procedures. Unclassified road inventories will be completed by each National Forest within ten years.

Forest Wide

S1	S2	Objective	Standard & Guideline
Vegetation Management			
X		Retain legacy elements important to future old forests, and biodiversity.	When implementing vegetation and fuels treatments, retain all live conifer trees with a dbh of 30 inches or greater in westside forest types and 24 inches or greater in the eastside pine forest type. Retain montane hardwoods 12 inches dbh or greater within westside forest types. Occasional mortality of larger trees will occur, however prescribed burn prescriptions and techniques are designed to minimize the loss of large trees and down material.
	X	Maintain and develop old forest habitat conditions by leaving the largest trees on site	When implementing mechanical thinning treatments, design projects to retain all live conifers 30 inches dbh or larger. Retain montane hardwoods 12 inches dbh or greater within westside forest types.
	X	Maintain and develop old forest habitat conditions by leaving the largest trees on site.	For mechanical thinning treatments in mature forest habitat (CWHR types 4M, 4D, 5M, 5D, and 6) outside defense zones: Design projects to retain at least 40 percent of the basal area, consisting of the largest trees in each treatment unit. This standard and guideline does not apply to the eastside pine type.
	X	Allow project designers to address and balance the need to provide and develop understory structure as an important old forest habitat component with the need to reduce ladder and crown fuels.	For mechanical thinning treatments in mature forest habitat (CWHR types 4M, 4D, 5M, 5D, and 6) outside defense zones: Where available, design projects to retain 5 percent or more of the total post-treatment canopy cover in lower layers composed of trees 6 to 24 inches dbh within the treatment unit. This standard and guideline does not apply to the eastside pine type.
	X	Maintain high levels of canopy cover whenever it is possible to do so and still meet project objectives.	For mechanical thinning treatments in mature forest habitat (CWHR types 4M, 4D, 5M, 5D, and 6) outside defense zones: Where vegetative conditions permit, design projects to retain 50 percent canopy cover after treatment within the treatment unit, except where site-specific project objectives cannot be met (for example, to achieve adequate height to live crown, provide sufficient spacing for equipment operation, minimize re-entry, or design cost efficient treatments). Where 50 percent canopy cover retention cannot be met as described above, design projects to retain a minimum of 40 percent canopy cover within the treatment unit. This standard and guideline does not apply to the eastside pine type.

Forest Wide

S1	S2	Objective	Standard & Guideline
	X	Where canopy cover is at or near 40 percent, maintain canopy closure conditions suitable for dispersal and foraging for California spotted owls while also allowing for effective fuels treatments.	For mechanical thinning treatments in mature forest habitat (CWHR types 4M, 4D, 5M, 5D, and 6) outside defense zones: Where pre-treatment canopy cover is at or near 40 percent, remove only surface and ladder fuels to achieve project fuels objectives. This standard and guideline does not apply to the eastside pine type.
	X	Avoid large changes in canopy density.	For mechanical thinning treatments in mature forest habitat (CWHR types 4M, 4D, 5M, 5D, and 6) outside defense zones: Design projects to avoid reducing pre-existing canopy cover by more than 30 percent within the treatment unit. Percent is measured in absolute terms (for example, do not reduce 80 percent canopy closure to less than 50 percent.) This standard and guideline does not apply to the eastside pine type
	X	Maintain and develop old forest habitat conditions by leaving the largest trees on site.	For mechanical thinning treatments in mature forest habitat (CWHR types 4M, 4D, 5M, 5D, and 6) outside defense zones in the eastside pine type: Design projects to retain 30 percent of the basal area, consisting of the largest trees in each treatment unit. Projects in the eastside pine type have no canopy cover retention standards and guidelines.
X		Reduce size and severity of wildland fires.	Mechanical fuel treatments in brush and shrub patches are designed to remove material necessary to achieve the following outcomes from wildfire under 90th percentile fire weather conditions: (1) wildfires burn with an average flame length of 8 feet or less; and (2) rate of spread (ROS) is less than 50 percent of pre-treatment ROS and line production rate is doubled. Treatments are effective for more than 5 years.
	X	Reduce size and severity of wildland fires.	Design mechanical treatments in brush and shrub patches to remove the material necessary to achieve the following outcomes from wildland fire under 90th percentile fire weather conditions: (1) wildland fires would burn with an average flame length of 4 feet or less; (2) the fire's rate of spread would be less than 50 percent of the pre-treatment rate of spread; and (3) fire line production rates would be doubled. Treatments should be effective for more than 10 years.
	X	Maintain shade intolerant species component in westside forest types	Promote shade intolerant pines (sugar and Ponderosa) and hardwoods in westside forest types.
Noxious Weeds			
X	X	Emphasize Integrated Weed Management as a guiding process for weed control.	When planning weed control projects, follow Forest Manual direction on Integrated Weed Management (FSM 2080)

Forest Wide

S1	S2	Objective	Standard & Guideline
X	X	Work with partners to educate people so that individuals voluntarily take measures to avoid spreading weeds	Inform forest users, local agencies, special use permitees, groups, and organizations in communities near national forests about noxious weed prevention and management.
X	X	Increase cooperation and coordination in order to more effectively prevent and control infestations.	Work cooperatively with the State of California, State of Nevada and individual counties (e.g. Cooperative Weed Management Areas), to prevent the introduction and establishment of noxious weed infestations and to control existing infestations.
X	X	Consider weed risk, prevention, and treatment in all NEPA documents.	Conduct a noxious weed risk assessment to determine low, moderate, or high risk for weed spread for various types of management activities. Refer to Weed Prevention Practices in Regional Noxious Weed Management Strategy to develop mitigation measures for high and moderate risk activities.
X	X	Maintain close contact with tribes and knowledgeable Native American individuals during all stages of implementation of integrated weed management.	Consult with Native Americans to determine priority areas for prevention and control where traditional gathering areas are threatened by weed infestations.
X	X	Minimize the introduction and establishment of noxious weed infestations as a result of heavy equipment.	As prescribed in the project weed risk assessment, require off-road equipment and vehicles (both Forest Service and contracted) used for project implementation to be weed free. Refer to Weed Prevention Practices in Regional Noxious Weed Management Strategy.
X	X	Prevent or minimize the introduction and establishment of weeds as a result of pack or saddle stock and erosion control projects	Encourage use of certified weed free hay and straw. Cooperate in development of a certification program for weed free hay and straw. The program will be phased in as certified weed free hay and straw become available. This would apply to pack and saddle stock used by public, livestock permittees, outfitter guide permittees, and local, State, or Federal agencies.
X	X	Prevent the introduction and establishment of weeds as a result of ongoing management activities (e.g. road and campground maintenance, facility maintenance)	Minimize weed spread by incorporating prevention and control measures into any ongoing management or maintenance activities that involve ground disturbance or the possibility of spreading weeds. Refer to Weed Prevention Practices in Regional Noxious Weed Strategy.
X	X	Prevent the introduction and establishment of weeds as a result of Forest Service-issued permits.	Include weed prevention measures, as necessary, when amending and/or reissuing permits (including but not limited to livestock grazing, special uses, pack stock operators).

Forest Wide

S1	S2	Objective	Standard & Guideline
X	X	Prevent the introduction and establishment of weeds as a result of mining-related activities	Include weed prevention and treatment in plans of operation and reclamation. (Refer to Weed Prevention Practices in Regional Noxious Weed Strategy). As appropriate, monitor for weeds for 2 years after project implementation before assuming no introductions have occurred.
X	X	Ensure fire suppression and burned area emergency rehabilitation (BAER) activities do not contribute to weed spread.	Burned area emergency rehabilitation team conducts a risk analysis for weed spread as a result of BAER treatments. Monitor and treat weed infestations for 3 years after fire.
X	X	Ensure adequate data are available on the distribution and rate of spread of noxious weed species.	Complete noxious weed inventories based upon a regional protocol within 3 years of the signing of this record of decision. Review and update on an annual basis.
X	X	Contain and control established infestations.	As outlined in the Regional Noxious Weed Strategy (USFS 2000), when detected, emphasize eradication of new, small infestations while providing for the safety of field personnel.
X	X	Restore ecological function where noxious weeds have resulted in degraded ecosystems	During landscape analysis or project level planning, consider restoration and revegetation of damaged ecosystems to minimize reinfestation. -- Adhere to the Regional Native Plant Policy for revegetation.
X	X	Ensure sufficient data is available to evaluate management actions, to assess progress towards management objectives and desired conditions.	Routinely monitor noxious weed control projects to determine success and evaluate need for follow-up treatments or different control methods. Monitor known infestations as appropriate to determine changes in density and rate of spread. Conduct follow-up inspections of ground disturbing activities to ensure compliance with the Regional noxious weed management strategy.
Willow Flycatcher			
X	X	Reduce the likelihood of willow flycatcher brood parasitism by brown-headed cowbirds.	Evaluate proposals for new concentrated stock areas (e.g. livestock handling and management facilities, pack stations, equestrian stations, and corrals) within five miles of occupied willow flycatcher habitat. Utilize a biological evaluation containing a broad landscape level analysis to determine if such action will increase brood parasitism pressure by brown-headed cowbird.

Forest Carnivore Den Sites

S1	S2	Objective	Standard & Guideline
Fisher			
X	X	Protect all known fisher natal (birthing) and maternal (kit rearing) den sites, and any located in the future	Protect verified fisher birthing and kit rearing dens from March 1 - June 30 with 700-acre buffers consisting of the highest quality habitat (CWHR size 4 or greater and canopy closure greater than 60%) in a compact arrangement surrounding the den site in the largest, most contiguous blocks available.
X		Protect all known fisher natal (birthing) and maternal (kit rearing) den sites, and any located in the future	Protect verified den sites with a limited operating period (LOP) for all new projects as long as habitat remains suitable, or until another regionally approved management strategy is implemented.
	X	Protect all known fisher natal (birthing) and maternal (kit rearing) den sites, and any located in the future	Protect verified den sites with a limited operating period (LOP) for vegetation treatments as long as habitat remains suitable, or until another regionally approved management strategy is implemented.
X	X	Protect all known fisher natal (birthing) and maternal (kit rearing) den sites, and any located in the future	The LOP may be waived for new individual projects of limited scope and duration, when a biological evaluation determines that such projects are unlikely to result in breeding disturbance considering their intensity, duration, timing, and specific location.
X		Protect all known fisher natal (birthing) and maternal (kit rearing) den sites, and any located in the future	Evaluate the appropriateness of LOPs for existing uses in fisher den site buffers during environmental analysis.
X	X	Protect habitat quality in fisher den site buffers	Where den site buffers occur in the urban wildland intermix, avoid fuel treatments to the extent possible. If areas within den site buffers must be treated to achieve fuels objectives, limit treatments to mechanical clearing of fuels. Treat ladder and surface fuels over 85% of the treatment unit to achieve fuels objectives. Use piling or mastication to treat surface fuels during initial treatment. Burning of piled debris is allowed. Prescribed fire may be used as a fuel treatment activity if no other reasonable alternative exists.
X		Protect den sites from disturbance due to roads, trails, off highway vehicle routes, recreational developments, and other developments	Evaluate proposals for new roads, trails, off highway vehicle routes, and recreational and other developments for their potential to disturb den sites. Mitigate impacts where there is documented evidence of disturbance to the den site from existing recreation, off highway vehicle route, trail, and road uses (including road maintenance)

Forest Carnivore Den Sites

S1	S2	Objective	Standard & Guideline
	X	Protect den sites from disturbance due to roads, trails, off highway vehicle routes, recreational developments, and other developments	Evaluate on-going and proposed activities within fisher den site buffers and take action to minimize the potential for disturbance to den sites.
Marten			
X		Protect known marten natal (birthing) and maternal (kit rearing) den sites, and any located in the future through research or monitoring.	Protect marten den site buffers from disturbance with a limited operating period (LOP) from May 1 through July 31 for all new projects as long as habitat remains suitable or until another regionally-approved management strategy is implemented. Marten den sites are 100-acre buffers consisting of the highest quality habitat in a compact arrangement surrounding the den site. CWHR types 6, 5D, 5M, 4D, and 4M in descending order of priority, based on availability, provide highest quality habitat for the marten.
	X	Protect known marten natal (birthing) and maternal (kit rearing) den sites, and any located in the future through research or monitoring.	Protect marten den site buffers from disturbance from vegetation treatments with a limited operating period (LOP) from May 1 through July 31 as long as habitat remains suitable or until another regionally-approved management strategy is implemented. The LOP may be waived for new individual projects of limited scope and duration, when a biological evaluation determines that such projects are unlikely to result in breeding disturbance considering their intensity, duration, timing, and specific location.
X		Protect den sites from disturbance due to roads, trails, off highway vehicle routes, recreational developments, and other developments	Evaluate proposals for new roads, trails, off highway vehicle routes, and recreational and other developments for their potential to disturb den sites. Mitigate impacts where there is documented evidence of disturbance to the den site from existing recreation, off highway vehicle route, trail, and road uses (including road maintenance).
	X	Protect den sites from disturbance due to roads, trails, off highway vehicle routes, recreational developments, and other developments	Mitigate impacts where there is documented evidence of disturbance to the den site from existing recreation, off highway vehicle route, trail, and road uses (including road maintenance). Evaluate proposals for roads, trails, off highway vehicle routes, and recreational and other developments for their potential to disturb den sites. Use data obtained from focused studies or other scientific research to assess disturbance levels.

General Forest

S1	S2	Objective	Standard & Guideline
California Spotted Owl			
X	no	Fuel Treatments in General Forest (outside spotted owl PACs and home range core areas) for Forested stands other than plantations and CWHR 5M, 5D and 6:	Design mechanical fuels treatments to remove the material necessary to achieve the following outcomes: Stands with <40% canopy cover: over 75 percent of the stand area, achieve an average height to live crown of 15 feet and an average flame length of six feet or less if the stand were to burn under 90th percentile fire weather conditions; Stands with 40 to 70% canopy cover: over 75 percent of the stand area, achieve an average height to live crown of 20 feet and an average flame length of six feet or less if the stand were to burn under 90th percentile fire weather conditions Stands with >70% canopy cover: over 75 percent of the stand area, achieve an average height to live crown of 25 feet and an average flame length of six feet or less if the stand were to burn under 90th percentile fire weather conditions. Do not mechanically treat the remaining 25% of the stand area to contribute to stand heterogeneity.
X	no	Fuel Treatments in General Forest (outside spotted owl PACs and home range core areas) for Forested stands other than plantations and CWHR 5M, 5D and 6:	Design prescribed fire treatments to achieve or approach the above fuels outcomes following up to two burns per decade and four burns over 20 years.
X	no	Fuel Treatments in General Forest (outside spotted owl PACs and home range core areas) for Forested stands other than plantations and CWHR 5M, 5D and 6:	Design mechanical treatments to achieve the above fuels outcomes through understory thinning to remove surface and ladder fuels up to 20 inches in dbh. Apply treatments to increase stand heterogeneity. Canopy cover reductions may be needed to meet fuels objectives, but will not exceed a 20 percent reduction (i.e. 70% to 50%). Treatments will focus on removal of suppressed and intermediate conifer trees. When conducting treatments in dense stands with uniform tree size and spacing, introduce heterogeneity into the stand by creating small, irregularly spaced openings (typically less than one acre).
X	no	Fuel Treatments in General Forest (outside spotted owl PACs and home range core areas) for Forested stands other than plantations and CWHR 5M, 5D and 6:	Within westside vegetation types where pre-treatment canopy cover is between 50-59%, design fuel treatments to retain a minimum of 50 percent canopy cover. Do not reduce canopy cover in stands currently between 40 and 50 percent canopy cover during fuels treatments except where this occurs from removal of primarily shade tolerant trees less than six inches in dbh. In the westside vegetation types, retain a minimum 50% canopy cover. In the eastside pine vegetation type, retain a minimum of 30 percent canopy cover.

General Forest

S1	S2	Objective	Standard & Guideline
Urban Wildland Intermix Threat Zone			
X	no	Fuel Treatments in Threat Zone of the Urban Wildland Intermix (outside spotted owl PACs) for Forested stands other than plantations and CWHR 5M, 5D and 6:	Design mechanical fuels treatments to remove material necessary to achieve the following outcomes:Stands with <40% canopy cover: over 85 percent of the stand area, achieve an average height to live crown of 15 feet and an average flame length of six feet or less if the stand were to burn under 90th percentile fire weather conditions; Stands with 40 to 70% canopy cover: over 85 percent of the stand area, achieve an average height to live crown of 20 feet and an average flame length of six feet or less if the stand were to burn under 90th percentile fire weather conditions Stands with >70% canopy cover: over 85 percent of the stand area, achieve an average height to live crown of 25 feet and an average flame length of six feet or less if the stand were to burn under 90th percentile fire weather conditions. Do not mechanically treat the remaining 15% of the stand area to contribute to stand heterogeneity.
X	no	Fuel Treatments in Threat Zone of the Urban Wildland Intermix (outside spotted owl PACs) for Forested stands other than plantations and CWHR 5M, 5D and 6:	Design prescribed fire treatments to achieve the above fuels outcomes following up to two burns per decade and four burns over 20 years.
X	no	Fuel Treatments in Threat Zone of the Urban Wildland Intermix (outside spotted owl PACs) for Forested stands other than plantations and CWHR 5M, 5D and 6:	Achieve the above outcomes by understory thinning to remove surface and ladder fuels up to 20 inches in dbh. Canopy cover reductions may be needed to meet fuels objectives, but will not exceed a 20 percent reduction (i.e. 70% - 50%). Treatments will focus on removal of suppressed and intermediate trees. Increase stand heterogeneity through use of non-uniform treatments. When conducting fuels treatments in dense stands with uniform tree size and spacing, introduce heterogeneity into the stand by creating small, irregularly spaced openings (typically less than one acre in size).
X	no	Fuel Treatments in Threat Zone of the Urban Wildland Intermix (outside spotted owl PACs) for Forested stands other than plantations and CWHR 5M, 5D and 6:	In westside forest types, where pre-treatment canopy cover is between 50 and 59 percent, design mechanical treatments to retain a minimum of 50 percent canopy cover. Do not reduce canopy cover in stands currently between 40 and 50 percent canopy cover except where this occurs from removal of primarily shade tolerant trees less than six inches in dbh. In the eastside pine vegetation type, retain a minimum of 30 percent canopy cover.
X	no	Fuel Treatments in Threat Zone of the Urban Wildland Intermix (outside spotted owl PACs) for Forested stands other than plantations and CWHR 5M, 5D and 6:	Conduct an analysis of suitable owl habitat around activity centers before applying the mechanical treatments described above. If sufficient suitable owl habitat exists within 1½ miles of the activity center to satisfy the home range core area delineation standards and guidelines, the area outside the PAC may be treated as described above. The mechanical treatments described above may not be applied within 1½ miles of the nest site or activity center where the requirements of a home range core area cannot be met; however, these areas may be treated according to the mechanical fuel treatment standards and guidelines for old forest emphasis areas. Document this site-specific analysis in the environmental analysis.

