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Final Environmental Impact Statement

Slapjack Project

Feather River Ranger District, Plumas National Forest

Butte and Yuba Counties, California

Logging in Clipper Mills, 1890s

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SLAPJACK PROJECT

Final Environmental Impact Statement
Butte and Yuba Counties, California

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Abstract: The United States Department of Agriculture, U.S. Forest Service, Plumas National Forest, Feather River Ranger District proposes to protect rural communities from fire hazards by constructing fuel breaks known as Defensible Fuel Profile Zones (DFPZs); implementing group selection harvest methods to create a fire-resilient healthy forest ecosystem; implementing individual tree selection harvests to restore stand densities more characteristic of past natural fire regimes; performing associated road system improvement work; and carrying out a range of aquatic, native plant, and wildlife habitat improvement activities on approximately 5,000 acres of forested federal land near Challenge, Forbestown, Feather Falls, and Clipper Mills, California. This *Slapjack Project Final Environmental Impact Statement* documents the analysis of the following seven alternatives:

- **Alternative A** — Proposes no action.
- **Alternative B** — The original action proposed to the public during scoping in September 2005. It was slightly modified in response to more detailed analysis. Alternative B proposes fuel treatments that include construction of DFPZs, group selection harvest, individual tree selection harvest, road system improvements, native plant and wildlife habitat improvements, meadow restoration, use of herbicides and other control methods to eradicate noxious weeds, and use of herbicides for preventive maintenance of DFPZs.
- **Alternative C** — The same as alterative B but without the use of herbicides for DFPZ preventive maintenance or for noxious weed control.
- **Alternative D** — The same as alternative B but without the use of herbicides for DFPZ preventive maintenance. Alternative D is the Forest Service preferred alternative.
- **Alternative E** — The same as alternative B but without the use of herbicides for noxious weed control.
- **Alternative F** — The same as alternative B but without group selection in subwatersheds where the predicted Equivalent Roaded Area exceeds the Threshold of Concern (an indicator used to predict the point at which cumulative off-site watershed effects could occur).
- **Alternative G** — The same as alternative B but without group selection in subwatersheds where the predicted Equivalent Roaded Area exceeds the Threshold of Concern (an indicator used to predict the point at which cumulative off-site watershed effects could occur). Alternative G does not include the use of herbicides for noxious weed control or for DFPZ preventive maintenance.

Summary

The Feather River Ranger District of the Plumas National Forest proposes to reduce hazardous fuels around rural communities to reduce the risk of high-intensity wildfires and to move the project area towards the desired future condition of a healthy, fire-resilient ecosystem. The proposed treatments include construction of Defensible Fuel Profile Zones (DFPZs), group selection harvest, individual tree selection harvest, road system improvements, native plant and wildlife habitat improvements, meadow restoration, eradication of noxious weeds with herbicides in combination with other control methods, and preventive maintenance of DFPZs with herbicides.

This action is needed because forest stands in the Slapjack Project area are crowded with brush that has become increasingly more flammable with age, resulting in a high risk of high-intensity wildfire. In addition to threatening communities, high-intensity, stand-replacing wildfires result in seriously degraded watershed health and wildlife habitat. The numbers of thin-barked shade-tolerant trees, such as white fir, tanoak, and incense-cedar, have increased as a result of past fire suppression and management practices. Analysis of seral stage stand distribution in the Slapjack Project area on National Forest System land shows that the area is deficient in early seral stage (seedling and sapling sized) stands. Meadow habitat is being lost as a result of conifer encroachment, poorly located roads, and changes to hydrologic functions. Several poorly designed or maintained culverts in the project area have created barriers for aquatic-dependent species such as rainbow trout. Botanical surveys indicate the presence of noxious weed (nonnative invasive plants) infestations in the project area, including the highly flammable Scotch, French, and Spanish brooms.