Old Forest Emphasis and Owl Home Range Core Areas

S1	S2	Objective	Standard & Guideline
California Spotted Owl			
X	no	Fuel Treatments in Old Forest Emphasis Areas and Spotted Owl Home Range Core Areas	Design mechanical fuels treatments to remove material necessary to achieve the following outcomes: ▪ Stands with <40% canopy cover: over 75 percent of the stand area, achieve an average height to live crown of 15 feet and an average flame length of six feet or less if the stand were to burn under 90th percentile fire weather conditions. ▪ Stands with 40 to 70% canopy cover: over 75 percent of the stand area, achieve an average height to live crown of 20 feet and an average flame length of six feet or less if the stand were to burn under 90th percentile fire weather conditions. ▪ Stands with >70% canopy cover: over 75 percent of the stand area, achieve an average height to live crown of 25 feet and an average flame length of six feet or less if the stand were to burn under 90th percentile fire weather conditions. To enhance stand heterogeneity and maintain intact biological processes, particularly soil biota that may be effected by mechanical treatments, do not mechanically treat the remaining 25% of the stand area.
X	no	Fuel Treatments in Old Forest Emphasis Areas and Spotted Owl Home Range Core Areas	Where mechanical treatments are necessary, design treatments to achieve or approach the fuels outcomes described above through the reduction of surface and ladder fuels less than 12 inches in dbh. Apply treatments to increase stand heterogeneity. Incidental felling of trees 12 to 20” dbh is permitted where required for operability. Retain felled trees on the ground where needed to achieve down material standards of 20 tons per acre in logs greater than 12 inches dbh.
X	no	Fuel Treatments in Old Forest Emphasis Areas and Spotted Owl Home Range Core Areas	Give priority to restoration of historic fire return intervals where possible. Emphasize restoration of fire to pine and mixed-conifer forests. In mixed-conifer forests, fire return intervals vary by aspect and topographic position, with most frequent burning on south and west facing aspects.
X	no	Fuel Treatments in Forested patches or stands (greater than one acre in size) identified as CWHR 5M, 5D and 6 (outside the Defense Zone of the Urban Intermix)	Design prescribed fire treatments to achieve the following fuels outcomes in RX21C following up to two burns per decade and four burns over 20 years.
X	no	Fuel Treatments in Old Forest Emphasis Areas and Spotted Owl Home Range Core Areas	Emphasize treatments in low elevation high hazard mixed conifer, eastside pine and mixed-conifer, and pine types on the upper two-thirds of south and west facing slopes near roads. Mechanical fuels treatments will be utilized where excessive smoke is a concern, the risk of escape of prescribed fire is substantial or in stands with excessive surface and ladder fuels in high fuel hazard and risk areas that preclude the use of prescribed fire alone without risk to loss of canopy structure.

Old Forest Emphasis and Owl Home Range Core Areas

S1	S2	Objective	Standard & Guideline
X	no	Fuel Treatments in Old Forest Emphasis Areas and Spotted Owl Home Range Core Areas	Do not reduce canopy cover in dominant and co-dominant trees by more than 10 percent across the patch or stand following mechanical vegetation treatments (e.g. 80% to 70%, or 65% to 55%).
X	no	Fuel Treatments in Old Forest Emphasis Areas and Spotted Owl Home Range Core Areas	Within westside vegetation types where pre-treatment canopy cover is between 50-59%, design mechanical treatments to retain a minimum of 50 percent canopy cover. Do not reduce canopy cover in stands currently between 40 and 50 percent canopy cover except where this occurs from removal of primarily shade tolerant trees less than six inches in dbh. In the eastside pine vegetation type, retain a minimum of 30 percent canopy cover.
X	no	Fuel Treatments in Old Forest Emphasis Areas and Spotted Owl Home Range Core Areas	Strategically placed area fuel treatments may be needed in old forest emphasis areas to minimize risks to human life and property, sensitive resources, or the old forest emphasis area from loss to wildfire. When treatments are necessary, prescribed fire is the first priority for achieving the fuels objectives. When prescribed fire will not achieve fuels objectives, use mechanical thinning as described in the preceding paragraphs to achieve the fuels objectives. When this treatment will not achieve the fuels objectives due to existing stand conditions, mechanical thinning of trees up to 20 inches dbh and canopy reductions of up to 20 percent (refer to mechanical treatment standards and guidelines for the threat zone) may be conducted in CWHR 4M and 4D stands to meet fuels reduction objectives.
X	no	Fuel Treatments in Old Forest Emphasis Areas and Spotted Owl Home Range Core Areas	Conduct an analysis of suitable owl habitat before applying mechanical treatments that remove trees up to 20 inches dbh and reduce canopy cover up to 20 percent in old forest emphasis areas. This type of treatment may only be used when sufficient suitable owl habitat exists within 1½ miles of a California spotted owl nest site or activity center to satisfy the requirements of a home range core area, as described in the standards and guidelines for delineating California spotted owl home range core areas. This type of treatment may not be applied within 1½ miles of the nest site or activity center if the requirements for delineating a home range core area cannot be met. Document this site-specific analysis in the environmental analysis.

Old Forest Patches or Stands

S1	S2	Objective	Standard & Guideline
X	no	Fuel Treatments in Forested patches or stands (greater than one acre in size) identified as CWHR 5M, 5D and 6 (outside the Defense Zone of the Urban Intermix)	Design mechanical fuels treatments to remove the material necessary to achieve the following outcomes: ▪ Stands with <40% canopy cover: over 75 percent of the stand area, achieve an average height to live crown of 15 feet and an average flame length of six feet or less if the stand were to burn under 90th percentile fire weather conditions. ▪ Stands with 40 to 70% canopy cover: over 75 percent of the stand area, achieve an average height to live crown of 20 feet and an average flame length of six feet or less if the stand were to burn under 90th percentile fire weather conditions. ▪ Stands with >70% canopy cover: over 75 percent of the stand area, achieve an average height to live crown of 25 feet and an average flame length of six feet or less if the stand were to burn under 90th percentile fire weather conditions. Do not mechanically treat the remaining 25% of the stand to enhance stand heterogeneity and maintain intact biological processes, particularly soil biota that may be effected by mechanical treatments.
X	no	Fuel Treatments in Forested patches or stands (greater than one acre in size) identified as CWHR 5M, 5D and 6 (outside the Defense Zone of the Urban Intermix)	Design mechanical treatments to achieve or approach the above fuels outcomes through the removal of surface and ladder fuels less than 12 inches in dbh. Incidental felling of trees 12 to 20 inches dbh is permitted only where required for operability. Retain felled trees on the ground where needed to achieve down material standards of 10-20 tons per acre in logs greater than 12 inches diameter at the midpoint.
X	no	Fuel Treatments in Forested patches or stands (greater than one acre in size) identified as CWHR 5M, 5D and 6 (outside the Defense Zone of the Urban Intermix)	Do not reduce canopy cover by more than 10 percent in the dominant or co-dominant trees across the patch or stand following vegetation treatments (e.g. 80% to 70%, or 65% to 55%).
X	no	Fuel Treatments in Forested patches or stands (greater than one acre in size) identified as CWHR 5M, 5D and 6 (outside the Defense Zone of the Urban Intermix)	In westside forest types, where pre-treatment canopy cover is between 50-59%, design mechanical treatments to retain a minimum of 50 percent canopy cover. Do not reduce canopy cover in stands currently between 40 and 50 percent canopy cover except where this occurs from removal of trees less than six inches in dbh. In the eastside pine vegetation type, retain a minimum of 30 percent canopy cover.

PACs, Den Sites

S1	S2	Objective	Standard & Guideline
Owls, Goshawk			
X		Prevent disturbance of PAC's	Evaluate proposals for new roads, trails, OHV routes, recreation and other developments for their potential to disturb nesting or denning sites. Mitigate impacts where there is evidence of disturbance to the nest or den site from existing recreation, OHV routes, trail, and road uses (including road maintenance).
	X	Prevent disturbance of PAC's	Mitigate impacts where there is documented evidence of disturbance to the nest site from existing recreation, off highway vehicle route, trail, and road uses (including road maintenance). Evaluate proposals for roads, trails, off highway vehicle routes, and recreational and other developments for their potential to disturb den sites. Use data obtained from focused studies or other scientific research to assess disturbance levels.
Goshawk			
X	X	Designation of Northern Goshawk Protected Activity Centers (PACs)	Delineate northern goshawk protected activity centers (PACs) surrounding all known and newly discovered breeding territories detected on National Forest System lands. Northern goshawk PACs are designated based upon the latest documented nest site and the location(s) of alternate nests, or the location of territorial adult birds or recently fledged juvenile goshawks during the fledgling dependency period if the actual nest site is not located.
X	X	Designation of Northern Goshawk Protected Activity Centers (PACs)	PACs are delineated to include the known and suspected nest stands, and encompass the best available 200-acres of forested habitat in the largest contiguous patches that are possible based on aerial photography. When suitable nesting habitat occurs in small patches, PACs can be defined as multiple blocks in the largest patches available within 0.5 miles of one another. The best available forested stands for PACs should be selected to incorporate where available: (1) trees in the dominant and co-dominant crown classes averaging at least 24 inches dbh, and (2) at least 70% tree canopy cover in westside conifer and eastside mixed conifer forests, and at least 60% tree canopy cover in eastside pine forests. Non-forest vegetation (e.g., brush, meadows, etc.) should not be counted as part of the 200 acres.
X	X	Designation of Northern Goshawk Protected Activity Centers (PACs)	When activities are planned within or adjacent to a PAC, conduct surveys to establish or confirm the location of the nest or activity center, if uncertain.
X	X	Designation of Northern Goshawk Protected Activity Centers (PACs)	When activities are planned adjacent to non-Forest Service lands, check available databases for the presence of nearby goshawk activity centers. Delineate a 200-acre circular area centered around the activity center. Designate and manage any region of the circular 200-acre area occurring on National Forest lands as a goshawk PAC.

PACs, Den Sites

S1	S2	Objective	Standard & Guideline
X	X	Designation of Northern Goshawk Protected Activity Centers (PACs)	Review boundaries of PACs and make adjustments as necessary to better meet these criteria as additional nest location and habitat data become available. PACs are maintained regardless of goshawk occupancy status unless habitat is rendered unsuitable by a catastrophic stand-replacing event and protocol surveys confirm non-occupancy.
X		Maintain habitat within Northern Goshawk Protected Activity Centers (PACs)	Within Protected Activity Centers outside of the Defense Zone of the Urban Wildland Intermix, limit stand-altering activities in northern goshawk PACs to reduction of surface and ladder fuels through prescribed fire treatments. In forested stands with overstory trees 11 inches in dbh and greater, design prescribed fire treatments that have an average flame length of 4 feet. Conduct hand treatments, including handline construction, tree pruning, and cutting of small trees (less than 6 inches dbh) as necessary within a one to two acre area surrounding known nest trees prior to burning to protect the nest tree and the trees in its immediate vicinity.
	X	Maintain habitat within Northern Goshawk Protected Activity Centers (PACs)	In PACs located outside the defense zone of the wildland urban intermix zone use prescribed fire treatments to address fuels and forest health issues with the following exception for threat zones only: Mechanical treatments are allowed where prescribed fire is not feasible, and where avoiding PACs would significantly compromise the overall effectiveness of the landscape fire and fuels strategy. Design mechanical treatments to maintain habitat structure and function of the PAC. In PACs where mechanical treatment is necessary: Prohibit mechanical treatments within a 500-foot radius buffer around nest trees. Allow prescribed burning within the 500-foot radius buffer. Prior to burning, conduct hand treatments, including handline construction, tree pruning, and cutting of small trees, within a 1- to 2-acre area surrounding known nest trees as needed to protect nest trees and trees in their immediate vicinity.
X		Maintain habitat within Northern Goshawk Protected Activity Centers (PACs)	Within Protected Activity Centers inside of the Defense Zone of the Urban Wildland Intermix, mechanical treatments are prohibited within a 500-foot radius buffer around northern goshawk nest trees within PACs. Allow prescribed burning within the 500-foot radius buffer. Conduct hand treatments, including handline construction, tree pruning, and cutting of small trees (less than 6 inches dbh) as necessary within a one to two acre area surrounding known nest trees prior to burning to protect the nest tree and the trees in its immediate vicinity. The remainder of the PAC may be mechanically treated to achieve the fuels reduction outcomes for General Forest.
	X	Maintain habitat within Northern Goshawk Protected Activity Centers (PACs	Within Protected Activity Centers inside of the Defense Zone of the Urban Wildland Intermix, mechanical treatments are prohibited within a 500-foot radius buffer around northern goshawk nest trees within PACs. Allow prescribed burning within the 500-foot radius buffer. Conduct hand treatments, including handline construction, tree pruning, and cutting of small trees (less than 6 inches dbh) as necessary within a one to two acre area surrounding known nest trees prior to burning to protect the nest tree and the trees in its immediate vicinity. The remainder of the PAC may be mechanically treated using the forest-wide standards and guidelines.
X		Maintain habitat within Northern Goshawk Protected Activity Centers (PACs)	Conduct mechanical treatments in no more 5% per year and no more than 10 percent per decade of the northern goshawk PACs until a formal monitoring and adaptive management approach is developed in coordination with PSW research station. Breeding season limited operating period restrictions may be waived, where necessary, to allow for use of early season prescribed fire in up to five percent of PACs per year on a forest.

PACs, Den Sites

S1	S2	Objective	Standard & Guideline
	X	Maintain habitat within Northern Goshawk Protected Activity Centers (PACs)	Conduct mechanical treatments in no more than 5 percent per year and 10 percent per decade of the acres in northern goshawk PACs until a formal monitoring and adaptive management approach is developed in coordination with PSW research station. Breeding season limited operating period restrictions may be waived, where necessary, to allow for use of early season prescribed fire in up to five percent of PACs per year on a forest.
X		Avoid northern goshawk breeding disturbance	Maintain a limited operating period (LOP), prohibiting activities within approximately ¼ mile of the nest site during the breeding season (February 15 through September 15) unless surveys confirm that northern goshawks are not nesting. If the nest stand within a protected activity center (PAC) is unknown, either apply the LOP to a ¼- mile area surrounding the PAC, or survey to determine the nest stand location. The LOP does not apply to existing road and trail use and maintenance, or continuing recreation use, except where analysis of proposed projects or activities determines that such activities are likely to result in nest disturbance. The LOP may be waived for individual projects or activities of limited scope and duration or when a biological evaluation determines that such projects are unlikely to result in breeding disturbance considering their intensity, duration, timing and specific location. Where a biological evaluation concludes that a nest site would be shielded from planned activities by topographic features that would minimize disturbance, the LOP buffer distance may be reduced.
	X	Avoid northern goshawk breeding disturbance	Maintain a limited operating period (LOP), prohibiting vegetation treatments within approximately ¼ mile of the nest site during the breeding season (February 15 through September 15) unless surveys confirm that northern goshawks are not nesting. If the nest stand within a protected activity center (PAC) is unknown, either apply the LOP to a ¼-mile area surrounding the PAC, or survey to determine the nest stand location. The LOP may be waived for vegetation treatments of limited scope and duration, when a biological evaluation determines that such projects are unlikely to result in breeding disturbance considering their intensity, duration, timing and specific location. Where a biological evaluation concludes that a nest site would be shielded from planned activities by topographic features that would minimize disturbance, the LOP buffer distance may be reduced.
X	X	Northern Goshawk Survey Requirements	Conduct surveys in compliance with the Pacific Southwest Region's survey protocols prior to undertaking management activities likely to reduce habitat quality but proposed within suitable northern goshawk nesting habitat (defined as stands with an average tree size of at least 11 inches dbh and canopy cover of at least 20% in eastside pine forests, and an average of at least 11 inches dbh and canopy cover of at least 40% in the other forest types) that is not within an existing owl or goshawk PAC.

PACs, Den Sites

S1	S2	Objective	Standard & Guideline
Great Gray Owl			
X	X	Maintain existing nesting and roosting habitats in a condition suitable for continued use by great gray owls for those purposes.	Establish and maintain a protected activity center that includes the forested area and adjacent meadow around all known great gray owl nest stands. Delineate at least 50 acres of the highest quality nesting habitat available in the forested area surrounding the nest. Also include the meadow or meadow complex that supports the prey base for nesting owls. Reliable sitings of great gray owls should be followed up with additional surveys to established protocols.
X		Prevent loss of reproductive success from activity-caused disturbance to great gray owls.	Apply a limited operating period to management activities within 0.25 miles of an active great gray owl nest stand during the nesting period (typically March 1 to August 15). Engage in no stand or ground altering activities, road construction during this period. Prohibit management activities within 0.25 miles of the nest site during the breeding season unless surveys confirm that great gray owls are not nesting. The LOP does not apply to existing road traffic and maintenance, trail and other recreational uses and activities, except where a biological evaluation determines the activities will result in nest disturbance. The limited operating period may also be waived for projects of limited scope and duration.
	X	Prevent loss of reproductive success from activity-caused disturbance to great gray owls.	Apply a limited operating period, prohibiting vegetation treatments and road construction within 0.25 miles of an active great gray owl nest stand, during the nesting period (typically March 1 to August 15). The limited operating period may be waived for projects of limited scope and duration.
X		Surrounding active great gray owl nests, provide suitable habitat for the prey species of great gray owls, such as pocket gophers and voles.	Maintain herbaceous meadow vegetation at least 12 inches in height and covering at least 90 percent of the meadow, within great gray owl protected activity centers.
	X	Surrounding active great gray owl nests, provide suitable habitat for the prey species of great gray owls, such as pocket gophers and voles.	In meadow areas of great gray owl PACs, maintain herbaceous vegetation at a height commensurate with site capability and habitat needs of prey species. Follow regional guidance to determine potential prey species and associated habitat requirements at the project level.

PACs, Den Sites

S1	S2	Objective	Standard & Guideline
California Spotted Owl			
X	X	Designation of Spotted Owl Protected Activity Centers (PACs)	Delineate California spotted owl protected activity centers (PACs) surrounding each territorial owl activity center detected on National Forest System lands since 1986 using aerial photo interpretation with field verification where needed. Owl activity centers are designated based upon the latest documented nest site, the latest known roost site when a nest location remains unknown, and as a central point based upon repeated daytime detections when neither nest nor roost locations are known for all territorial owls.
X	X	Designation of Spotted Owl Protected Activity Centers (PACs)	PACs are delineated, using aerial photography, to include the known and suspected nest stands, and encompass the best available 300-acres of habitat in as compact a unit as possible. The best available habitat for PAC's should be selected to incorporate where available): (1) two or more tree canopy layers; (2) trees in the dominant and co-dominant crown classes averaging at least 24 inches dbh, and (3) at least 70% tree canopy cover (including hardwoods); and (4) in descending order of priority, CWHR classes 6, 5D, 5M, 4D, and 4M and other stands with at least 50% canopy cover (including hardwoods).
X	X	Designation of Spotted Owl Protected Activity Centers (PACs)	Review boundaries of PACs and make adjustments as necessary to better meet these criteria as additional location and habitat data become available.
X	X	Designation of Spotted Owl Protected Activity Centers (PACs)	When activities are planned within or adjacent to a PAC, conduct surveys to establish or confirm the location of the nest or activity center, if uncertain. When Forest Service activities are planned adjacent to non-Forest Service lands, check available databases for the presence of nearby owl activity centers. Delineate a 300 acre circular area centered around the activity center. Designate and manage any region of the circular 300-acre area occurring on National Forest lands as an owl PAC.
X	X	Designation of Spotted Owl Protected Activity Centers (PACs)	PACs are maintained regardless of owl occupancy status unless habitat is rendered unsuitable by a catastrophic stand-replacing event and protocol surveys confirm non-occupancy.
X		Fuel Treatments in Protected Activity Centers	Conduct vegetation treatments in no more than 5 percent per year and 10 percent per decade of the California spotted owl PACs in the 11 Sierra Nevada national forests until a formal monitoring and adaptive management approach is developed in coordination with the Pacific Southwest Research Station. Monitor the number of PACs treated at a bioregional scale. Update the total number of PACs to account for losses of PACs due to catastrophic events.
	X	Fuel Treatments in Protected Activity Centers	Conduct vegetative treatments in no more than 5 percent per year and 10 percent per decade of the acres in California spotted owl PACs in the 11 Sierra Nevada national forests until a formal monitoring and adaptive management approach is developed in coordination with the Pacific Southwest Research Station. Monitor the number of PACs treated at a bioregional scale. Update the total number of PACs to account for losses of PACs due to catastrophic events.