The proposed project integrates several strategies aimed at reducing hazardous fuels, providing commercial products, and coordinating vegetation management activities with local communities. The legislation, strategies, and documents integrated into the Slapjack Project are as follows:

- *Plumas National Forest Land and Resource Management Plan* (the “Forest Plan”) and Record of Decision (1988)
- *Herger-Feinstein Quincy Library Group Forest Recovery Act* (HFQLG Act) (1998)
- HFQLG final environmental impact statement (EIS) and Record of Decision (1999)
- *National Fire Plan* (2000)
- Cohesive Strategy (2000)
- 10-year Comprehensive Strategy (2001)
- *Healthy Forest Restoration Act* (2003)
- Sierra Nevada Forest Plan Amendment final EIS and Record of Decision (2004)
- Challenge Landscape Assessment (2006)

Purpose and Need for Action

The need for the Slapjack Project is based on the current condition of resources and problems in the Slapjack Project area. The Forest Service developed the five purpose statements (which are also considered the objectives of the project) listed below as a method of categorizing the current condition of resources and resolving the various needs for action. The five objectives of the Slapjack Project, which constitute the purpose for action, are to

1. Protect rural communities in the Wildland Urban Interface by reducing the risk of a high-intensity wildfire.

2. Move the project area toward the desired future condition of a healthy, fire-resilient ecosystem.

3. Provide an adequate timber supply that contributes to the economic stability of rural communities.

4. Implement restoration projects to achieve healthy aquatic and riparian ecosystems and improve wildlife habitat through prescribed burning.

5. Control the spread of noxious weeds within forest communities in order to maintain native plant diversity, natural communities, and DFPZ effectiveness.

Proposed Action (Alternative B)

Alternative B is the original action proposed to the public during scoping in September 2005 and is designed to move the project landscape toward a more fire-resilient condition, characterized by uneven-aged (all-aged), multistoried, fire-resilient stands. Alternative B includes the following actions:

- Reduce fire hazards by constructing approximately 15 miles of DFPZs on approximately 4,400 acres.

- Harvest trees using group selection (219 acres) and individual tree selection (148 acres) harvest methods.

- Perform road work that includes 7 miles of road closure, 19 miles of road decommissioning, 18 miles of reconstruction, 4 miles of new temporary spur construction, light maintenance of 4 miles of existing spurs, and 2 miles of road resurfacing as part of a watershed improvement project. Approximately 6 miles of new temporary roads would be constructed and decommissioned after project completion.

- Restore and enhance aquatic, native plant, and wildlife habitat by removing or upgrading six culverts for fish passage improvement; restoring 59 acres of meadow; stabilizing 1,200 feet of streambank; and reducing fuel loads through prescribed underburning on 180 acres of California spotted owl habitat.

Alternative B proposes the use of herbicides to accomplish the following:

- Perform preventive maintenance of DFPZ units (1,954 acres) two to three years after DFPZ construction. The herbicide imazapyr would be used to control tanoak and shrub regrowth and prevent its re-formation as ladder fuels. Selection of this alternative would not determine how or even if DFPZs would be maintained over the long term. Decisions regarding the long-term maintenance of the DFPZs would be made at the time such maintenance is determined to be necessary.

- Control noxious weeds (English ivy; barbed goat grass; yellow starthistle; French, Scotch, and Spanish brooms; and rush skeleton weed) on a maximum of 33 acres annually with a variety of control tactics, including use of the herbicide triclopyr BEE (on a maximum of 31 acres). Treatments would occur annually over a five-year period.

Noxious Weed Control and Eradication

Alternative B proposes to maintain native plant diversity, natural communities, and DFPZ effectiveness by controlling noxious weeds on a maximum of 33 acres annually using a combination of tactics, including herbicide (triclopyr BEE on a maximum of 31 acres), hand pulling, and backpack torches. Control tactics and the target species are described below:

- Hand pulling would be used on various broom species, English ivy, barbed goat grass, and rush skeleton weed. This can be an effective control tactic for plants that do not reproduce by rhizomes (thick underground stems that produce roots and stems that develop into new plants). Plants should be pulled prior to dispersing seeds.

- Weed wrenches are tools specifically designed for manually removing deep-rooted woody perennial plants such as Scotch broom. Weed wrenches would be used on mature plants in the spring and winter when they are relatively easy to remove. A disadvantage of this technique is the inadvertent burial of broom seeds when plants are pulled out.

- Backpack torches use propane and a torch on a long wand. The torches produce high-temperature flames, which have been shown to be an effective tool on broom seedlings. The torches would be used in the winter and spring when there is no threat of fire escape.

- Brush cutters / string trimmers are motorized, hand-held cutting tools that can be used on annual grasses, yellow starthistle, and woody shrubs such as broom. The timing of the application is critical for success; for instance, cutting broom in the late summer when it is water stressed has been shown to be very effective.

- Underburning / prescribed fire can effectively control broom and other species if timed properly. After underburns, there is frequently a flush of weed seedlings that must be killed before they set seeds.

- Herbicides applied with backpack sprayers may be used on broom seedlings. A foliar (leaf) application of triclopyr BEE in fall would effectively control French, Scotch, and Spanish broom seedlings. Herbicides would be used annually on a maximum of 31 acres proposed for weed control; herbicide use would be concentrated in treatment units with existing broom populations.

Alternative Development

The Forest Service developed five alternatives (C, D, E, F, and G) to the proposed action based on issues identified by the Slapjack Interdisciplinary Team (ID Team) during the public scoping process. The Forest Service also analyzed a no-action alternative (alternative A). The ID Team, in conjunction with the Responsible Official, developed alternatives to the proposed action in response to the following issues: (1) use of herbicides and (2) management activities in watersheds over the Threshold of Concern.

To provide a clear basis for choice among the alternatives, measurement indicators were identified that respond to the two issues listed above. Thus, the purpose and need, range of alternatives, environmental effects, and the final decision are discussed throughout this document in terms of the issues and the corresponding measurement indicators. The alternatives developed in addition to the proposed action (alternative B) are described below.

Alternative A (No Action)

Under alternative A, no fuels treatments, DFPZ construction, group selection or individual tree selection harvests, transportation system improvements, wildlife habitat improvements, or watershed restoration would be implemented to accomplish the purpose and need. The desired condition set forth in the *Herger-Feinstein Quincy Library Group Forest Recovery Act* (HFQLG Act) of an uneven-aged (all-aged), multistory, fire-resilient forest would not be achieved, and the ecological health of the forest would not be improved and maintained. The no-action alternative would not meet the intent of the 1988 *Plumas National Forest Land and Resource Management Plan* (the “Forest Plan”), as amended by the 1999 Record of Decision on the HFQLG final EIS and the 2004 Record of Decision on the Sierra Nevada Forest Plan Amendment (SNFPA) final supplemental EIS.

Action Alternatives

The final EIS presents the analysis of six action alternatives (B, C, D, E, F, and G) in addition to the no-action alternative (alternative A). The action alternatives are the same in terms of DFPZ construction and individual tree selection harvest, canopy cover, diameter limits for tree removal, road system improvements, and restoration of wildlife, aquatic, and riparian ecosystems. All action alternatives address the overstory crown design criteria of 40 percent canopy cover described in “Appendix J: Fire and Fuels” of the HFQLG Act final EIS. Because the action alternatives differ in the number of acres of group selection harvest treatments or by the method of DFPZ maintenance and noxious weed control, they vary in terms of cost, herbicide use, treatment effectiveness, and watershed impacts. Alternative B (proposed action) is described above. None of the action alternatives propose specific treatments for the future maintenance of DFPZs. Decisions regarding long-term DFPZ maintenance—including the specific treatments to be used (such as herbicides)—would be made when the time for maintenance of the natural stands is reached (approximately 10–20 years after initial treatment).

Alternative C

Like alternative B, alternative C calls for the construction of approximately 4,400 acres of DFPZs and implementation of group selection (219 acres) and individual tree selection (148 acres). Road

work and aquatic and wildlife habitat improvement activities would also occur as described for alternative B. However, unlike alternative B, alternative C does not propose the use of the herbicides triclopyr BEE to control noxious weeds or imazapyr as part of maintenance activities to prevent brush regrowth on 1,954 acres of DFPZs. Noxious weeds would instead be controlled on 33 acres in the project area using a variety of methods, including backpack torches and hand pulling. Herbicides for noxious weed control or DFPZ maintenance were eliminated from consideration in alternative C in response to the issues raised during scoping.

Alternative D (Forest Service Preferred Alternative)

Alternative D proposes the same DFPZ construction, group selection, individual tree selection, road work, and aquatic and wildlife habitat improvement activities as alternative B. It also includes the use of the herbicide triclopyr BEE in combination with other treatments to control noxious weeds on a maximum of 31 acres. Unlike alternative B, alternative D does not propose the use of the herbicide imazapyr to control brush regrowth on 1,954 acres of the DFPZs. Alternative D does not propose specific treatments for the future maintenance of DFPZs. Decisions regarding long-term DFPZ maintenance—including the specific treatments to be used (such as herbicides)—would be made when the time for maintenance of the natural stands is reached (approximately 10–20 years after initial treatment).