PACs, Den Sites

S1	S2	Objective	Standard & Guideline
X		Avoidance of Breeding Disturbance	Maintain a limited operating period (LOP), prohibiting activities within approximately ¼ mile of the activity center during the breeding season (March 1 through August 31) unless surveys confirm that California spotted owls are not nesting. The LOP does not apply to existing road and trail use and maintenance, or continuing recreation use, except where analysis of proposed projects or activities determines that such activities are likely to result in nest disturbance. The LOP may be waived for individual projects or activities of limited scope and duration or when a biological evaluation determines that such projects are unlikely to result in breeding disturbance considering their intensity, duration, timing and specific location. Where a biological evaluation determines that a nest site would be shielded from planned activities by topographic features that would minimize disturbance, the LOP buffer distance may be reduced.
	X	Avoidance of Breeding Disturbance	Maintain a limited operating period (LOP), prohibiting vegetation treatments within approximately ¼ mile of the activity center during the breeding season (March 1 through August 31), unless surveys confirm that California spotted owls are not nesting. The LOP may be waived for projects of limited scope and duration or when a biological evaluation documents that such projects are unlikely to result in breeding disturbance considering their intensity, duration, timing and specific location. Where a biological evaluation determines that a nest site would be shielded from planned activities by topographic features that would minimize disturbance, the LOP buffer distance may be reduced.
X		Avoidance of Breeding Disturbance	When activities are planned within or adjacent to a PAC and the location of the nest site or activity center is uncertain, conduct surveys to establish or confirm the location of the nest or activity center
	X	Avoidance of Breeding Disturbance	When vegetation treatments are planned within or adjacent to a PAC and the location of the nest site or activity center is uncertain, conduct surveys to establish or confirm the location of the nest or activity center.
X	X	Spotted Owl Survey Requirements	Conduct surveys in compliance with the Pacific Southwest Region's survey protocols prior to undertaking vegetation treatments in spotted owl habitat with unknown occupancy and designate PACs where appropriate according to survey results.
X		Fuel Treatments in Protected Activity Centers outside of the Defense Zone of the Urban Intermix Zone	Limit stand-altering activities to reducing surface and ladder fuels through prescribed fire treatments. In forested stands with overstory trees 11 inches dbh and greater, design prescribed fire treatments that have an average flame length of 4 feet or less. Prior to burning, conduct hand treatments, including handline construction, tree pruning, and cutting of small trees (less than 6 inches dbh), within a 1- to 2-acre area surrounding known nest trees as needed to protect nest trees and trees in their immediate vicinity.

PACs, Den Sites

S1	S2	Objective	Standard & Guideline
	X	Fuel Treatments in Protected Activity Centers outside of Defense and Threat Zones of the Wildland Urban Intermix Zone	Limit stand-altering activities to reducing surface and ladder fuels through prescribed fire treatments. In forested stands with overstory trees 11 inches dbh and greater, design prescribed fire treatments that have an average flame length of 4 feet or less. Prior to burning, conduct hand treatments, including handline construction, tree pruning, and cutting of small trees (less than 6 inches dbh), within a 1- to 2-acre area surrounding known nest trees as needed to protect nest trees and trees in their immediate vicinity.
	X	Fuel Treatments in Protected Activity Centers in Threat Zones of the Urban Intermix Zone.	Limit stand altering treatments as above with the following exception: Mechanical treatments are allowed where avoiding all PACs would significantly compromise the overall effectiveness of the landscape fire and fuels strategy. Within the assessment area or watershed, locate fuels treatments to minimize impacts to PACs. When treatment areas must intersect PACs and choices can be made about which PACs to enter, use the following criteria to preferentially avoid PACs that have the highest likely contribution to owl productivity. (1) Lowest contribution to productivity: PACs presently unoccupied and historically occupied by territorial singles only. (2) PACs presently unoccupied and historically occupied by pairs, (3) PACs presently occupied by territorial singles, (4) PACs presently occupied by pairs, (5) Highest contribution to productivity: PACs currently or historically reproductive. Historical occupancy is considered occupancy since 1990. Current occupancy is based upon surveys consistent with survey protocol (March 1992) in the last 2-3 years prior to project planning. These dates were chosen to encompass the majority of survey efforts and to included the breeding pulses in the early 1990s when many sites were found to be productive. 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.

Southern Sierra Fisher

S1	S2	Objective	Standard & Guideline
X	X	Avoid degrading fisher habitat	Prior to vegetation treatments, identify important wildlife structures such as large diameter snags and coarse woody debris within the treatment unit. Use firing patterns, lining of snags and large logs, and other techniques to minimize effects to snags and large logs. Evaluate the effectiveness of these mitigation measures after treatment.
X		Maintain suitable habitat for fishers throughout the Southern Sierra Fisher Conservation Area	In areas within the SSFCA that are outside of the urban interface, manage each planning watershed to support fisher habitat requirements. Retain 60% of each 5,000-10,000 acre watershed in CWHR 4 (11-24” dbh) or greater and canopy closure greater than or equal to 50%
X	X		Manage the portions of the southern Sierra fisher conservation area that overlap with old forest emphasis areas (as mapped for Modified Alternative 8 of the FEIS: the map layer is available upon request) according to the standards and guidelines for old forest emphasis areas. Manage portions of the southern Sierra fisher conservation area that do not overlap with old forest emphasis areas according to the standards and guidelines for the general forest allocation. Because the effects of prescribed fire on key components of fisher habitat are uncertain, give preference to mechanical treatments over prescribed fire. However, prescribed fire may be applied to achieve restoration and regeneration objectives for fire-adapted giant sequoia.

Herger-Feinstein Quincy Library Group Pilot Project Area

S1	S2		Management Direction (applies until the HFQLG Pilot Project is completed)
	X	Apply standards and guidelines for the northern goshawk, fisher, marten from the HFQLG Forest Recovery Act ROD	Apply the following limited operating periods: ▪ Northern goshawk – within ¼ mile of territory – March 1 through September 15 ▪ Marten den – within ½ mile of known sites – May 1 through August 1 ▪ Fisher den – within ½ mile of known sites – March 1 through July 1. Apply standards and guidelines for the northern goshawk, marten, and fisher from land and resource management plans for the Plumas, Lassen, and Tahoe National Forests prior to the Sierra Nevada Forest Plan Amendment Record of Decision.
	X	Apply land allocations from the HFQLG Forest Recovery Act ROD	Offbase and Deferred Areas are not actively managed to achieve fuels or vegetation objectives. The following activities are not allowed in offbase and deferred areas: DFPZ construction, group selection, individual tree selection, all road building, all timber harvesting activities, and any riparian management that utilizes road construction or timber harvesting.
	X	Apply land allocations from the HFQLG Forest Recovery Act ROD	Late Seral/Old Growth (LSOG) Rank 4 and 5 poylgons: Old forest patches (CWHR types 5M, 5D, and 6) within these areas are not actively managed to achieve fuels or vegetation objectives. Timber harvest and road construction is not allowed within old forest patches in this land allocation. DFPZs may be constructed outside old forest patches within this land allocation. Managers design DFPZ treatments consistent with objectives for DFPZs as described in Appendix J of the HFQLG Forest Recovery Act FEIS and the California spotted owl interim guidelines.
	X	Apply land allocations from the HFQLG Forest Recovery Act ROD	California spotted owl Protected Activity Centers (PACs) are deferred from HFQLG Forest Recovery Act resource management activities (including DFPZ construction, group selection, individual tree selection) and timber harvesting. Prescribed burning may be conducted in PACs to reduce hazardous fuels. California spotted owl PACs discovered since the HFQLG Forest Recovery Act are added to the network consistent with direction in the California Spotted Owl Interim Guidelines.
	X	Apply land allocations from the HFQLG Forest Recovery Act ROD	California spotted owl Habitat Areas (SOHAs) are deferred from HFQLG Forest Recovery Act resource management activities (including DFPZ construction, group selection, individual tree selection) and timber harvesting. Prescribed burning may be conducted in SOHAs to reduce hazardous fuels.

Herger-Feinstein Quincy Library Group Pilot Project Area

S1	S2		Management Direction (applies until the HFQLG Pilot Project is completed)
	X	Conduct the resource management activities consistent with the provisions of the HFQLG Forest Recovery Act	National Forest lands in the HFQLG Pilot Project Area outside Offbase and Deferred Areas, California spotted owl PACs and SOHAs available for resource management activities specified in the HFQLG Forest Recovery Act: Construct defensible fuels profile zones (DFPZs), conduct group selection, and conduct individual tree selection consistent with the HFQLG Forest Recovery Act ROD with the exception of the California spotted owl mitigation measure.to avoid these activities in suitable California spotted owl habitat, including nesting habitat and foraging habitat. Design DFPZ treatments consistent with objectives for DFPZs as described in Appendix J of the HFQLG Forest Recovery Act FEIS. Apply the California Spotted Owl Interim Guidelines as follows: Within strata preferentially selected by nesting owls (selected strata) which are outside of PACs, one commercial entry is allowed during the pilot project. No removal of live trees 30 inches dbh or larger is allowed and at least 40 percent of the basal area and canopy closure is retained in the largest trees available. Within strata utilized, by not preferred for nesting by owls (other strata), one commercial entry is allowed during the pilot project. No removal of live trees 30 inches dbh or larger is allowed and at least 30 percent of the basal area (at least 50 square feet of basal area per acre) is retained in the largest trees available. In both selected and other strata, the largest 4 to 8 snags (dead trees and/or trees expected to die within six months), up to 20 square feet of basal area, per acre are maintained (may be averaged over the harvest unit). The number of snags to be left is dependent on the diameter of snags available for retention. In addition, fuels treatments to remove surface and ladder fuels and protect owl habitat is encouraged. An average of at least 10 to 15 dry tons per acre is retained. Adaptive management is allowed in two situations: (1) When a project-specific biological evaluation demonstrates that the objectives of the CASPO recommendations may be better achieved through an alternative prescription, and (2) when projects are designed as administrative studies and coordinated with the Pacific Southwest Forest and Range Experiment Station (PSW) or an oversight team established for this purpose. On each national forest, administrative studies are limited to no more than two percent of the lands identified as “suitable for timber production” in the Forest Land Management Plans. Pure eastside pine habitat is not considered to be suitable. However, there is a small subset of suitable habitat within the eastside pine type (primarily fairly well-stocked pine stands with a white fir understory). When a project is proposed within this suitable area, the area will be surveyed for owls. Where owls are detected, the area will be managed using the Modified Cumulative Effects Analysis (CEA) process. Design group selection harvests to retain all live trees greater than or equal to 30 inches dbh. Design individual tree selection harvests consistent with the California Spotted Owl Interim Guidelines for retaining large trees, canopy cover, snags, and down logs as described for DFPZ treatments above.

Appendix B: Modeling Outputs and Effects of Alternative Proposed Actions

Introduction

This DSEIS essential used the same modeling and analysis systems used to do the Sierra Nevada Framework Project. Therefore, this appendix will only describe items that were differences from those used to produce the Final EIS for SNFPA and the reader can find a more detail description of the techniques and assumptions in Appendix B of the FEIS. This analysis, like the in FEIS, is based on a multi-scale and hierarchical modeling approach to analyze the various alternatives developed by the management team. The analysis was accomplished by using a suite of different optimization, visualization, and simulation models to make projections of how the National Forests within the Sierra Nevada Framework region would respond to different disturbances and management events. Due to the complexity and magnitude of this project, the use of multiple models and development of a analytical support system was required to integrate these processes.

The analysis uses data from forest inventory plots, GIS-based resource inventories, vegetative simulation models, operations research decision analysis techniques, and mapping and data visualization tools to support decision-making. Vegetative prescriptions, management activities, and disturbances events are assigned to specific types of land areas (allocations), and the resulting effects on forest outputs and environmental consequences including vegetation structure, wildlife suitability, and fuel conditions are evaluated.

Results from the modeling effort are only approximations of what to expect when any given alternative is implemented. The objective of modeling is to aid planners in estimating likely future consequences of alternative management actions. A choice between alternatives can be made even though the model may lack precision in describing specific attributes of a given alternative. The planning models used have many internal limitations and parameters. These limitations must be considered when analyzing the outputs and effects projected by these models. Once the EIS models were formulated, a number of sensitivity tests were made to check for reasonableness and to make calibrations to coefficients whose development was not based on empirical data or where development of coefficients was not exactly straightforward. Since many of the Standards and Guidelines are not easily put into a mathematical formulation, it is important that model outputs satisfy the intent of the ID Team and the Standards and Guidelines themselves. This was done through an iterative process involving all of the ID Team and key management members and those responsible for developing the component models.

The analysis process was based on close integration of GIS, fire simulation, and forest inventory data with traditional vegetative growth and yield modeling in essential a single process which allows users to:

- define spatially explicit management allocations, constraints (S&Gs), and priority units using GIS technology,
- link these management units to forest inventory information,
- simulate and evaluate hundreds of thousands of possible management activities, while tracking over 50 resource variables through time,
- provide insight on policy or management alternatives with different sets of desired future conditions and standards and guides,

- select an “optimal mix” of treatments to achieve a balance among a broad range of often conflicting management goals and desired future conditions,
- evaluate alternative management strategies using sophisticated mapping, reporting, and data visualization or rendering tools,
- links various resource data and models into an integrated system, enabling analysis of both terrestrial and aquatic ecosystems, and
- declare spatially explicit delineation of areas where land management activities and resource protection measures will be meaningfully.

National Forest Land and Resource Management Plans and amendments to these plans are themselves models of land management through time. The plans attempt to simulate actions (for example, management activities such as vegetative intervention and road decommissioning) and project environmental consequences from these actions. Not all resources and factors can be considered and addressed in a plan. Plans and analysis attempt to that mimics, in a simplified fashion, what might happen through time. Similarly, none of the models described below can perfectly represent the “real world” situation. Therefore, the results from these models are only approximations to the outcomes that can be expected if the alternatives are put into action. The purpose of these models is to provide insight and clarify knowledge. In many cases, these approximations are fully adequate to compare alternative strategies or reject those that are not feasible or reasonable. A choice between alternatives can be made even though the models may lack the precision to describe the behavior of specific attributes of a given alternative. In other words, the models reveal relative differences between alternatives more reliably than absolute differences. These models make projection of future conditions under a given set of assumptions and not prediction of future conditions.

Changes in Analysis, Assumptions, and Input Data from FEIS-ROD

Changes have occurred mainly from two sources. First there has been newer information. This includes the following:

- Three new forest inventories were used to updated the Eldorado, Tahoe, and Plumas National Forests statistics. This update included new vegetative type maps and new FIA inventory plots used to describe the mapping units.
- Each of the National Forests within the bioregion updated the Great Gray Owl, Spotted Owl, and Goshawk Protected Activity Center [PAC’s] maps. These updates and refine of boundaries is consistent with direction and definitions found in the ROD.
- Each of the National Forests within the bioregion also updated Wildland Urban Intermix [WUI] maps that are based on locally determined defense and threat zones using the standards and guides defined in the ROD. This is a refine is consistent with ROD direction and are subject to further refinement at the project decision level.
- Updated potential treatment unit maps to include work already done such as partial completion of the HFQLG DFPZ’s and group selection commitment.

Second, there have been changes in the way certain effects have been analyzed. This includes the following changes in assumptions used to model effects and consequences:

- Revised map representation of SPLAT’s. In the FEIS, SPLAT’s were defined by the upper 2/3 of the slopes and the south facing aspects and comprised about 1/3 of the lands in need of fuel treatment. Now the SPLAT's are defines to resemble more of a herring bone or tread pattern which more closely match that defined under the Finney Fire strategy defined in the Appendix J of the FEIS. Through intensive fire and watershed analysis on Cosumnes Watershed of the Eldorado National Forests, it was found that pattern define in FEIS did not produce the desired outcomes and that a more efficient approach was needed from a fire fuels perspective. A pattern more evenly distributed over the landscape was found to be more efficient when model with FARSITE and FLAMMAP fire simulation models.

- We have used detailed watershed analysis to update our fire effects coefficients that are used in our region-wide models. Thorough 2 watershed analysis, we have found that we can design our units so that they still me fidelity to Finney strategy and avoid intersection with PAC in over two thirds of the cases. These and other findings were used to coefficient used to describe the related effectiveness of different layout strategies and treatment intensities.
- Cost and Values derived from fuel treatment such as treatment cost and values derived from timber and biomass were updated to reflect current conditions.

Modeling of Alternatives

The alternatives were modeled using two different complementary processes before subjecting the alternatives to analysis. First, a spatially explicit depiction of the allocations and potential or permissive prescriptions were developed using GIS. Second, outputs from the potential prescription data and vegetation inventory were simulated through vegetative growth models to project changes in vegetation over time in a non-spatial manner. While this analysis implies that outputs and treatments can be assigned to specific acres, in reality they cannot be directly tied to spatially specific acres for two reasons. First, the analysis includes the effects from future projected disturbances such as wild fire which cannot be predicted to a specific acre, and the Forest Service planning process reserves to the project level planning the decision where and when specific acres will be treated. What this model does is assign treatments to candidate areas and test to see if there are sufficient degrees of freedom to accomplish the treatments within the allocation and Standard and Guidelines developed for a specific area.

The first step in the modeling process was developing the land allocation layers for each alternative. The resulting product is a spatially explicit map describing potential treatment or prescriptions that can occur on each acre of the landscape. Candidate acres for treatment are selected. This was done by applying rules to land allocations and their overlaps with each other in each alternative. Once the allocation maps were created and treatments determined for each alternative, potential outputs were generated by the use of scheduling models such as SPECTRUM or FELDSPAR. The table below shows generic prescriptions that are permitted on different land allocations used in this analysis to compare difference between the existing ROD and the proposed action to modify this ROD. The following modeling rules apply to the table below.

- For each alternative, each land allocation has an associated prescription.
- The prescriptions are listed by number and any **lower** number prescriptions are permitted exception for the special case prescription like for plantations.
- A particular land area may be affected by or be a member of several land allocations. When overlapping allocations occur, the lowest number prescription in the set applies and any prescription with lower number is allowed.
- There are except to this general rule where intersections of specific allocation require a high level of treatment (override or trump) such as with defense zone.

- Overrides only apply to code of equal to higher than the lowest code in the intersection set. If the specific area intersects an allocation with lower code than in the exception set, then the lower code applies.

Table Ba. Land Allocations and Prescription Assignment.

	S1-ROD				S2-PROPOSAL				
Data Layers, Grids, Coverages	**Regular**	**Exceptions - Highest Value - Overrides Regular Rx**			**Regular**	**Exceptions - Highest Value - Overrides Regular Rx**			
		HFQLG Grp Sel	**Defense Zone**	**Threat Zone**		**HFQLG Grp Sel**	**HFQLG DFPZ's**	**Defense Zone**	**Threat Zone**
Classified Areas [in preemptive order]									
Administrative - Ownership	0				0				
Wilderness existing and Proposed	1				1				
Lands unavailable for veg treatment e.g. RNA's, SIA's	1				1				
Northwest Forest Plan	1				1				
Wild and Scenic Rivers	25				25				
Protected Activity Centers									
Great Gray Owl - 50-ac	25				25				
Spotted Owls - 300-ac	25		40		25			33	31
Goshawks- 200-ac	25		40		25			33	31
Willow Flycatchers - occupied	1				1				
Amphibian	1				1				
Home Range Core Area for Spotted Owls	40	90	50		60	90	70	80	
Old Forest Emphasis Areas	40	90	50		60	90	70	80	
Slope Break									
Greater than 35-% slope 4d,5m.5d.6	25	90	50		60	90	70	80	
Greater than 35-% slope other CWHR's	25	90			25	90	70		
Treatment Zones									
Urban Core	1		n/a	n/a	1			n/a	n/a
Defense Zone	50	90		n/a	90	90	70		n/a
Threat Zone	40	90	n/a		60	90	70	n/a	
Fuel Treatment Zone	40	90	n/a	n/a	60	90	70	n/a	n/a
Area Treatments					60	90	70		
Vegetative Type-Condition									
Non-Forested Types	3				3				

Data Layers, Grids, Coverages		S1-ROD Regular	S1-ROD Exceptions - Highest Value - Overrides Regular Rx: HFQLG Grp Sel	S1-ROD Exceptions: Defense Zone	S1-ROD Exceptions: Threat Zone	S2-PROPOSAL Regular	S2-PROPOSAL Exceptions - Highest Value - Overrides Regular Rx: HFQLG Grp Sel	S2-PROPOSAL Exceptions: HFQLG DFPZ's	S2-PROPOSAL Exceptions: Defense Zone	S2-PROPOSAL Exceptions: Threat Zone
Plantations		15	n/a			15	n/a	n/a		
Brush-Shrubs		16	n/a			16	n/a	n/a		
Woodlands		17	n/a			17	n/a	n/a		
Eastside Pine Type		40	90	50		67	90	70	80	
CWHR's										
	4m	25	90	50		60	90	70	80	
	4d	40	90	50		60	90	70	80	
	5m	25	90	50		60	90	70	80	
	5d, 6	30	90	50		60	90	70	80	
	other CWHR	40	90	50		40	90	70	80	
Residual										
Already Treated Lands to fuel Standards		9	90			9	90	70		
Unassigned forested lands		99				99				
Treatment Units in preemptive order										
Group Selection										n/a
	Admin Study Only	90				90			n/a	n/a
	Lands open to Group Select	n/a				90			n/a	n/a
DFPZ's [HFQLG's only]										
	Completed	9		n/a	n/a	9			n/a	n/a
	Planned	40		50		70			n/a	n/a
Defense Zone Segments		50		n/a	n/a	90		70	n/a	n/a
DFPZ's [other than HFQLG]		40		50		60		70		
SPLAT's		40		50		60		70		
Area Treatments		40		50		60				

Note: Codes ending in '0' such as 60 means that all the 60's code could apply such as 61, 63, 65, etc.