Alternative E

Alternative E proposes the same DFPZ construction, group selection, individual tree selection, road work, and aquatic and wildlife habitat improvement activities as alternative B. Alternative E also proposes the use of the herbicide imazapyr to control brush regrowth on 1,954 acres of the DFPZs within two to three years of initial treatment. The herbicide triclopyr BEE would not be one of the treatments used to control noxious weeds under this alternative. Noxious weeds would instead be controlled on 33 acres in the project area using a variety of methods, including backpack flamers and hand pulling.

Alternative F

Alternative F proposes the same DFPZ construction, individual tree selection, road work, and aquatic and wildlife habitat improvement activities as alternative B. It also includes the use of the herbicides imazapyr to control brush regrowth on 1,954 acres of DFPZs and triclopyr BEE to control noxious weeds on a maximum of 31 acres in combination with other treatments. Unlike alternative B, this alternative would implement approximately 190 acres of group selection harvest instead of 219 acres because units located in subwatersheds in which the calculated Equivalent Roaded Area is predicted to be over the Threshold of Concern were dropped in response to issues raised during scoping. Acres of individual tree selection units would not be affected because no units are proposed in subwatersheds predicted to be over the Threshold of Concern.

Alternative G

Alternative G proposes the same DFPZ construction, individual tree selection, road work, and aquatic and wildlife habitat improvement activities as alternative B. Alternative G was developed to address watershed concerns, much like alternative F. Alternative G would implement approximately

190 acres of group selection harvest instead of 219 acres because units located in subwatersheds in which the calculated Equivalent Roaded Area is predicted to be over the Threshold of Concern were dropped. Acres of individual tree selection units were not affected because no units are proposed in subwatersheds predicted to be over the Threshold of Concern.

Alternative G does not propose the use of herbicides to control noxious weeds or the regrowth of brush on 1,954 acres of DFPZs. Noxious weeds would instead be controlled on 33 acres in the project area using a variety of methods, including backpack torches and hand pulling.

The selection of alternative G does not propose specific treatments for the future maintenance of DFPZs. Decisions regarding long-term DFPZ maintenance—including the specific treatments to be used (such as herbicides)—would be made when the time for maintenance of the natural stands is reached (approximately 10–20 years after initial treatment).

Summary of Environmental Consequences

The environmental effects of each alternative considered in the Slapjack Project EIS are summarized below. The summary focuses on the environmental consequences of each alternative based upon the five project objectives and the two issues (described below) raised by the public, as measured by a set of measurement indicators developed to show the differences between the alternatives and provide a clear basis for the decision to be made by the Responsible Official. “Chapter 3: Affected Environment and Environmental Consequences” describes the additional effects on each resource area in detail.

Effects Related to Objective 1: Protect rural communities in the Wildland Urban Interface by reducing the risk of a high-intensity wildfire.

Alternative A (No Action). Surface fuels, ladder fuels, and canopy fuels would not be modified over the short term; therefore, potential fire behavior would not change from the current condition. Fires would be expected to be more intense, resulting in a greater percentage of tree mortality. The Slapjack Project area would remain mostly in Condition Classes 2 and 3 and would have a moderate to high risk of losing key ecosystem components because the vegetation characteristics and fuel composition would not change. Flame lengths (2 to 7 feet) and canopy base height conditions (1 to 3 feet) under the no-action alternative would allow surface fires to move into the crowns. Fuel and fire conditions under the no-action alternative would allow wildland fires to develop into either passive or active crown fires. Passive crown fires torch out individual or small groups of trees as the surface fuels burning under them provide the convective heat to ignite the above-ground fuels. Active crown fires spread from tree to tree in conjunction with the convective heat of the surface fuels burning under them. A wildfire occurring under 90th percentile weather conditions would be expected to kill 20–25 percent of trees between 10 and 29 inches diameter at breast height (dbh).

All Action Alternatives. Flame lengths would be reduced from 2–7 feet, to 1–4 feet, by reducing surface fuels through underburning, piling and burning, or mastication. Fuel loading would be reduced by more than 57 percent across all units. The proposed treatments of hand and mechanical thinning, biomass removal, and mastication would increase canopy base height in most of the units from 1–3 feet to over 19 feet. Combined, the reduction in fuel loading and increased canopy base

height would decrease the likelihood that surface fires would develop into crown fires. A wildland fire occurring under 90th percentile weather conditions would be expected to kill approximately 9 percent of trees between 10 and 29 inches dbh.