Table Bb. Summary of Prescription used in this Analysis.

No Treatment	
Rx-0	Let Grow - No Treatments planned
Rx-3	Non Forested - Does not need a treatment
Rx-5	Wildfland Fire Use
Rx-9	Already Treated - in Desired Fuel state for at least 10-yrs.
Specialized Rx's - not limited to usual S&G's	
Rx-11	Incidential Removal including road construction
Rx-12	Restoration of Species [I.e. Aspen]
Rx-13	Reforestation
Specialized Rx for Unique Forest types and/or conditions - *not limited to usual or general S&G's*	
Rx-15	Plantations and Non-Stocked
Rx-16	Brush and Shrubs
Rx-17	Woodland-Hardwood types [live oaks] Note: Montana Oak-Conifers are treated similar to Conifers.
Fuel Reduction and Thinning	
Rx-20	6-inch Hand
Rx-25	Prescribed Burning Only
SUMMARY OF GENERIC PRESCRIPTION UNDER THE ROD	
Fuel Reduction and Thinning	
Rx-30	12-inch DBH, 10% Canopy reduction, 50% retention
Rx-40	20-inch DBH, 20% Canopy reduction, 50% retention
Rx-50	30-inch DBH, no- Canopy reduction, no- Canopy retention
Salvage	
Rx-101	Limited Salvage - dead only
SUMMARY OF GENERIC PRESCRIPTIONS UNDER THE PROPOSAL	
Fuel Reduction and Thinning	
Rx-31	Mechanical Treatment - Surface and Ladder Fuels only
Rx-33	Mechanical Treatment - Surface, Ladder, and Crown Fuels only
Rx-35	Mechanical Treatment - Surface, Ladder, and Crown Fuels + Forest Health - Drought resistance
Rx-41	Mechanical Treatment - Meets Fuels and Health applies to other CWHR classes - non habitat
Rx-51	Mechanical Treatment - Meets Fuels and Health + suffiicient volume to meet operability thresholds
Rx-55	Mechanical Treatment - Meets Fuels and Health + suffiicient volume & thin above 2-storied
Rx-61	Mechanical Treatment - up to S&G limits - 50/50
Rx-63	Mechanical Treatment - up to S&G limits - 50/40
Rx-65	Mechanical Treatment - Meets Fuels and Health Eastside Pine [4m-6] & HFQLG-DFPZ's
Rx-67	Mechanical Treatment - Meets Fuels DFC's and HFQLG-DFPZ's desires- alternate
Rx-71	CASPO for HFQLG [based in Interium Guidelenes]
Rx-81	Defense Zone Fuels and Revenue
Rx-91	Thin down to 30-inch - GAP Regen
Salvage	
Rx-103	Limited Salvage dead and dying
Rx-105	Salvage up limits defined by S&G's in units > 10-acres

Table Bc. Summary of Prescription Modeling Rules and Specifications for S2-Proposal.

	Rx Name	Rx Specification - Summary
Rx-01	**Letgrw**	No Treatment - let grow - only effected by natural disturbances
Rx-25	**RxFire**	Prescribed Fire Proxy Use 4 ft flame length from FOFEM, std crown ratio reduction and use 80% multiplier Follow-up treatment 2 ft flame length with 25% multiplier w/in same period 20 year maintenance cycle with 4 ft flame RxFire maintenance
Rx-15	**PlntTh**	Prescriptions for Plantations and Non Stocked Lands on commercial sites Thinning in Plantation including Release, PCT, and Commercial Thin only binding constraint is 30-inch DBH Maximum size of tree to be removed
Rx-31	**MechT1**	Proxy for Surface and Ladder Fuels only Use 5 ft flame length from FOFEM to determine trees to remove, No canopy ratio reduction Limit remove up to 20-inch DBH Follow-up treatment 2 ft flame length with 25% multiplier w/in same period 20 year maintenance cycle with 4 ft flame RxFire maintenance
Rx-33	**MechT2**	Proxy for Surface, Ladder, and Canopy Fuels only Use 6 ft flame length from FOFEM to determine trees to remove, No canopy ratio reduction Limit remove up to 30-inch DBH Follow-up treatment 2 ft flame length with 25% multiplier w/in same period 20 year maintenance cycle with 4 ft flame RxFire maintenance
Rx-41	**OthThn**	Fuel Thinning designed for in CWHR size Class 2,3 all density and Size Class 4,5 and density of S or P only Treat stand using MechTI Rx treatment without follow-up RxFire then: thinning proportionally for stem >9.9 until you bind on one of the following constraints is reached 1 30-inch DBH Maximum size of tree to be removed 2 50 sq.ft of Basal Area or 1/2 existing, whichever is larger Follow-up treatment 2 ft flame length with 25% multiplier w/in same period 20 year maintenance cycle with 4 ft flame RxFire maintenance
Rx-51	**MaTbr1**	Fuel Thinning Rx for doing minimum Timber-Value Treat stand using MechTI Rx without follow-up RxFire

	Rx Name	Rx Specification - Summary
		If Canopy Closure [pcNet] after MechT1 is > 40%, thinning proportionally for stem >9.9 until one of the following constraints is reached. 1 3,000 board feet of sawlogs 2 40% Minimum BA retention in Largest Trees 3 30-inch DBH Maximum size of tree to be removed 4 5-% Minimum Retention in Post Canopy Cover in Stem 6-24-inch DBH 5 40% Canopy Closure Minimum Retention 6 30-% Maximum canopy reduction If Canopy Closure [pcNet] after MechT1 is less than <40%, **STOP** Follow-up treatment 2 ft flame length with 25% multiplier w/in same period 20 year maintenance cycle with 4 ft flame RxFire maintenance
Ex-55	**2Stord**	Fuel Thinning Rx for generating two storied stand and Value Treat stand using MechTI Rx without follow-up RxFire If Canopy Closure [pcNet] after MechT1 is > 40%, thinning from above [from upper most diameter permitted - 30-inches or BA retention] until one of the following constraints is reached. 1 40% Minimum BA retention in Largest Trees 2 30-inch DBH Maximum size of tree to be removed 3 5-% Minimum Retention in Post Canopy Cover in Stem 6-24-inch DBH 4 40% Canopy Closure Minimum Retention 5 30-% Maximum canopy reduction If Canopy Closure [pcNet] after MechT1 is less than <40%, **STOP** Follow-up treatment 2 ft flame length with 25% multiplier w/in same period 20 year maintenance cycle with 4 ft flame RxFire maintenance
Rx-61	**MaThn1**	Rx for doing the 50/50 Rule - 50% Goal is invoked Treat stand using MechTI Rx without follow-up RxFire If the intial Canopy Closure is >= 50% [pcNet] and the after MechT1 treatment CC is > 50%, thin proportionally for stem >9.9 until one of the following constraints is reached 1 40% Minimum BA retention in Largest Trees 2 30-inch DBH Maximum size of tree to be removed 3 5-% Minimum Retention in Post Canopy Cover in Stem 6-24-inch DBH

	Rx Name	Rx Specification - Summary
		4 50% Canopy Closure Minimum Retention
		5 30-% Maximum canopy reduction
		If Canopy Closure [pcNet] after MechT1 is less than <50%,
		STOP
		If Canopy Closure prior to treatment is < 50% and [pcNet] after MechT1 is greater than 40%
		thin proportionally for stem >9.9 until one of the following constraints is reached
		1 40% Minimum BA retention in Largest Trees
		2 30-inch DBH Maximum size of tree to be removed
		3 5-% Minimum Retention in Post Canopy Cover in Stem 6-24-inch DBH
		4 40% Canopy Closure Minimum Retention
		5 30-% Maximum canopy reduction
		If Canopy Closure [pcNet] after MechT1 is less than <40%,
		STOP
		Follow-up treatment 2 ft flame length with 25% multiplier w/in same period
		20 year maintenance cycle with 4 ft flame RxFire maintenance
Rx-63	**MaThn2**	Rx for doing the 50/50 Rule and 40% retention floor on CC is invoked
		Treat stand using MechTI Rx without follow-up RxFire
		If Canopy Closure [pcNet] after MechT1 is > 40%, thin proportionally for stem >9.9 until one of the following constraints is reached.
		1 40% Minimum BA retention in Largest Trees
		2 30-inch DBH Maximum size of tree to be removed
		3 5-% Minimum Retention in Post Canopy Cover in Stem 6-24-inch DBH
		4 40% Canopy Closure Minimum Retention
		5 30-% Maximum canopy reduction
		If Canopy Closure [pcNet] after MechT1 is less than <40%,
		STOP
		Follow-up treatment 2 ft flame length with 25% multiplier w/in same period
		20 year maintenance cycle with 4 ft flame RxFire maintenance
Rx-65	**MaThn3**	Option and EASTSIDE PINE option
		Threat stand using MechTI Rx treatment and
		then thin proportionally stems greater than 9.9" until one of the following constraints is reached.
		1 30% Minimum BA retention in Largest Trees
		2 30-inch DBH Maximum size of tree to be removed

	Rx Name	Rx Specification - Summary
		Follow-up treatment 2 ft flame length with 25% multiplier w/in same period 20 year maintenance cycle with 4 ft flame RxFire maintenance
Rx-67	**MaThn4**	Revised DFPZ Rx for HFQLG only Threat stand using MechT2 Rx treatment and then thin proportionally stems greater than 9.9" until one of the following constraints is reached. 1 30% Minimum BA retention in Largest Trees 2 30-inch DBH Maximum size of tree to be removed 3 40% Canopy Closure Minimum Retention if Canopy Closure [pcNet] after MechT2 is less than <40%, **STOP** Follow-up treatment 2 ft flame length with 25% multiplier w/in same period 20 year maintenance cycle with 4 ft flame RxFire maintenance
Rx-71	**CASPO2**	Thinning under CASPO Interium Guidelines Separate stands into Select and other strata and treated according the CASPO interim guidelines
Rx-81	**DefZon**	Thin to 60% of Normal Basal Area Threat stand using MechT2 Rx without follow-up RxFire and then thin proportionally stems greater than 9.9" until one of the following constraints is reached. 1 30-inch DBH Maximum size of tree to be removed 2 60% on nornmal basal area defined in BA for Def Zone worksheet If Basal area is below this amount after MechT2, then **STOP** Follow-up treatment 2 ft flame length with 25% multiplier w/in same period 20 year maintenance cycle with MechT1 Rx
Rx-91	**Gap-30**	Thin Down to 30-inch DBH and GAP Regeneration Treat stand using MechT2 Rx without follow-up RxFire and then thin proportionally stems greater than 9.9" until one of the following constraints is reached. 1 30-inch DBH Maximum size of tree to be removed Follow-up treatment 2 ft flame length with 25% multiplier w/in same period 20 year maintenance cycle with MechT1 Rx

ARC-INFO GIS software, with seamless resource and administrative layers across the Sierra Nevada region. Most of the analysis was conducted with GRID layers at a 30-meter pixel resolution. The development and meta-data documentation of the individual layers used for alternative modeling and consequences analysis are provided in detail in digital form in the project file as part of the planning record. A more detailed, technical description of the automated analysis process can be found in the administrative record of the FEIS. Essential the same process was used for this draft SEIS.

Overview of Scheduling Model Process

Once the allocation maps are completed for each alternative, analysis areas are developed based on:

1. vegetative types and stand condition,
2. management areas or zones which define where activities are permitted, modified, or restricted,
3. constraints and/or desired conditions that control or affect activities, and
4. other terrain or management designations where the same activity under the same prescription can be expected to produce significantly different output or where the full range of biologically possible management actions may not be appropriate.

Acres in each unique analysis area are assumed to respond in the same way to management activities and produce the same outputs and effects regardless of their location on the forest. This process allows the users to formulate and re-formulate alternative sets of management goals and desired resource conditions by creating new Analysis Areas, new management objective, and new Standards and Guidelines.

All of the alternatives have the same management areas but different management directions in the form of objectives, intents, desired conditions, and standards and guidelines that apply. *Allocation* defines where activities are allowed, need to be modified, or are prohibited. *Standards and Guidelines* define limits or requirements that must be met before any activities occur. *Objectives or Goals* are usually defined as a set of desired conditions we wish to obtain from doing the activities and provide the means of selecting which treatments should occur from the suite allowed by the land allocation. In addition, for some of the alternatives, management direction includes *prioritization* of treatments, such as treating a minimum of 75-% of the initial fuel treatment acres within Wildland Urban Intermix [WUI]. When conflicts occur, Allocations override Standards and Guidelines that override objectives that override Priorities. A summary of the names of the individual layers used in modeling alternatives and analyzing consequences, and the sources of the data for them, are included in the following table. For complete documentation of the individual layers see the GIS data documentation CD used for FEIS.

Forest inventory data are then linked to each strata type. The Region 5 Forest Service Forest Inventory and Analysis (FIA) inventories and databases provided sampling data to describe the various map strata. Data associated with a stratum type includes a tree list of species, dbh, height, live-crown ratio, tree sampling weight, etc. and plot location information. This data is the input used in the GAMMA, a forest vegetative simulator, based on coefficients from Forest Service Forest Vegetation Simulator (FVS) model (formerly known as PROGNOSIS). The growth simulators allow us to grow the tree portion of FIA plots and apply various management treatments and disturbances (fire, insects, disease, etc.) agents to these stands and see the effects on growth and inventory over time. Data output from these simulators include yield and habitat tables that show how various attributes of the stand change over time based on growth, treatment, and disturbance. Also these data allow us to classify the vegetation into classes such as Wildlife Habitat Relationship categories, old growth rankings, and different types of specialized habitat. Over 50 variables are tracked over time by prescription. Information on regeneration success in plantations (summarized by Silvicultural Accomplishment Report), estimates of insect and disease activities based on change detection, and analysis of the last 30-years of fire history were used to develop the mortality model used in GAMMA and SPECTRUM. The Forest Service Timber Sale Program Information

Reporting System (TSPIRS) and State of California Board of Equalization timber value databases were used to estimate values and costs.

A realistic growth and yield model enables is essential to predicting change in forest condition and assess impacts of harvesting operations. There are numerous growth and yield models used to project forest growth and mortality. For this planning effort, we used the GAMMA model developed by Wilson, (1999) which is a variation of Forest Service FVS model. GAMMA uses the FVS growth coefficients but manages the data and prescription scripts or key words differently. The GAMMA simulator permits the user to track inventory, growth, mortality, and removal through time. The GAMMA visual basic programming language options also permits the tracking of derived variables such as habitat components, snags, dead and down, etc. GAMMA is an individual tree growth and yield model for Sierra Nevada. The simulator processes stands of trees plot-by-plot and then aggregates the results as strata averages at end of each time period. Prescription "scripts" are developed to simulate management through time. These strata-prescription regimes are written to simulate how vegetative manipulation could occur in these types. The simulator uses forest inventory [FIA] plots data as input. The tree lists from inventory plots for each vegetation strata are run separately to develop yield streams particular to each vegetation strata. The results are stored in relation database for used by other programs. The GAMMA model defines the range of biologically feasible activities that can be considered as management options throughout the planning process.

SPECTRUM Analysis

The linear programming (LP) model SPECTRUM (formerly known as FORPLAN) developed by K. Norman Johnson was selected as the primary analysis tool for National Forest scale planning. SPECTRUM is used to analyze different management alternatives. It optimizes the attainment of desired future conditions (DFCs) by scheduling activities that move existing conditions toward the desired ones. This schedule is subject to meeting standards and guidelines (S&Gs), to imposed disturbance regimes, and to projected outputs and effects of time as a result of implementing the alternative. The major strength of this model is its ability to model the effects of constraints on outputs over time. The major limitations of this model, as related to this project, are that activities and projected effects are not spatially explicit (activities area assigned to AA's and not specific acres) and that inputs and outputs are deterministic (do not consider variability and uncertainty in input data).

SPECTRUM was used to determine the most cost effective schedule of treatments that would produce desirable outputs and effects given the objectives (DFCs) and the constraints (S&Gs) of each alternative. The IDT provided a range of management alternatives. A SPECTRUM analysis was then made for each alternative by each National Forest within the SNFP region. All the information needed for SPECTRUM analysis was entered into a set of data files. The SPECTRUM matrix generator then created a matrix of rows and columns that is then solved by linear programming software. A report is then generated that is used by the IDT to display environmental consequences of the alternatives. Reports can be made for the entire planning area or for individual attributes defining the analysis areas or management prescriptions.

The ID Team specified which set or suite of prescriptions is "permitted" on each acre of land by alternative. The development of these specifications has been described above. This specification was used in SPECTRUM to limit the kind of activities that could occur within a specific land allocation within a specific alternative. Each numerical code was placed in a hierarchy wherein activities represented by lesser numbers were allowed, but activities with greater numbers were not. This assignment was mapped and overlaid with vegetative strata and other layers to form unique analysis areas within the SPECTRUM model for each alternative.

Constraints or Standards and Guidelines (S&Gs) are parameters added to the linear programming model that limit the means of optimizing goals stated in the form of objective functions. An example of constraint was to limit to total amount of initial treatment to less than 120,000 per year for all alternatives analyzed. In many cases these constraints are imbedded in the yield and wildlife habitat tables such a meeting canopy closure requirement or not exceeding a diameter limit.

A number of different output reports can be generated from the SPECTRUM system. The major portion of the report contains information on scheduling of activities, the amount of outputs and effects produced by these activities, and financial costs and values produced. Examples of items reported include: acres of mortality by different severity classes, volume of timber removed by various products, acres of the forest in various CWHR or Old Growth states, costs of different management activities, and the inventory, growth/mortality, and removal of various stand attributes such as snags, dead and down material, and large trees.

The “CWHR” System

The University of California, Berkeley, and the California Department of Fish and Game developed the California Wildlife Habitat Relationships System (CWHR) (Airola 1988, Mayer and Laudenslayer 1988, Zeiner et al. 1990) CWHR system cooperatively. It contains information relating the habitat preferences of 643 terrestrial vertebrate species found in California. It allows a user to predict the occurrence and habitat quality for any of these species based upon the presence of specific habitat types and habitat elements. It includes species notes for each species including life history, range maps, legal status, habitat requirements, etc. In addition, it contains ARC/INFO GRID habitat suitability models for more than 30 species, a dBase compatible database and data-query system, and a series of books describing the system. The WHR habitat system, like many other vegetation classification systems, uses the combination of plant species, size, and density to classify habitats. The CWHR system then uses this habitat classification to identify habitat relationships between the vegetation found in an area and wildlife which is likely to be found in that area.

WHR habitat classification predictions are incorporated into GAMMA vegetative growth and yield model, allowing us to predict the habitat changes over time associated with different vegetative and silvicultural regimes. Tying these habitat predictions back to the wildlife species database would provides one basis for determining how planned forest management activities are likely to influence wildlife populations in the future. This information could then be used to evaluate whether or not a given mix of management activities is likely to meet a specific set of desired conditions related to wildlife habitat.

Experience has shown that many critical or important wildlife habitats should be modeled with a specific habitat model rather than trying to crosswalk a generalized model, such as CWHR, to predict those habitats. Therefore, species such as California spotted owl, goshawk, key fur bearers, etc. uses models and classification systems based upon documented habitat use and local observations instead of trying to use CWHR to understand forest management implications. Where possible, a “chain of evidence” approach leads to better habitat models. This method uses several different ecosystem and vegetative characteristics to identify habitat.

Modeling Disturbance from Wildfire, Insect, and other Pest

The purpose of disturbance prescriptions is to model disturbance and recovery from wildfire. To simulate fire, the tree-killing algorithms in the First Order Fire Effects Model (FOFEM) are used. The factors that affect tree mortality in FOFEM include scorch height and bark thickness. Gamma calculates a scorch height based on user-supplied flame-length. Bark thickness is calculated using Region 5 species-specific equations found in the Wessin, Sornec, and Icasca variants of the Forest Vegetation Simulator source code. Three conditions of fire severity, with associated recovery options, are modeled in the internal disturbance prescriptions lethal fire, mixed lethal fire, and non-lethal fire. Each of these are described in the Appendix B of FEIS.

Canopy Cover

Tree crown cover is the ground area covered by a tree crown, as delimited by the vertical projection of its outermost perimeter. The aggregate expression of crown cover is canopy density, or canopy cover.

Canopy cover (expressed as a percent of area) is being afforded ever-increasing importance in terms of evaluating and classifying forest stands and in defining or setting parameters for stand treatments. Values for percent canopy cover can be derived in many ways and are often used interchangeably, without considering that different approaches may result in widely, even wildly divergent values. Three general derivation methods are photo-interpretation, a variety of direct field-based measurements, and a variety of calculation methods based on field measurements of tree diameter.

Analysis for this EIS is based on a calculation method using field measurement of tree diameter called PcNetAvg, with one exception. If the S&G's required at canopy cover be measured by Photo Interpretation [PI], when a regression equation was used to convert to that scale based on related plot and PI collected over the last 10-years in the region.

The notion of percent cover or canopy cover is being afforded ever-increasing importance in terms of evaluating and classifying forest stands and in defining or setting constraints on stand treatments. Percent cover is a component of the CWHR and LSOG habitat classification systems and is used to constrain tree removal in various thinning. Values for percent cover come from many sources; from photo-interpretation using the Li-Strahler model, from densiometer measurements in conjunction with wildlife habitat studies, from inventory data processing. I've been concerned for some time that percent cover values from these sources are being used interchangeably, without considering that these 3 approaches may result in widely, even wildly divergent values for percent cover.

John B. Collins and Curtis E. Woodcock compared percent cover values developed from photo-interpretation with values determined by processing forest inventory data (Collins, J.B. and Woodcock, C.E. Revising Estimates of Canopy Cover Derived from the Li-Strahler Model. Tech. Pap. No. 12. Boston University Center for Remote Sensing). To obtain estimated percent cover from field data, they used techniques analogous to those found in "How to estimate canopy cover using maximum crown width/dbh relationships" by Ralph Warbington and Jack Levitan for "non-overlapping" cover. First the proportion of land covered by tree crowns is calculated based on dbh-crown width relationships (I call this "gross" cover). Then the gross cover values is adjusted for crown overlap, assuming trees are randomly located:

RandomCover = (1 - 1/EXP(GrossCover)) * 100

Where gross cover is the sum of individual tree crown area's (or mean tree crown area times number of trees) divided by 43560. This formulation has the desirable property of limiting percent cover estimates to less than 100%. Gross cover for stands quite often exceeds 100%. The correction equation is:

*AdjustedCover = -0.0319 + 1.151 * RandomCover*

In other words, percent cover values derived from photo-interpretation are about 15% higher than corresponding estimates derived from inventory data processing, assuming random tree spacing.

Gamma, an application developed for the Sierra Nevada Framework growth & yield analysis, uses a procedure named pcNetAvg to adjust Gross Cover to percent cover values used for habitat classification and for stand treatments which are defined, in part, by residual percent cover requirements. It calculates a weighted average between Random Cover and Gross Cover, and then averages the intermediate value with Random Cover. pcNetAvg values do not exceed 100% for any feasible values of GrossCover.

OUTPUTS and Multi-PRODUCTS Yields generated by the Analysis over the planning horizon

(1) ***SWTB* - MBF** Scribner, for all commercial conifers >= 9.9" dbh to 6-inch top (that would exclude species like juniper, bristlecone pine, etc. ... Net volume (minus defect) is determined using Levitan average defect equations.

(2) BIOM - BDT's - calculate total stem cuft volume for all live trees, convert to **BDT's**

(3) ***FUEL* -** slash and ground fuels, including litterfall and limbs. under development...cuft of down material **< 3.0"** diam, converted to **BDT**...for the grid inventories I can initialize point-by-point from woody debris inventory, for other inventories (Tahoe and plantations), we'll have to make a guess... amount at any point in time is result of initial value minus decay plus input from treatment or snag/limb fall.

(4) ***D&DW* -** cu ft of all dead material (standing and down) > 3.0"; initialize from inventory, level based on interaction of decay rate and new mortality -- reduced during treatment or fire by specified percentage...Proposed methodology is: for trees with dbh > 3.0", for larger material calculate a cone segment from lg diam = dbh to sm diam = 10", assuming taper is 1" in 8 feet... this will be approximate wood volume (not including bark)…then convert to **BDT**.

(5) ***%COV* - Percent canopy cover** using regressed value to represent PI crown cover consistent with the mapping and plot work described above.

(6) **SNAG - number of standing snags** > 15" dbh and minimum height of 20-ft; initial levels from inventories, level at any period is balance of snag fall predicted by exponential decay model (with half-life specified by species and/or dbh classes) and new mortality.

(7) ***HDWD* - number of hardwood trees** > 15" dbh

(8) ***LGTR* - number of large trees -** minimum dbh is 30" westside, 24" eastside, 21" in alpine types (A and L)

(9) ***VLTR* - number of very large trees -** minimum dbh is 50" westside, 40" eastside, 32" alpine

(10) **CWHR -** 15 categories in 3 age dependent tables, same as draft except calculation method slightly modified... still uses pcNetAvg for percent cover [same as in the draft]. Measured in **acres**.

(11) ***RANK* -** SNEP Old growth ranks 1-5 [same as in the draft] Measured in **acres**.

Contrast between Alternative S1-the ROD and S2-the Proposal for the purpose of modeling

There are significant differences in Management Prescriptions [series of activities over time designed to meet a desired condition or objective] between S1- the ROD and S2- the Proposal. The major differences are contrasted below:

1. Absolute upper diameter limits of S1 [6-inch, 12-inch, and 20-inch limits] have been replaced with variable diameters limits based on retain either 30 or 40 percent of the existing basal area in the largest trees [CASPO rules]. The 30-inch DBH maximum rule is retained. In most cases, except for previously thinned stands, the basal area retention rule will lead to lower limits than the 30-inch maximum. The Gamma model is used to calculate these diameter limits.

2. Under alternative S-1, canopy cover limits are considered absolute and treatments cannot bring the stand below these values even if the stand existing condition is at the "cusp" and a minimum desired fuel treatment would bring the stand below this standard. Under alternative S-2, the model is allowed to do a fuel treatment related to removing minimum requisite surface, ladder, and crown fuels to meet the fuel objectives in most all cases even if it requires a stand to go slightly below the canopy standard. Canopy cover requirements are in effect after the fuels have been treated and are apply to any additional removal of trees to meet other objectives such as cost off-set. This difference is significant since large portion of the acres to be treated are at the 40-50-percent canopy class and have a high probability of not being able to receive an adequate fuel treatment because of the canopy standards and guides.
3. Alternative S-1 does not allow trees greater than 6-inches to be removed if the stand has a canopy cover of 40 to 49.9 percent if mechanical means are to be used. Trees with diameter less than 6-inches are allowed to be removed. The reason for this exception is that stems less than 6-inch do not count in the determination of canopy closure.
4. The other major significant requirement in Alternative S1 and not in S-2, is the requirement to leave approximately 20 percent [it ranges from 10-25 percent of a stand depending on land allocation] must be left untreated if mechanical treatment is to be used. These portions of a stand have no fuel reductions and reduce the effectives of the Landscape level treatments on fire behavior.
5. Alternative S-1 and S-2 apply the standards to different scales. The S-1 alternative applies its standard and guides to the stand while S-2 is usually applied to the treatment units that are made up of multiple standards where the same general treatment method [like mechanical treatment] is applied. The major effect of average basal area retention standards over a number stands is usually to reduce the upper limit. The problem with averaging canopy cover over multiple stands is that a number of individual stands could go below the limits while the average of all stands is higher than the standard.
6. Only alternative S-1 requires that inclusion of 1-acre or larger of 5M, 5D, and 6 CWHR in stands that have be classified into CWHR classes other than those mentioned above to a more restrictive set of standards. There is no such required in Alternative S-2.
7. Under S1, only group selection designed for the administrative study is proposed for treatment. Under S2, both the acres proposed under the administrative study units plus sufficient number to meet the full acres proposed under the Act is programmed for S-2 (approximately 42,500 acres).

Just as there are significant differences between the alternatives, there are key similarities between them including the following:

1. They both use the same land base and allocations including the same treatment units over the next 20-years with two minor exceptions. This explains why the treatment schedules and many of the effects are quite close when comparing S1 to S2. There are two notable exceptions: First there is the difference in group selection defined above and second there is the difference of about 23,000 acres of PAC and treatment unit intersected acres cannot be treated, even with burning, under S-1 because of the 5/10 percent PAC by number entry rules under the ROD. Under S2, the rule is measured by acres enter and not by number PAC's entered and is not binding.
2. Both alternatives use the same logic to assign which acres need to be prescribed burned and which are candidates for mechanical treatment.
3. Neither alternative pushes the its treatment units to the maximum amount of product that could be produced except for group selection, but rather that which meets it desired condition measured at a landscape level. This means for the purpose of this analysis, the Defense zone prescriptions did

not remove all stems up to 30-inch even though it would have been permitted under the rules. Rather to remove stems and alter surface fuels to meet a desired fuel condition for the zone. Both alternatives optimize at landscape rather than at stand level as related to selection of prescription to be used.

4. Both alternatives attempt to do 75 percent of treatments within the next 5-years within the WUI while completing the HFQLG work by 2009.

In summary, what distinguishes the alternative from each other is the intensity of the activities that can occur in each of the treatment areas. The treatment area and allocations are for most part identical.

Qualifications of Planning Team Analysts

The planning analysts for this project included Klaus Barber, Bernie Bahro, Laurie Perrot, Don Yasuda, and Mike Gertsch, Andy Taylor, and Ken Wright. Each has over 15-years experience in the field. Together they have presented over 50 technical papers related to the kind of analysis described below, and all are considered experts in their fields. All have experience with Forest Plans, the FEMAT report and Northwest Forest Plan, and the revised draft environmental impact statement (RDEIS) for Managing the California Spotted Owl. Allocation mapping was accomplished by a team led by Dr. Joanne Fites-Kaufman, a forest ecologist with more than 10 years experience. Dr. Fites-Kaufman was also a principal scientist for the Sierra Nevada Ecosystem Project.

Appendix C: Consistency Review of Documentation for the Sierra Nevada Forest Plan Amendment

Sensitivity of the environmental consequences analysis of the Environmental Impact Statement to proposed changes

The Interdisciplinary Team (IDT) reviewed the January 2000 Final Environmental Impact Statement (EIS) for the Sierra Nevada Forest Plan Amendment (SNFPA) to determine whether the environmental consequences that were described there adequately assessed the effects of implementing the proposed changes in the Supplement Environmental Impact Statement (SEIS). This document describes the issues for which the effects of implementing the proposed changes were adequately addressed in the EIS. No additional analysis will be needed for these issues. This document also describes the issues for which additional effects analysis is needed for changes being considered in the SEIS.

Sources: FEIS, Volume 1 – Chapter 1, Purpose and Need and Volumes 2 and 3 - Affected Environment and Environmental Consequences and SEIS, Chapters 1 and 2 – Purpose and Need, and Alternatives Including the Proposed Action.

Chapter 1 – Purpose and Need
FEIS, Volume 1, Chapter 1, pages 1-18

The purpose and need for the actions analyzed in the FEIS was to address five problem areas: protect, increase, and perpetuate old-forest ecosystems; protect and restore aquatic, riparian, and meadow ecosystems; address emerging fire protection and fuels reduction needs; control the spread of noxious weeds; and restore and sustain lower westside hardwood forests. The proposed actions in the SEIS are refinements to measures that were considered in the FEIS to address these issues. Implementation of the proposed actions would not modify or change any of the analytical assumptions or conclusions of this chapter.

Chapter 2 – The Alternatives
FEIS, Volume 1, Chapter 2, pages 1- 202

The FEIS considered eight action alternatives that represented different approaches for addressing the five problem areas. These alternatives are brought forward in the draft SEIS. The proposed changes in the SEIS are consistent with the range of management options that were evaluated in the eight alternatives in the FEIS. The consequences of the proposed changes are also within the range of consequences described for the eight action alternatives in this chapter.

Chapter 3 – Affected Environment and Environmental Consequences
FEIS, Volumes 2 and 3, Chapter 3, Parts 1-6

In most NEPA documents, Chapter 3 provides a description of the affected environment and Chapter 4 discusses the environmental consequences of the implementing the alternatives under consideration. The FEIS for the SNFPA combined these discussions into a single chapter.

Landscape Patterns and Vegetation Dynamics (Part 3.1, pages 47-100)

This section contains key concepts, definitions and measures for describing the Sierra Nevada landscapes. These were reviewed for applicability to the SEIS. This information is unchanged and applicable to the draft SEIS.

Hardwood Ecosystems (Part 3.3, pages 162-190)

Sustaining Westside hardwood ecosystems was identified as one of the five problem areas of the FEIS. A detailed assessment of hardwood ecosystems is presented in this section. A conservation strategy for lower westside hardwood ecosystems and standards and guidelines specific to management of hardwood species were developed and implemented in the ROD. Chief among the standard and guidelines are retention requirements for large hardwood ecosystems. The proposed changes in the SEIS would not alter the existing strategy or change the specific hardwood standards and guidelines. Therefore, there is no need to complete further assessments on impacts to hardwood ecosystems.

Soil Quality (Part 3.8, pages 355-368)

The effects of management activities from the FEIS on soil quality were reviewed and are not affected by new information or analysis contained in the SEIS. The alternatives in the SEIS were also reviewed for potential effects on soil quality. The coarse scale of analysis used in the determination of these consequences in the FEIS is not adequately sensitive to determine differences between the ROD (S1) and the Proposed Action (S2). The treatment acres are the same in these two alternatives. Therefore the consequences are determined to be similar for these alternatives.

Other Forest Products (Part 5.2, pages 396-398)

The FEIS made some general observations on the role of fire and commercial harvesting of non-wood forest products such as cones, ferns and mushrooms. These relationships remain valid. There is no indication that the proposed changes would depart from the assessment in the FEIS. Therefore no additional analysis is warranted in the SEIS.

Mining and Mineral Resources (Part 5.4, pages 417-441)

Environmental effects associated with mining primarily relate to riparian areas. The effects of the proposed action does not change the aquatic conservation strategy. Therefore no additional analysis is warranted in the SEIS.

Scenic Integrity and Landscape Character (Part 5.7, pages 501-505)

The FEIS projected that the emphasis on amenity values in all of the action alternatives would enhance both healthy ecosystems and healthy landscapes. This conclusion also assumes adequate consideration of scenery and landscape character during site-specific planning and implementation. There is no evidence to suggest that implementing the proposed changes would result in conditions that are different than the trends described in the FEIS. No additional analysis is recommended for the SEIS.

Heritage Resources (Part 5.8, pages 510-515)

The FEIS primarily evaluated disturbance acres, wildfire, road construction and road decommissioning relative to impacts on heritage resources. Low impact was projected for all action alternatives. Larger amounts of acreage treated for fuels reduction was favorable to heritage resources management. The proposed changes do not depart from this assessment. No additional analysis is warranted in the SEIS.

Energy (Part 5.9, pages 516-527)

An updated discussion of biomass is included in the SEIS, Chapter 4, Section 4.4.1. Forest Products.

American Indian Rights and Interests (Part 6.5, pages 551-558)

Factors used to assess the environmental consequences of the FEIS alternatives to American Indian rights and interests were based on goals for improving government-to-government relations between the Forest Service and American Indian Tribes. These included coordination and collaboration around fire protection, proactively managing culturally significant plants, providing appropriate access to sacred and ceremonial sites and traditional use areas, and protecting sensitive traditional knowledge. All alternatives in the FEIS contribute to these goals, differing only by the rate at which they are accomplished. The proposed changes do not depart from this assessment and continues the commitment to these goals and to formal consultation protocols. Hence no additional analysis is warranted in the SEIS.

Social Impact Analysis and Civil Rights (Part 6.6, pages 561-567)

The evaluation of social impacts, environmental justice, and civil rights considers people of color, gender-based groups, civic and community organizations, students and youth, the elderly poor and working class communities, farm workers, other labor groups, and communities. The environmental consequences of the proposed changes relative to employment and income are discussed in the SEIS in Chapter 4, section 4.4. Land and Resource Uses. Effects associated with risks of wildfire are also discussed in Chapter 4, section 4.2. Physical and Biological Resources. The FEIS discussion on poverty and childhood education remains valid and is not affected by the proposed changes. The ability to gather plant materials and to obtain fuelwood is not affected by the proposed changes. Communication and outreach to communities is maintained with the proposed changes. Hence no additional analysis is appropriate for the SEIS.

Species of the Sierra Nevada (Volume 3, Part 4)

The FEIS provides a very detailed evaluation of the current status and projected future trends for plant and animal species in the Sierra Nevada. The report provides a hierarchical description that begins with effects analysis for broad taxonomic groups and species groups associated with major life zones. More detailed assessments are then provided for a much smaller number of individual and groups of species with special status. Changes in preferred habitat types were evaluated for all species and changes in finer-scale attributes were assessed for individual and groups of species using the California Wildlife Habitat Relationships System. Species viability assessments were then completed by species experts for each of the action alternatives. The viability assessments were based the best available information about the species such as life history, status, and habitat relationships. This information was used to project the historic and projected environmental effect on each species or group, using five possible outcomes to describe relative habitat and population conditions. The FEIS was careful to advise the reader that there remains a high degree of uncertainty regarding the habitat relationships, status and trend, population viability, and other attributes of the vast majority of species in the Sierra.

Broad-Scale Trends (Part 4.2, pages 1-70)

The FEIS first provides an analysis to estimate the broad-scale trends in 450 vertebrate species. Trends in preferred habitat types were projected for each species. A cluster analysis was used to compare relative changes in habitat value for eight groups of vertebrate species over time. This analysis suggested that habitat changes are similar across alternatives. This is, in part, because the forested area containing large trees and other habitat improvements will increase in all alternatives. There is no evidence to suggest that implementing the proposed changes would result in conditions that are discernibly different from the trends described for all alternatives in the FEIS. Accordingly, additional analysis to evaluate the proposed changes in the SEIS would not be helpful.

Birds. Next, The FEIS described projected broad trends for major taxonomic groups of vertebrates. All of the alternatives produced similar results for terrestrial land birds where about half of the species would experience more suitable habitat in future, a quarter would have less habitat, and the habitat for the remainder would not change appreciably from current conditions. Implementing the proposed changes would not be expected to produce appreciably different trends from those described in the FEIS. So, additional analysis is not necessary for the group of terrestrial land birds.

The FEIS also compared projected habitat trends for 26 species of raptors in the Sierra Nevada national forests for the eight alternatives. Suitable habitat was projected to have slight increases or decreases (5 percent or less) for twenty one of the species and results were similar for all alternatives. Large habitat reductions of 15-85 percent were projected for 5 species, but all of these are typically found in lowland areas away from the national forests. Similar trends were projected for each species across the alternatives. There is no evidence to suggest that implementing the proposed changes would result in raptor habitat conditions that are discernibly different from the trends described for all alternatives in the FEIS. No addition work on this subject is recommended.

Amphibians. The assessment for amphibian species did not compare projected changes in habitat across alternatives. Instead, the affects of the alternatives on amphibian fauna of the Sierra was described in four ways.

1) A subgroup of species inhabiting foothill habitats was identified as the group at highest risk. This group lives primarily on private land and is largely unaffected by national forest management.
2) A second group was noted to be heavily affected by conditions that would not be influenced by actions considered in the FEIS. Trends for these animals are predominantly impacted by fish stocking, hydroelectric developments, pesticides, and similar actions. The proposed actions should not result in conditions for these species that are different that those that were consistently described for all alternatives in the FEIS. No additional analysis is recommended for this group of amphibians.
3) The relationships of some amphibian species was related to the Aquatic Management Strategy in the FEIS. Changes to the AMS are not being proposed in the SEIS, so no additional analysis for these species is warranted.
4) A list of individual species that are affected by grazing, vegetation management, and other activities being considered in the FEIS was identified. These species were the subject of more detailed evaluation that followed later in the document. These species are addressed individually later in this report as well.

Fish. The FEIS assessed the effects of the alternatives on fish species. The assessment concluded that alternatives which use landscape analysis to identify and protect special aquatic management areas (refuges, diversity areas, etc) consistently provided the best conditions for fish species at risk. The proposed changes in the SEIS would not alter the existing strategy for completing landscape analysis or protecting special management areas through the Aquatic Conservation Strategy. Therefore, there is no need to further evaluate potential impacts of the proposed actions on these species.

Reptiles. The FEIS made some very general observations about the effects of management on reptiles, but it did not identify any impacts that varied substantial among the alternatives. There is no evidence to suggest that implementing the proposed changes would depart from the assessment in the FEIS. Therefore, no additional analysis is warranted in the SEIS.

Assessments for Individual Species

Endangered, Threatened, and Proposed Species (Part 4.3, pages 1-65)

Mammals

Sierra Nevada Bighorn Sheep

New information regarding the Sierra Nevada Bighorn Sheep was recognized after reviewing the SNFPA FEIS affected environment and querying Forest Service personnel familiar with the species. It has been determined through survey information (Gary Milano, pers. Comm.) that the sheep population in the Sequoia-Kings National Park /Inyo National Forest is conservatively estimated at over 250 animals and possibly as high as300 animals. A new herd was discovered and is wintering west of the Sierra Crest at Charlotte Dome/Bubbs Creek in Sequoia-Kings National Park in the Kings River watershed: approximately 18-19 animals were observed on January 20, 2003. The Wheeler Ridge herd is now of sufficient size to allow the California Department of Fish and Game to capture and transplant sheep to supplement the Mt. Baxter herd during the 2003 spring season.

The FEIS compared the effects of the alternatives on population outcomes for the Sierra Nevada bighorn sheep. The document noted that population changes in this declining species are primarily influenced by disease past from domestic sheep and predation. The proposed changes do not include any changes in sheep grazing practices and should not influence predation on the species. Therefore, there is no need to complete further assessments on impacts to the Sierra Nevada bighorn sheep.

Birds

Bald Eagle, California Condor, and Southwestern Willow Flycatcher

The assessment in the FEIS did not result in identifiable differences among the alternatives for these species. There is no evidence to suggest that implementing the proposed changes in the SEIS would result in conditions that are discernibly different from the trends described for all alternatives in the FEIS. Therefore, there is no need to complete further assessments on impacts to these species.

Fish

Little Kern Golden Trout, Piaute Cutthroat Trout, Lahontan Cutthroat Trout, Modoc Sucker, Warner Sucker, Shortnose Sucker, Lost River Sucker, Spring Run Chinook, Winter Run Chinook, Central Valley Steelhead

The FEIS compared the projected habitat and population outcomes for each of these species. No differences were described across the range of alternatives for any of the species. Implementing the proposed changes in the SEIS would not be expected to produce appreciably different trends from current conditions as described in the FEIS. Therefore, no additional analysis is needed for this group of fish species.

Owens Tui Chub, Cowhead Lake Tui Chub, Owens Pupfish, Sacramento Splittail

These species do not occur on the national forests in the Sierra Nevada. Therefore, they were not analyzed in the FEIS and do not warrant assessment in the SEIS.

Forest Service Sensitive Species (Part 4.4, pages 1-276)

Mammals

Pacific Fisher

The pacific fisher has been extirpated from much of it’s historic range in the Sierra. The species is known to be sensitive to management that disturbs old forests. Because the proposed changes in the SEIS would make adjustments in forest management practices in the Sierra Nevada, this species will be the focus of additional analysis.

Marten

The FEIS evaluated the effects of the alternatives on marten habitat. Marten habitat was projected to remain broadly distributed across its current and historic ranges under all alternatives. Proposed changes in the SEIS will be analyzed to determine if there is any change in this trend.

Sierra Nevada Red Fox

This species is suspected to be significantly sensitive to intensive sheep grazing in meadows. The Sierra Nevada red fox can also be impacted by heavy recreation use of its remote high-elevation habitats. The proposed changes in the SEIS would not make adjustments to sheep grazing or wilderness management practices in the Sierra Nevada. Thus, this species should not be the focus of additional analysis in the SEIS.

Wolverine

The wolverine was evaluated in the FEIS where it was described as a very rare occupant of remote boreal areas. Wolverine populations are most influenced by trapping, shooting, and increasing human use of their habitats. None of these factors would be modified under the proposed changes in the SEIS and additional analysis for this species is not recommended.

Pallid Bat and Townsend's Big-Eared Bat

These species were evaluated in the FEIS where they were projected to remain broadly distributed across their current and historic ranges under all alternatives. There is no evidence to suggest that implementation of the proposed changes in the SEIS would result in different conditions for these bat species. Therefore, additional analysis for pallid and Townsend's big-eared bats is not warranted.

Sierra Nevada Snowshoe Hare

The Sierra Nevada snowshoe hare is widespread in North American boreal forests. The species has a small, but sable population in the Sierra where it has probably never been abundant. The FEIS concluded that populations will remain stable with broad to frequently patchy habitat continuing throughout the range. There is no reason to conclude that implementation of the proposed changes in the SEIS would result in appreciably different habitat conditions for the Sierra Nevada snowshoe hare. Therefore, additional analysis for this species is not necessary.

Birds

California Spotted Owl

The California spotted owl can be significantly influenced by forest management. Because the proposed changes would make adjustments in forest management practices in the Sierra Nevada, this species will be the focus of additional analysis in the SEIS.

Northern Goshawk

The northern goshawk can also be significantly influenced by forest management. Because the proposed changes would make adjustments in forest management practices in the Sierra Nevada, this species will also be the focus of additional analysis in the SEIS.

Willow Flycatcher

This species is known to be potentially impacted by livestock grazing. Because the proposed changes would make adjustments in grazing management in the Sierra Nevada, this species will be the focus of additional analysis in the SEIS.

Greater Sandhill Crane

The greater sandhill crane inhabits the northeastern Sierra during spring and summer where it breeds in open, freshwater wetlands and shallow marshes. The species has recently been shown to be increasing in eastern Sierra counties. The FEIS concluded that the most significant impacts to the greater sandhill crane are associated with livestock grazing in meadows and wetlands. The proposed changes in the SEIS do not change the management direction evaluated in the FEIS. Therefore, no additional analysis is necessary

California Yellow-billed Cuckoo

Only one breeding population of yellow-billed cuckoos occurs on national forest land in the Sierra Nevada. That population inhabits the South Fork Wildlife Area on the Sequoia National Forest where it is not directly affected by actions considered in the FEIS or SEIS. Therefore, additional analysis for this species is not appropriate.

Amphibians

Foothill Yellow-Legged Frog

The foothill yellow-legged frog occurs primarily in lower elevation riparian zones where it has been extirpated from about two-thirds of its historic range. The most significant factors that influence population trends are water diversion, urbanization, mining, grazing, recreation and pesticide use. The FEIS noted that the Forest Service has little influence on most of the land and activities that are important for this species. It therefore concluded that all of the alternatives produced similar habitat conditions for the foothill yellow-legged frog and would not put the species at risk. The proposed changes in the SEIS will be analyzed to see if they produce similar results.

Mountain Yellow-Legged Frog

This species inhabits high-elevation lakes, ponds, and streams in the Sierra where it is susceptible to impacts from predation by exotic fish, pesticides, and trampling from pack stock and recreation. The FEIS noted that the key to conserving this species lies in provisions of Aquatic Management Strategy that was included in some alternatives and adopted in the ROD. The proposed changes in the SEIS would not modify the AMS. The proposed changes also would not result in appreciable changes to pack stock and recreation management within the habitat for the mountain yellow-legged frog. The SEIS will analyze these assumptions.

Yosemite Toad

The Yosemite toad is a species for which specific grazing management direction was adopted in the ROD. The proposed changes in the SEIS would modify this direction. Accordingly, the effects of the proposed changes on the Yosemite Toad will be evaluated in the SEIS.

Cascade Frog, Northern Leopard Frog, and Spotted Frog

These species inhabit the streams and ponds of the northern Sierra. Like many other amphibians, they are thought to be affected by a variety of factors including water diversions, predation by fish, pesticide applications, and grazing. The Aquatic Management Strategy was developed for some alternatives in the FEIS to conserve important aquatic resources, including at-risk amphibians. The AMS was adopted in the ROD and would not be altered by the proposed changes under consideration in the SEIS. The SEIS will verify this analysis.

Batrachoseps relictus species complex and other sensitive salamanders

The FEIS described a small list of salamander species that occur in small areas of the Sierra. The status and habitat relationships for these species is poorly understood, but they are thought to be particularly sensitive to disturbances in damp terrestrial habitats. The FEIS concluded that it is not possible to assess the effects of management on these species at the scale of the Sierra Nevada. Assessments for these animals are completed through the biological evaluation process at the project level. This condition would continue if the proposed changes were adopted and there is no need to attempt further evaluations at the scale of the Sierra in the SEIS.

Fish

Goose lake Lamprey, Fall Run Chinook, Eagle Lake Rainbow Trout, Volcano Creek Golden Trout, Goose Lake Redband Trout, McCloud River Redband Trout, Warner Valley Redband Trout, Lahontan Lake Tui Chub, Goose Lake Tui Chub, and Hardhead

The FEIS provided two tables that projected the effects of management on these species over 50 years. One table estimated the effects implementing the alternatives on each species habitat within the Sierra Nevada national forests. The other forecast relative population trends for the animals over the same time period. The tables suggest that none of the alternatives would result in a significant change from the current condition for any species. There is no evidence to suggest that implementing the proposed changes in the SEIS would result in conditions that are recognizably different from the trends described for all alternatives in the FEIS. Therefore, further analysis for these species would not be helpful.

Reptiles

Northwestern Pond Turtle

The FEIS concluded that the effects of implementing the alternatives on this species would be very similar to those described for the foothill yellow-legged frog (see above). Because additional analysis for the foothill yellow-legged frog is not warranted, no additional assessment work will be done for Pond Turtle.

California Legless Lizard

California legless lizards are typically found in damp soil along streams in chaparral, pine-oak, and deciduous woodland communities. Populations are strongly influenced by noxious weed introductions, trampling from grazing, and off-road vehicle disturbances. Modifications to these risk factors are not expected in key habitats for this species under the proposed changes in the SEIS. No additional analysis is therefore warranted for the California legless lizard.

Sierra Night Lizard and Panamint Alligator Lizard

These are highly isolated species that is very poorly understood. Impact assessments can be most usefully done during the planning for individual local project. Attempts to evaluate status changes for these animals at the scale of the Sierra Nevada would not be useful.

Coast Horned Lizard

The Coast horned lizard inhabits undisturbed sandy areas on the lower west side of the Sierra Nevada. Primary risk factors include development and road building, introduction of noxious weeds, and off-highway vehicle use. The risk factors should not be influenced by management changes being considered in the SEIS. Therefore, additional analysis for this species would not be instructive.

Moderate and High Vulnerability Species and Species of Concern (Part 4.5, pages 1-133)

Individual Species Assessments

In this section, the FEIS described a variety of individual species that have special habitat relationships that make them vulnerable to land management programs on the national forests of the Sierra Nevada. The species are:

Mammals	Birds	Fish
White-tailed Hare	Band-tailed Pigeon	Rough Sculpin
Pygmy Rabbit	Black Tern	Kern Brook Lamprey
Spotted Bat	Forster's Tern	Pacific Lamprey
Small-footed Myotis	Swainson's Thrush	Kern River Rainbow Trout
Silver-haired Bat	Yellow-Breasted Chat	Owens Sucker
Long-legged Myotis	Bank Swallow	Mountain Sucker
Hoary Bat	Long-eared Owl	Eagle Lake Tui Chub
Fringed Myotis	Olive-sided Flycatcher	Pit River Tui Chub
Western Mastiff Bat	Mt. White-Crowned Sparrow	Sacramento Hitch
Western Red Bat		Owens Speckled Dace
Long-eared Myotis		Pit River Roach
	Amphibians	Red River Roach
	Mount Lyell Salamander	San Joaquin Roach

The FEIS evaluated the effects of implementing the alternatives by providing two tables for each species. The first table projected qualitative trends for the species and their habitat on national forests in 50 years. The second table estimated the cumulative effects on population trends after five decades. For all of these species, the FEIS projected that the future condition did not differ from the existing condition under any alternative. Therefore, these species were not found to be sensitive to any of the management programs being considered in the FEIS. There is no evidence to suggest that the proposed changes in the SEIS would produce different outcomes for these animals. Accordingly, additional analysis for these species would not be helpful.

Aquatic Invertebrates

The biology of aquatic invertebrates is poorly understood in the Sierra Nevada. A total of 21 species of aquatic invertebrates were evaluated for viability in the FEIS. The aggregate of species are susceptible to adverse impacts from dams and diversions, livestock grazing, and alteration of riparian habitat. The species are also dependent on perennial sources of high-quality water and are believed to be representative of many other aquatic invertebrate species in the region.

The FEIS compared programs for managing risk factors across alternatives. The document noted that the proposed changes in the SEIS would not change current programs for hydroelectric development or the Aquatic Management Strategy in the ROD. However, the FEIS correlated habitat value for three species of aquatic invertebrates with the grazing practices in important habitats for the willow flycatchers and at-risk amphibians. It also related aquatic invertebrate viability to the overall grazing utilization standards in each alternative. Using this assessment, the FEIS concluded that Alternatives 2, 8, and Mod 8 would provide the greatest assurance for viability of aquatic invertebrates and Alternatives 3, 4, and 7 would provide the least assurances. The proposed changes would alter current grazing utilization standards and grazing practices in some important wildlife habitats only when rangeland conditions are moving in an improved trend. For this reason, the SEIS will not include additional analysis on aquatic invertebrates.

Reptiles

The FEIS identified 15 species of reptiles that are either management indicator species or have moderate vulnerability to national forest management. The species were divided into three groups according to their habitat associations. All of the species were judged to be widespread and none is threatened at this time. The FEIS concluded that none of the alternatives would affect the viability of any species. There is no evidence to suggest that implementing the proposed changes would depart from these findings. Therefore, no additional analysis is warranted in the SEIS.

Vascular Plants, Bryophytes, and Fungi (Part 4.6, pages 1-75)

New information on recently identified plants is included in Chapter 3, Affected Environment.

The FEIS evaluated the effects of the alternatives on 135 species of threatened, endangered, and sensitive species of vascular plants, bryophytes, and lichens. The species were subdivided into 14 ecological guilds according to their habitat associations. Many of the species were included in multiple guilds. The species within each guild were described and the risk factors for associated species were listed. The risk factors were then used to assess the effects implementing the alternatives on each species for 50 years. Assessments were completed for overall habitat and population trends. This analysis demonstrated that 12 species are sensitive to the variation in management that would be provided by some of the alternatives. For the remaining 123 species, there were no projected changes from current habitat or population conditions for any alternative.

For the twelve species that were sensitive to national forest management, all were judged to have adequate protection to avoid the loss of viability and a trend towards listing in all of the alternatives. There is no evidence to suggest that implementing the proposed changes would depart from these findings. Therefore, no additional analysis is warranted in the SEIS.

List of Preparers

The following is a list of contributors to this draft supplemental environmental impact statement. Numerous other people have also contributed in many ways to this document. Their help is greatly appreciated.

Interdisciplinary Team

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Dr. Ahuja is currently a Province Air Quality Specialist for the Forest Service supporting air program for the eight northern national forests in California. He has worked for the Forest Service for twenty years in the Southwest and Pacific Southwest Region in various positions. He holds a Ph.D. from the University of California at Davis. He also has Air Quality Certification from University of California (Extension) Davis. He has written various technical documents and papers for Forest-wide and Region-wide use.

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Berni received his A.S. in Forestry from the University of New Hampshire’s Thompson School of Applied Science in 1979. He graduated in 1989 with a B.S. in Science Education from Oregon State University. In 1993 he graduated from Technical Fire Management, an advanced study program in Wildland Fire Science that is accredited through Colorado State University. Berni has been working for the U.S. Forest Service for 23 years, with twenty years in wildland fire suppression. Berni was the District Fire and Fuels Specialist on the Placerville Ranger District, Eldorado National Forest. and is currently an Assistant Regional Fuels Specialist – Planning He has worked in three regions, on three National Forests and at a Forest Service Experiment Station. He also participated in the Sierra Nevada Ecosystem Project as an Associate Contributor and co-authored two publications.

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Bill was born in San Francisco and raised in the East Bay. He received a BS degree in Forest Management from the University of California, Berkeley. His positions in the Forest Service include five years on the Mendocino NF in timber sale preparation, four years on the Stanislaus NF in sale administration, five years on the Klamath NF as resource officer, and three years in timber management and 20 years in planning and environmental coordination on the Tahoe NF.

Dave Bakke - Region 5 Pesticide-Use Specialist

Since 1999, the Region 5 Pesticide-Use Specialist, responsible for review and direction of pesticide uses in the region. BS, Forestry, UC Berkeley. 24 years experience with the Forest Service. Completed the Region 5 Advanced Course in Forest Ecology and Silviculture in 1983. Certified R5 Silviculturist since 1986. Completed the Forest Service National Advanced Pesticide Management Training course in 1991. From 1978 to 1998, on the Eldorado National Forest, with last fifteen years as a silviculturist, at both the District and Forest level. Since 1991, involved in the completion of NEPA planning documents involving herbicides, including the writing of site-specific herbicide risk assessments. In current position, have been involved with appeals, litigation, NEPA input, and technical article review and writing involving pesticides.

Klaus Barber - Analysis Core Team Coordinator

Education: BS in Forest Management from University of California, Berkeley and an MBA from University of Southern California. Experience: Klaus has 34-years with the Forest Service as District Timber Management Officer, Timber Planner, Forest Land Use Planner, Regional Biometrican, and presently Regional Operational Research and Management Science specialist. He has worked on special projects, such Redwood Park Expansion, Gang-of -Four Spotted-Fisheries Analysis, FEMAT, and Cal Owl. He is the co-developer of CIA, ELMO, and RELM computer models.

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Teresa has a BS degree in wildlife biology. She has worked in wildlife for 15 years; with the Forest Service for 13 years.

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Lisa has worked as a soil scientist for the last 14 years. She is currently in the Region 2, Regional Office. Prior to that she was the Forest Soil Scientist on the Inyo National Forest and has also worked in Sacramento for US Bureau of Reclamation (1992- 1995), the Tahoe National Forest (1989-1992), and for the Plumas National Forest (1988). She has a MS Soil Science from University of California, Davis and a BA in General Agriculture from Washington State University.

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Joanna Clines - Botanist

Joanna has Bachelor of Arts degree in biology from California State University, Fresno. She earned a Master of Arts degree in plant ecology from CSU Fresno, and completed a thesis on the reproductive ecology of the rare shrub *Carpenteria californica*. Prior to joining the Forest Service as a seasonal botanist in 1988, Joanna gained experience in wildlife and fisheries biology working for California Department of Fish and Game and Kings River Conservation District, and in botany with the California Energy Commission. Joanna has worked as the Forest Botanist for the Sierra National Forest for 10 years. Other duties on the Sierra National Forest include coordination of the noxious weed program and the research natural area program.

Steve Eubanks - Forest Supervisor

Born and raised around Salem, Oregon. BS in Forest Engineering from Oregon State. Transportation Planner on Mt. Hood Forest, Project Planner on Estacada District, Mt. Hood (west side Cascades); Tmbr Mgmt Assistant, Tieton District, Wenatchee NF (east side Cascades); District Ranger, Bear Springs RD, Mt Hood (east side Cascades); District Ranger, Blue River RD, Willamette NF (west side Cascades); Leader, National Recreation Strategy, Rec, Wilderness, Heritage Staff in WO; For. Supvr, Chippewa NF, Minnesota; For. Supvr, Tahoe NF. Significant interaction with Ecosystem Researchers, starting at Tieton District and continuing to present, but maximized during my Blue River Ranger job because HJ Andrews Exp. Forest located on that district. Our work was foundation for a lot of developments in forest ecosystem mgmt in the west. Extensive experience in prescribed and wildland fire.

Jo Ann Fites - Kaufman – Ecologist

Jo Ann has a PhD in Forest Ecosystems at the University of Washington, a M.S. in Forest Resources at the University of Georgia, and a B.S. in Biology at Humboldt State University. She has worked for the Forest Service for 13 years as a botanist, vegetation ecologist and fire ecologist in northern California.

Mike Gertsch - Wildlife Biologist

Mike has a B.S. in Wildlife Management from Humboldt State University. He is the Forest Service liaison to the U.S. Fish and Wildlife Service. He has also worked as a district biologist on the Umpqua National Forest and zone biologist on the Idaho Panhandle NF and served as Klamath Province FWS/FS liaison for implementation to the Northwest Forest Plan. He is the Acting Regional TES Program Manager. He has been with the Forest Service for 29 years.

Dave R. Gibbons - Director Ecosystem Conservation Staff

Dave has spent the last 28 years working for the Forest in varying capacities. First, as a Forest fisheries biologist and resources staff on the Tongass National Forest in Alaska, and next as the Regional Program manager for fisheries in the Pacific Southwest and Alaska Regions. After the Exxon Valdez oil spill in March 1989, he worked for 2 years as the Forest Service representative on the Department of Justice intertidal damage assessment studies, nest as the first Restoration Director of the Exxon Valdez Restoration Program for 2 years and for four remaining years as the Forest Service representative on restoration team and Exxon Valdez Trustee Council. From 1998 to 2003, he held the position of Forest Supervisor the Chugach National Forest and since early 2003, as the Director of the Ecosystem Conservation Staff for the Pacific Southwest Region. Dave has authored many papers dealing with land and aquatic resource management issues including his doctoral dissertation on streamside and aquatic habitat risk assessments. He has a B.S. Degree from the University of Washington in Fisheries, an M.S. Degree from the University of Connecticut in Water Quality/Fisheries and a Ph.D. in Fisheries from the University of Washington.

John Kliejunas - Regional Forest Pathologist

Masters of Forestry degree, University of Minnesota; Ph.D. in plant pathology, University of Wisconsin, Madison. Seven years research experience on native forest decline, University of Hawaii. Forest pathologist, State and Private Forestry staff, in Pacific Southwest Region since 1979. Regional forest pathologist since 1986.

Tina Mark - Wildlife Biologist

Tina received a B.A. degree in Zoology from U.C, Berkeley in 1978. She is currently the Assistant Forest Biologist on the Tahoe NF. Tina began her career in wildlife biology with the Forest Service in 1980. In addition to wildlife biology, Tina has worked in the fields of range, timber, and sensitive plants. She has worked on the Inyo NF, R-5 Regional Office, Humboldt-Toiyabe NF, and the Tahoe NF. She has been on the Tahoe NF since 1995.

Gary Milano

1994-Present: Wildlife Biologist, Inyo National Forest

1979-1994: Biological Technician (Wildlife) Bend Ranger District, Deschutes National Forest, OR

1977-1979: Wilderness Ranger, Beartooth and Washakie Wilderness Areas, Shoshone National Forest, WY

1976: Biological Technician (Wildlife), Lander Resource Area, Bureau of Land Management, Lander, WY

1975: Biological Technician (Wildlife), White River Resource Area, Bureau of Land Management, Meeker, CO

1974: B.S. Degree, Wildlife Management, University of New Hampshire.

Kathleen Morse - Interdisciplinary Team Leader

University of Montana, B.A. Natural Resource Economics

Graduate work at University of Washington School of Marine Affairs

Research Specialist -Battelle Pacific Northwest Laboratories 1988-1989

Operations Research Analyst - Modoc National Forest 1989-1991

Regional Economist, Lead Staff to Governor's Timber Task Force - Region 10 1991-2000

District Ranger - Inyo National Forest 2001-present

Team Member - Sierra Nevada Forest Plan Amendment Review Team, 2002

Richard Perloff - Wildlife Biologist

Degree: B.S. Biology 1982; Lewis and Clark College, Portland OR. Five years experience in field research on a number of vertebrate species. Fourteen years experience as a Forest Service wildlife biologist, Job **Title:** Wildlife Biologist - Mammoth/Mono Lake Ranger District, Inyo National Forest.

Laurie Perrot - Writer/Editor

Degree: B.S. in forestry, University of California, Berkeley. Work Experience: Writer/editor for the Sierra Nevada Forest Plan Amendment Draft and Final Environmental Impact Statements and the Herger-Feinstein Quincy Library Group Forest Recovery Act Supplemental Draft Environmental Impact Statement. Laurie worked on the Plumas National Forest as a NEPA Planner for 10 years, preparing environmental analyses and leading interdisciplinary teams. She spent 4 years with the U.S, Environmental Protection Agency Regional Office in San Francisco as an environmental specialist in the pesticides regulatory program.

Brent Roath – Forest Soil Scientist

Brent has a B.S. in Soil Science from Oregon State University. He has a total of 26 years experience as a Soil Scientist on the Angeles, Boise, Six Rivers and Sierra National Forests. He has been on the Sierra National Forest since 1987.

Cindy K. Roberts - Wildlife Biologist

Cindy Roberts has an Associate degree in Animal Science from Yuba College, and a Bachelor of Science degree in Biological Sciences and a Masters degree in Wildlife Conservation from California State University Sacramento. She has been working for the USDA Forest Service for 12 years on two different forests within Region 5. As a District Biologist, Cindy has managed Wildlife, and as positions changed, Botany and Fisheries responsibilities as well. Cindy’s duties have also included Forest Fish and Wildlife Program responsibilities and Acting Forest Wildlife Biologist.

Gary Rotta - Wildlife Biologist

Gary holds a Bachelor of Science in Wildlife Management from Humboldt State University. He has worked as a Forest Service Wildlife Biologist on the Plumas National Forest since 1978. Gary is responsible for program planning and budgeting, project coordination, planning, implementation and monitoring for wildlife issues on the Mt. Hough Ranger District. He is currently an Associate Faculty Instructor for Introduction to Fisheries and Wildlife at Feather River Community College in Quincy, California.

Sheri Smith - Supervisory Entomologist

Sheri graduated with a B.S. in Biology and Entomology in 1986 from Utah State University, Logan, UT. Graduated with a Masters in Entomology and Statistical Analysis from Utah State in 1988.

Started working for the Forest Service in Ogden, UT in 1988. Transferred to Redding, CA with the Forest Service in 1990. Worked as an entomologist covering northwestern CA for 1 year and then transferred to Sonora, CA in 1991. Worked as an Entomologist covering the Southern Sierra Nevada through 1994. Transferred to Susanville, CA in 1994. Currently, she works for the State and Private branch of the Forest Service and is the Supervisory Entomologist and Forest Health Protection Specialist covering northeastern CA.

Phil Strand - Fisheries biologist

Phil has been Fisheries Program Manager for the Sierra and Sequoia National Forests since 2000. He has a B.S. in Forest Sciences from University Washington and has been with the Forest Service for 26 years.

Andy Taylor - Forest Analyst

BS and MS Forest Management from Michigan State University.

Forest analyst for the Mendocino NF since 1980.

Member of the Cal Owl EIS team.

Member of the analyst core team for the SNFPA and SNFPA review.

Forest GIS coordinator for the Mendocino NF since 1995.

Gary Thompson - Fuels Coordinator

Gary is currently in the Region 5, RO as the Fuels Coordinator. He has 30 years in the Forest Service. He was on the Sierra NF from 1979-2002 as the District Fire Management Officer, TMO, and Silviculturist. He was certified in Region 5 as a Silviculturist in 1977.He received a BS in Forestry from Humboldt State University in 1974.

Craig Wilson- Wildlife Biologist

Craig graduated with a B.S. degree in Wildlife and Conservation Biology from the University of Nevada Reno. Craig is currently the District Wildlife Biologist on the Sierraville Ranger District of the Tahoe National Forest. Craig has worked as a wildlife biologist with the Forest Service for eight years.

Kenneth A. Wright - Forest Analyst

Education: B.S. in Forest Science, M.S. Watershed Management Humboldt State University. Experience: Ken has 26-years experience with the Forest Service as Planning Hydrologist, District Soils Scientist/Hydrologist, Forest Planner, and is currently the Forest Analyst on the Six Rivers National Forest (1992 to Present). He has worked as an analyst on the Six Rivers National Forest Plan, Northwest Forest Plan, California Spotted Owl Plan, and the Herger-Feinstein Quincy Library Group EIS.

Don Yasuda Assistant Resource Officer/Wildlife Biologist

Don is currently on the Pacific RD, Eldorado NF He has 16 years experience as a Wildlife Biologist, all at Pacific RD (1987-present) He received a B.S. degree, in Wildlife and Fisheries Biology, from UC Davis, in 1987 He is a Certified Wildlife Biologist, a member of The Wildlife Society a Region 5 representative on the California Interagency Wildlife Task Group (2002-present) the Region 5 co-representative (1999-present) and National co-chair (2003-present) on the Natural Resource Information System (NRIS) Fauna module User Board.

Project Support

Gary Chase – DSEIS Layout

Gary has an A.A. degree in Forestry from Lane Community College in Eugene Oregon. He has worked for the Forest Service for 28 years; mostly on the Shasta-Trinity National Forest. His current work revolves around web site development and document publishing.

Monica Johnson - Business Management Assistant

Monica Johnson accepted a transfer to the USDA Forest Service in 1999 and is assigned as Business Management Assistant to the Public Use & Facilities (PUF) and Acquisition Management (AM) staffs. Previous work assignments include the Navy Supply Center, Oakland; Navy Public Works Center, San Francisco Bay and Engineering Field Activity West, San Bruno.

Heidi Valetkevitch - Public Affairs Specialist

Heidi is assigned to the Forest Service's national headquarters in Washington, DC, where she serves as the national media officer in the Office of Communication. Heidi was detailed to the Sierra Nevada Framework Review Team and the Public Affairs and Communications Office as a communications coordinator.

Wendy Yun - Executive Assistant and Administrative Liaison

Wendy joined the ranks of the Forest Service in the summer of 1992. Before accepting her current position with the Sierra Nevada Framework for Conservation and Collaboration, she worked as a hydrologist on the Tahoe National Forest. She holds a Bachelor’s Degree in Biophysics from the University of California at Berkeley.

Distribution List

The lists that follow show tribes, federal, state, and local government agencies, elected officials, libraries and individuals who will receive the draft Supplemental Environmental Impact Statement for the Sierra Nevada Forest Plan Amendment.

California and Nevada Tribes

- Alturas Rancheria, CA
- American Indian Council of Mariposa, CA
- Antelope Valley Paiute Tribe, CA
- Benton Paiute Reservation, CA
- Berry Creek Rancheria, CA
- Big Pine Band of Owens Valley, Paiute-Shoshone, CA
- Big Sandy Rancheria Western Mono (Monache), CA
- Big Valley Rancheria Pomo and Pit River, CA
- Bishop Reservation Paiute-Shoshone, CA
- Blue Lake Rancheria, CA
- Bridgeport Indian Colony, CA
- Buena Vista Rancheria of Me-Wuk Indians, CA
- Calaveras Band of Miwok Indians, CA
- Carson Colony Community Council, NV
- Cedarville Rancheria of Northern Paiute Indians, CA
- Chicken Ranch Rancheria, CA
- Chico Rancheria, CA
- Choinumni Tribe, CA
- Cold Springs Rancheria, CA
- Colusa Rancheria, CA
- Dresslerville Community Council, NV
- Dunlap Band of Mono Indians, CA
- Enterprise Rancheria, CA
- Fallon Paiute-Shoshone Tribes, NV
- Fort Bidwell Reservation, CA
- Fort Independence Reservation, CA
- Greenville Rancheria, CA
- Ione Band of Miwok Indians, CA
- Jackson Rancheria, CA
- Kern Valley Indian Community, CA
- Lone Pine Community, CA
- Lovelock Paiute Tribe, NV
- Mono Lake Indian Community, CA
- Mooretown Rancheria, CA
- North Fork Rancheria, CA
- Cedarville Rancheria, CA
- Picayune Rancheria, CA
- Pit River Tribal Council, CA
- Pyramid Lake Paiute Tribe, NV
- Redding Rancheria, CA
- Reno Sparks Tribal Council, NV
- Sheep Ranch Rancheria, CA
- Shingle Springs Rancheria, CA
- Stewart Community Council, NV
- Susanville Rancheria, CA
- Table Mountain Rancheria, CA
- Timba-Sha Western Shoshone, CA
- Tule River, CA
- Tuolumne Rancheria, CA
- United Auburn Indian Community, CA
- Walker River Paiute Tribal Council, NV
- Washoe, CA&NV
- Washoe/Paiute of Antelope Valley, CA
- Winnemucca Colony Council, NV
- Woodfords Community Council, CA
- Wukchumni Nation, CA
- Yerington Paiute Tribal Council, NV
- Fort McDermitt Pai-Sho Tribes, NV
- Mono Nation, CA

Federal Government Agencies

- US Environmental Protection Agency
- USDA Natural Resources Conservation Service
- USDI Bureau of Land Management
- USDI Fish and Wildlife Service
- USDI Geological Service
- USDI National Park Service
- National Marine Fisheries Service

California State Government Agencies

- California Environmental Protection Agency
- California Resources Agency
- Lahontan Water Quality Control Board
- Tahoe Regional Planning Agency
- CDF and Tahoe Regreen
- League to Save Lake Tahoe
- Tahoe Resource Conservation District

Nevada State Government Agencies

- Nevada Cooperative Extension
- Nevada Dept of Parks & Recreation
- Nevada Division of Agriculture
- Nevada Division of Conservation District
- Nevada Division of Environ Protection/Bureau of Mining
- Nevada Division of Environmental Protection
- Nevada Division of Forestry
- Nevada Division of Minerals

- Nevada Division of State Lands
- Nevada Division of State Parks/Dist II HQ
- Nevada Division of Water Planning
- Nevada Division of Wildlife
- Nevada Historic Preservation Office
- Nevada Natural Heritage Program
- Nevada State Clearinghouse/SPOC
- Nevada Dept of Conservation & Nat Resources
- Nevada State Board of Sheep Commissioners

County Board of Supervisors for California and Nevada

- Alpine County
- Amador County
- Butte County
- Calaveras County
- Carson City-Board of Commissioners
- Douglas County-Board of Commissioners
- El Dorado County
- Esmeralda County-Board of Commissioners
- Fresno County
- Inyo County
- Kern County
- Lassen County
- Madera County
- Mariposa County
- Mineral County-Board of Commissioners
- Modoc County
- Mono County
- Nevada County
- Placer County
- Plumas County
- Shasta County
- Sierra County
- Siskiyou County
- Tehama County
- Tulare County
- Tuolumne County
- Washoe County-Board of Commissioners
- Yuba County

Other California and Nevada County Government

- Alpine County-Planner
- Amador County-Land Use Agency
- Butte County-Water & Resource Conservation
- California County Planning Commissioners Association
- California County Planning Directors Association-
- Calaveras County-Public Works
- Carson City County-Planning Department
- Douglas County-Planning Department
- El Dorado County-Planning Department
- Esmeralda County-Planning Department
- Fresno County-PW Planning & Resource Mgmt
- Inyo County-Planning Department
- Kern County-Planning Department
- Lassen County-Public Works
- Madera County-Planning Department
- Mariposa County-Planning Department
- Mineral County-Planning Department
- Modoc County-Planning Department
- Mono County-Engineer/Public Works
- Placer County-Planning Department
- Plumas County-Planning Department
- Shasta County-Engineer/Public Works
- Sierra County-Planning Department
- Siskiyou County-Planning Department
- Tehama County-Planning Department
- Tuolumne County-Planning Department
- Washoe County-Dept Water Resources
- Yuba County-Planning Dept/Community Development

Federal Elected Officials

US Senators-California

- Dianne Feinstein
- Barbara Boxer

US Senators-Nevada

- John Ensign
- Harry Reid

US House of Representatives-California

- John Doolittle
- Wally Herger
- Howard McKeon
- George Miller
- Devin Nunes
- Doug Ose
- Richard W. Pombo
- George Radanovich
- Bill Thomas

US House of Representatives-Nevada

- Shelley Berkley
- Jim Gibbons
- Jon Porter

California State Elected Officials

State Senate

- Sam Aanestad
- Roy Ashburn
- Thomas Oller

- Charles Poochigian

State Assembly

- Dave Cogdill
- Rick Keene
- Doug LaMalfa
- Tim Leslie
- Bill Maze
- Alan Nakanishi
- Steve Samuelian

Libraries

- Alpine County Library, Markleeville CA
- Bear Valley Branch Library, Bear Valley CA
- Billinghurst Library, Reno NV
- Butte County Library, Chico CA
- Calaveras County Library, San Andreas CA
- Calaveras County Library, Angels Camp CA
- Calaveras County Library, Arnold CA
- Calaveras County Library, Mokelumne Hill CA
- California Resource Agency Library, Sacramento CA
- California. Polytechnic. State University Library, San Luis Obispo CA
- California State University Library, Humboldt, Arcata CA
- California State University Library, Chico CA
- California State University Library, Fresno CA
- California State University Library, Northridge CA
- California State University Library, Rohnert Park CA
- California State University Library, Sacramento CA
- California State University Library, San Diego CA
- California State University Library, San Jose CA
- Carson City Library, Carson City NV
- College of the Redwoods Library, Fort Bragg CA
- Contra Costa Community College Library, Pleasant Hill CA
- Diablo Valley College Horticulture Library, Pleasant Hill CA
- Douglas County Library, Minden NV
- Douglas County Library, Zephyr Cove NV
- Downtown Reno Library, Reno NV
- D-Q University Library, Davis CA
- Duncan/Traner Library, Reno NV
- El Dorado County Library, Cameron Park CA
- El Dorado County Library, El Dorado Hills CA
- El Dorado County Library, Georgetown CA
- El Dorado County Library, Placerville CA
- El Dorado County Library, Pollock Pines CA
- Eldorado County Library, South Lake Tahoe CA
- Elk Grove Neighborhood Library, Elk Grove CA
- Fair Oaks-Orangevale Community Library, Fair Oaks CA
- Foresthill Library, Forest Hill CA
- Fresno County Library, Auberry CA
- Fresno County Library, Big Creek CA
- Fresno County Library, Caruthers CA
- Fresno County Library, Clovis CA
- Fresno County Library, Easton CA
- Fresno County Library, Firebaugh CA
- Fresno County Library, Fowler CA
- Fresno County Library, Cedar-Clinton, Fresno CA
- Fresno County Library, Central, Fresno CA
- Fresno County Library, Fig Garden, Fresno CA
- Fresno County Library, Gillis, Fresno CA
- Fresno County Library, Ivy Center, Fresno CA
- Fresno County Library, Mosqueda, Fresno CA
- Fresno County Library, Pinedale, Fresno CA
- Fresno County Library, Politi, Fresno CA
- Fresno County Public Library, Fresno CA
- Fresno County Library, Kerman CA
- Fresno County Library, Kingsburg CA
- Fresno County Library, Laton CA
- Fresno County Library, Mendota CA
- Fresno County Library, Miramonte CA
- Fresno County Library, Orange Cove CA
- Fresno County Library, Parlier CA
- Fresno County Library, Peidra CA
- Fresno County Library, Reedley CA
- Fresno County Library, Riverdale CA
- Fresno County Library, San Joaquin CA
- Fresno County Library, Sanger CA
- Fresno County Library, Selma CA
- Fresno County Library, Shaver Lake CA
- Fresno County Library, Squaw Valley CA
- Fresno County Library, Tranquility CA
- Galt City Public Library, Galt CA
- Kern County Library, Arvin CA
- Kern County Library, Baker Street, Bakersfield CA
- Kern County Library, Beale Memorial, Bakersfield CA
- Kern County Library, Eleanor Wilson, Bakersfield CA
- Kern County Library, Holloway-Gonzales, Bakersfield CA
- Kern County Library, Northeast, Bakersfield CA
- Kern County Library, Rathbun, Bakersfield CA
- Kern County Library, Southwest Bakersfield, Bakersfield CA
- Kern County Library, Boron CA
- Kern County Library, Buttonwillow CA
- Kern County Library, California City CA

- Kern County Library, Delano CA
- Kern County Library, Frazier Park CA
- Kern County Library, Kernville CA
- Kern County Library, Lake Isabella CA
- Kern County Library, Lamont CA
- Kern County Library, McFarland CA
- Kern County Library, Mojave CA
- Kern County Library, Ridgecrest CA
- Kern County Library, Rosamond CA
- Kern County Library, Shafter CA
- Kern County Library, Taft CA
- Kern County Library, Tehachapi CA
- Kern County Library, Wasco CA
- Kern County Library, Wofford Heights CA
- Kings County Library, Handford CA
- Los Angeles Arboretum Plant Sciences Library, Arcadia CA
- Los Angeles County Public Library, East Imperial Hwy, Los Angeles CA
- Los Angeles Public Library, 5th Street – Serials Division, Los Angeles CA
- Madera County Library, Chowchilla CA
- Madera County Library, North Fork CA
- Madera County Library, Ave 12, Madera CA
- Madera County Library, North G St., Madera CA
- Madera County Library, Oakhurst CA
- Mariposa County Library, Mariposa CA
- Merced County Library, Merced CA
- Modoc County Library, Alturas CA
- Mono County Library, Bridgeport C A
- Mono County Library, Mammoth Lakes CA
- Nevada County Library, Nevada City CA
- Nevada State Library & Archives, Carson City NV
- Nevada Supreme Court Library, Carson City NV
- Oakland Public Library, Oakland CA
- Occidental College Library, Los Angeles CA
- Patrick Squires Library, Reno NV
- Placer County Library, Auburn CA
- Sacramento County Library, Sacramento CA
- Santa Ana Public Library, Santa Ana CA
- Santa Rosa Junior College Library, Santa Rosa CA
- Sierra College Forestry Library, Rocklin CA
- Sierra College Library, Grass Valley CA
- Sierra County Library, Loyalton CA
- Sierra Nevada College, Incline Village NV
- Sierra View-Old Town Mall Library, Reno NV
- Siskiyou County Library, Mt Shasta CA
- Siskiyou County Library, Weed CA
- Siskiyou County Library, Yreka CA
- Sonoma County Free Public Library, Santa Rosa CA
- Stanford Univ. Main Library, Stanford CA
- Strybing Arboretum Library, San Francisco CA
- Susanville Library District, Susanville CA
- Tilden Regional Park, Berkeley CA
- Truckee Library, Truckee CA
- Truckee Meadows Com. College Library, Reno NV
- Tualre County Library, Alpaugh CA
- Tualre County Library, Dinuba CA
- Tulare County Library, Earlimart CA
- Tulare County Library, Exeter CA
- Tulare County Library, Ivanhoe CA
- Tulare County Library, Lindsay CA
- Tulare County Library, Orosi CA
- Tulare County Library, Pixley CA
- Tulare County Library, Porterville CA
- Tulare County Library, Springville CA
- Tulare County Library, Strathmore CA
- Tulare County Library, Terra Bella CA
- Tulare County Library, Three Rivers CA
- Tulare County Library, Tipton CA
- Tulare County Library, Tulare CA
- Tulare County Library, Visalia CA
- Tulare County Library, Woodlake CA
- Tulare Volunteer Branch Library, Farmersville CA
- Tuolumne County Library, Sonora CA
- University of California Library, La Jolla CA
- University of California, General Library, Berkeley CA
- University of California, Natural Research Library, Berkeley CA
- University of California, Davis CA
- University of California Research Library, Los Angeles CA
- University of California Library, Irvine CA
- University of California Library, Santa Barbara CA
- University of Nevada, Life & Health Sciences Library, Reno NV
- University of San Francisco, Harney Science Center Library, San Francisco CA
- US Environmental Protection Agency Library, Las Vegas NV
- Washoe County Library, Incline Village NV
- Washoe County Library, Galena Community, Reno NV
- Washoe County Library, North Valleys, Reno NV
- Washoe County Library, Northwest Reno, Reno NV
- Washoe County Library, Mendive Community, Sparks NV
- Washoe County Library, 12th St., Sparks NV
- Washoe County Library, Verdi NV

Individuals

- Alice & Joseph Abbott
- Marilyn Abby
- Paul Accornero
- Laurence Ackerman
- Derrick Adamache
- Carol Adams
- Donald Adams
- Peter Adams
- Dale & Becky Addington
- Steven Aderhold
- John Ahern
- Jon Aichele
- John Airola
- Dale Albaugh
- Barbara Albaugh
- Del Albright
- Michael Alda
- Roger Alderman
- Jack Aldridge Jr
- Jack Alexander
- Mike Alexander
- Warren Alford
- Julie Allen
- Manuel Alvidrez
- Thomas Ameika
- Laurel Ames
- Deborah Amshoff
- Adolph Amster
- Kellee Anderson
- Ken Anderson
- Monty Anderson
- Norman Anderson
- Stephen Anderson
- Steve Anderson
- Bob Andrews
- Kristen Andrews
- Joseph Andrews
- Grant Appley
- Rick Araujo
- Laurie Archambault
- Ron Arington
- Paul Arms
- Deanna Armstrong
- Jim Armstrong
- Pete & Kathy Arnaudo
- Helen Arnot
- Mel Arnot
- Yvonne Willis Ash
- Bruce Ashley
- Misha Askren
- Howard Asplund
- Mildred Asplund
- Howard Atamian
- Robert Avery
- Keith Axelson
- Larry Ayers
- Arthur L Bachelor
- Alma Bachelor
- Evan Backs
- Alan Bacock
- Bill Baer
- Don Baesel
- Mary Bagan
- Richard Bagley
- Karen Bagne
- Brook & Cindy Bahn
- Laurence Bahr
- Joseph Bail
- Bill Bailey
- Elizabeth Bailey
- Gene Bailey
- Rex Bailey
- Rich Bailey
- Sharon Bailey Bok
- Natalie Baily
- Laurel Baird
- Robert Baird
- Carmen Baker
- Dave Baker
- Gary Baker
- Helene Baker
- Lynn R & Angie Baker
- Richard Baker
- Russell Baker
- Herb Baldwin
- Ms Sy Baldwin
- Steve & Lois Balent
- Daniel Ball
- Daniel Ball
- Evelyn Ballard
- Larry Ballew
- William Banka
- William Banks
- Richard Banner
- Linda Barbosa
- Richard Barhite
- Maureen Elaine Barile
- Ken Barmore
- Cynthia Sue Barnes
- Alvin Barnes
- Ken Barnes
- James Barnum
- John Barr
- Jean Barrett
- Fred Bartels
- Kathleen Bartels
- Roger Bartlett
- Robert & Lesa Barton
- Mike Bashore
- Philip Batchelder
- James Bates
- Phillip Battaglia
- Joan Baylie
- Dorothy Bazar
- Julie Bear
- Thomas Beard
- W Beasley
- Dan Beatie
- Diane Beck
- Lois Beck
- Dawne Becker
- Don Becker
- Douglas Becker
- Rudolph Becking
- Marcia Bedard
- Lloyd Bedwell
- Lettie Beeman
- Alan Beer
- David Beesley
- Allan Beeson
- Lee Belau
- Blake Bell
- Mark Belles
- Philip Bender
- Robert & Joan Benedetti
- Joseph Benedict
- Stephen Benner
- Bruce Bennett
- Mildred & Edward Bennett
- Robert Bennett
- Steve Bennett
- Dan Benton
- Tony Berchtold
- Michael Bergamini
- Geri Bergen
- Mark Berger
- Albert Bergeron
- Roland Bergthold
- Eleanor Berke
- Anne Berner
- Dee Berner
- Scot Bernstein
- Bryant Berny

- Ernest Berry
- Patricia E Brown Berry
- C David Bertelsen
- Arnold Bertram
- Judith Bess
- Charles Betcher
- A Bettencourt
- James Bill
- Darrell Billups
- Wheeler Birdwell Iii
- Kevin Birkes
- Kevin Birkes
- Vern & Marjorie Bische
- Nancy Bish
- William Bishop
- Marcus Bitter
- Clyde Blackwell
- Alan Blair
- Allen Blanc
- Melissa Blankinship
- Bruce A & Patricia Blayney
- Laurice & Pauline Blayney
- Olga E & Richard Bleak
- R Blinkwolt
- Thomas Bliss
- Carla Blizzard
- Barton Bloom
- David Boatright
- Charles Boatwright
- Janet Bolles
- Robert Bollin
- Carole Bolotin
- Randy Bolt
- Ernestine Bond
- Michael Bonnel
- Chris & Holly Bonner
- Charles Bonny
- Mark & Margaret Booker
- Leslie Borasi
- Jim Botsford
- Ernest Bouillon
- Barry Boulton
- Byron Bourman
- Carver Bowen
- Joseph Bower
- Rosemary Bowker
- Diane & Roy Bozarth
- Joe Braden
- Gail Bradley
- Elliott Brainard
- Elfrieda Branch
- Alan Brandt
- Dorothy & Herb Brasch
- Alfred Braun
- Joe Brazie
- Rick Breeze Martin
- L William Breiner
- Donald Bremner
- Richard Brengman
- James & Mary Brenneman
- John Breylinger
- Michelle Brezae
- Don Bricker
- Kem Bricker
- David Brierley
- John Brinda
- Clarice Brinker
- Scott & Candice Brinker
- Robert Brister
- Craig Britton
- Elmar Brock
- William Brooke
- Sandy Brooke Cannon
- Fred Brooks
- Don & Grace Broombaugh
- Garth Brott
- Bernadette Brott
- Carroll Brown
- Dewayne Brown
- Melinda Brown
- Eleanor Brown
- Gary Brown
- Houston Brown
- James Brown
- Ken Brown
- Ralph Brown
- Rod Brown
- Steve Brown
- Sueretta Brown
- Ronald Brown Sr
- Ellen Brownell
- Ed Brownlee
- Helen Brubaker
- Frank Bruder
- Joe Brundage
- Betty Bryan
- Robert Bubala
- Clarence Buck
- Beatrice Buck
- Constance Buck
- Larry Buckley
- Doug & Lee Buckmaster
- Thomas Budlong
- Deborah Bulger
- Walter Bunt
- Peter Bunting
- Larry Burd
- Dennis Burge
- Coleen Burgess
- Stephen Burgess
- Joyce Burk
- Roy Burnell
- Daniel Burnett
- Robert Burns
- Ernest Burroughs
- Steve Burroughs
- Betty Burton
- Scott Bush
- John Butkis
- Ray Butler
- Regina Buttram
- Everett Butts
- Dan Byrne
- Martin Byrne
- Michael Byrne
- Paul Cadruvi
- Mary Cahill
- Alan Cain
- Carrie Caldwell
- Stan Califf
- Emma Callaghan
- Robert Callender
- Jim Cameron
- Bruce Campbell
- Bruce Campbell
- Delna Campbell
- James Campini
- Nick Campion
- Stephen Canning
- Catherine Capone
- Carl & Paulette Cappelen
- Richard Cardella
- Joseph & Barbara Cardoza
- Warren Carleton
- Bernard Carlson
- George & Mary Carpenter
- Patrick Carr
- Gary Carsten
- F Carter
- John Carter
- Wayne & Judy Carter
- Nathan Carver
- Chris Cash
- Michelle Cassella
- Richard Castaldini
- Lydia Stewart Castle
- Paul Castro
- Phil Caterino
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- Delmar Janson
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- William Jones
- Wright Jones
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- Roberta Joughin
- Brian Joyce

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- Richard Jurewicz
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- John Kamansky
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- Bernard Karian Dds
- Richard Kattelmann
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- Richard Kaufmann
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- B Keith
- Juliet Kendrick
- Eric Kennedy
- Jon Kennedy
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- John Ketcham
- Sandi & Hank Ketels
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- Saralta Khoury
- Emmy Kibler
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- Scott King
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- Marianne Klarer
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- Ragnhild Klein
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- Cheri Klusman
- Helen Klusman
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- Peter Knapp
- William Knerr
- Clay Knopf
- Robert Knott
- Karen Knudsen
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- Thomas Koch
- Walter Koch
- Walter Koch Ii
- N Koehler
- Andrew Koijane
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- Jo Kolp
- Ken Kolp
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- Christopher Kost
- James Kowalski
- Evelyn Ann Kramer
- Jed Kramer
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- Earl Kriens
- C Krosschell
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- Ross Kuzma
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- Omer Lamborn
- Lisa Lamborn
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- R Lancaster
- L Landes
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Acronyms and Abbreviations

A.A.	Associate of Arts degree
ac.	Acre
ALSE	Area of Late Successional Emphasis
AM	Acquisitions Management
AMS	Aquatic Management Strategy
AOC	Area of Concern
APCD	Air Pollution Control District
ASQ	Allowable Sale Quantity
AUM	Animal Unit Month
BA	Basal area
B.A.	Bachelor of Arts degree
BACM	Best Available Control Measure
BAER	Burned Area Emergency Rehabilitation
BLM	Bureau of Land Management
BM	Benchmark
B.S.	Bachelor of Science degree
BVFSYU	Big Valley Federal Sustained-Yield Unit
CAR	Critical Aquatic Refuge
CARB	California Air Resource Board
CASPO	California spotted owl
CC	Canopy cover/closure
CCF	100 cubic feet
CDFG	California Department of Fish and Game
CEA	Cumulative effects analysis
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CI	Confidence interval
Co.	County
CRLF	California red-legged frog
CSU	California State University
CWD	Course woody debris
CWHR	California Wildlife Habitat Relationships system
DAU	Deer Assessment Unit
dbh	Diameter at breast height
DEIS	Draft environmental impact statement
DFC	Desired future condition
DFPZ	Defensible fuel profile zone
DFTM	Douglas-fir tussock moth
DSEIS	Draft supplemental environmental impact statement
EIS	Environmental impact statement
ESA	Endangered Species Act
FACA	Federal Advisory Committee Act
FARSITE	Fire Area Simulator (computer program)
FEIS	Final environmental impact statement
FEMAT	Forest Ecosystem Management Analysis Team
FERC	Federal Energy Regulatory Commission
FIA	Forest Inventory and Analysis
FLAMMAP	Fire Behavior Mapping and Analysis System (computer program)

FOFEM	First Order Fire Effects Model
FORPLAN	Forest Planning model (computer program) (See SPECTRUM)
FR	Federal Register
FSH	Forest Service Handbook
FSM	Forest Service Manual
FSYU	Federal Sustained-Yield Unit (See BVFSYU)
ft.	Foot
FVS	Forest Vegetation Simulator (computer program)
FWS	Fish and Wildlife Service (See USFWS)
FY	Fiscal year
FYLF	Foothill yellow-legged frog
GAMMA	GAMMA Remote Sensing (computer program)
GC	Glucocorticoid
GIS	Geographic Information System
GRID	ArcInfo GRID
GS	Group selection
ha.	Hectare
HFQLG	Herger-Feinstein Quincy Library Group
HRCA	Home range core area
HIS	Habitat Suitability Index
ID	Interdisciplinary
IDT	Interdisciplinary team
km.	Kilometer
KMDA	Known Mineral Deposit Area
LOP	Limited operating period
LP	Linear programming
LSOG, LS/OG	Late Successional/Old Growth
m.	Meter
mi.	Mile
MIS	Management Indicator Species
mm.	Millimeter
MMBF	Millions of board feet
M.S.	Masters of Science degree
MOD 8	SNFPA FEIS Alternative Modified 8
MOU	Memorandum of Understanding
MYLF	Mountain yellow-legged frog
NAPA	National Academy of Public Administration
NEPA	National Environmental Policy Act
NF	National Forest
NFS	National Forest System
NLF	Northern leopard frog
NP	National Park
NPS	National Park Service
NRC	National Research Council
NRF	Nesting, roosting and foraging (habitat)
NRIS	Natural Resource Information System
NTMB	Neotropical migratory bird
OFEA, OFE	Old Forest Emphasis Area
OHV	Off-highway vehicle
OSV	Over the snow vehicle
PAC	Protected Activity Center
PCT	Pre-commercial thin
PFC	Proper functioning condition
PhD	Doctor of Philosophy degree
PM_{10}, $PM_{2.5}$	Particulates 10 microns in size and 2.5 microns in size

PROGNOSIS	Prognosis Simulator (computer program…See FVS)
PSW	Pacific Southwest Forest and Range Experiment Station
PUF	Public Uses and Facilities
RCA	Riparian Conservation Area
RCO	Riparian Conservation Objectives
RD	Ranger District
RDM	Residual dry matter
RNA	Research Natural Area\
RPA	Resource Planning Act
RO	Regional Office
ROD	Record of Decision
ROS	Rate of spread
RVD	Recreation Visitor Day
S&G	Standard and Guideline
SD	Standard deviation
SDI	Stand density index
SE	Standard error
SEIS	Supplemental environmental impact statement
SIA	Special Interest Area
SNEP	Sierra Nevada Ecosystem Project
SNFPA, SNFP	Sierra Nevada Forest Plan Amendment
SOHA	Spotted Owl Habitat Area
SPECTRUM	Spectrum model (computer program)
SPLAT	Strategically placed area treatment
spp.	Species
SSFCA	Southern Sierra Fisher Conservation Area
T&E	Threatened and Endangered
TEPS	Threatened, Endangered, Proposed or Sensitive
TES	Threatened, Endangered or Sensitive (See TEPS)
TMDL	Total maximum daily load
TMO	Timber Management Officer
TSPIRS	Timber Sale Program Information Reporting System
TWS	The Wildlife Society
UC	University of California
US	United States
USDA	United States Department of Agriculture
USDI	United States Department of Interior
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
UV-B	Ultraviolet-B
WHR	Wildlife Habitat Relationships (See CWHR)
WUI	Wildland Urban Intermix
yr.	Year

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