Effects Related to Objective 2: Move the project area toward the desired future condition of a healthy, fire-resilient ecosystem.

Alternative A. Currently, treatment units show a high proportion of smaller tree size classes, high fuel ladder potential, and interlocking crowns capable of sustaining crown fires. Maintaining the existing stand structure would favor shade-tolerant species such as white fir, tanoak, and incense-cedar. There would be little opportunity for the naturally dominant pine species to reestablish and regenerate themselves, except what may occur through natural large-scale disturbance events such as wildfire. In the absence of action, declining stand growth and vigor would put parts of the project area at high risk of insect and disease infestations. Stand health would continue to decline in overstocked aggregations of trees within moderately stocked and densely stocked stands, eventually resulting in individual tree mortality. Mortality would increase the fuel loading, but endemic mortality would keep a continuous supply of dead trees for wildlife foraging and nesting.

Canopy cover in the treatment units ranges from 47 to 87 percent in CWHR size class 4 and 5 stands and from 20 to 82 percent in CWHR size class 3 stands (thin group), plantations (masticate group), and other stands (underburn group). Without treatment, the canopy closure in these stands, especially in the plantations, would continue to increase, shading out brush and smaller trees, which would die and increase the ladder fuels and fire hazard. Trees in the suppressed and intermediate crown classes would continue to provide ladder fuels into the overstory crown canopy.

All Action Alternatives. The effects discussed in this section would likely be the same for alternatives B, C, D, and E. Alternatives F and G call for fewer acres of group selection (190 acres compared to 219 in the other action alternatives), so they would result in slightly less change in species composition, forest health, and stand structure than described for alternatives B, C, D, and E.

In the treatment units, species composition would shift toward more shade-intolerant, fire - resistant species. Thinning would favor the retention of under-represented conifers (sugar pine and Douglas-fir), as well as oaks in those plantations dominated by ponderosa pine. Thinning would also favor retention of the most vigorous trees, rather than simply achieving desired spacing. This would result in increased species representation in the stands than what currently exists. The openings created by group selection would allow sunlight to reach the forest floor, creating favorable conditions for the establishment and growth of shade-intolerant, fire-adapted species.

Reducing tree density would improve tree growth and vigor, reduce susceptibility to drought and bark beetle attack, and reduce fire hazard. For all action alternatives, approximately 67 percent of the existing basal area would be retained for CWHR size class 4 and 5 stands. All action alternatives meet the requirements of retaining 30 percent of the existing basal area for CWHR size class 4 stands and 40 percent of existing basal area for CWHR size class 5 stands.

Post-treatment canopy cover would average 40 percent in DFPZs, 50 percent in individual tree selection units, and 60 percent in Riparian Habitat Conservation Areas (plantations only). All actions

alternatives would meet the canopy requirements for CWHR size class 4 and CWHR size class 5 stands listed in table 2 of the SFNPA Record of Decision.

Thinning from below would remove ladder and canopy fuels. This would increase ground-to-crown height, spacing between trees, and spacing between tree crowns. All action alternatives would increase the quadratic mean diameters for treatment units (in CWHR size class 4 and 5 stands) from 11–12 inches dbh to 22–29 inches dbh. This indicates that there would be a higher proportion of medium- to large-size trees in the stand, which would reduce the ladder fuels and fire hazard.

Effects Related to Objective 3: Provide an adequate timber supply that contributes to the economic stability of rural communities.

Alternative A. This alternative would not reduce critical fuel loadings or harvest any timber. No funds would be generated for the U.S. Treasury or returned to local counties. No additional employment opportunities or wages paid to the primary and service industries employees would be circulated through the local economy. No timber products (commercial firewood, biomass chips, or sawlogs) would be provided to the local economy.

All Action Alternatives. The action alternatives would generate approximately 9.8 million board feet of sawlogs and 34,000 tons of biomass from the DFPZ, group selection, and individual tree selection units.

Net harvest revenues for thinning and biomass removal would generate $632,000 for alternatives B through E. Net harvest revenue for alternatives F and G would be slightly higher at $668,000. The group selections dropped from alternatives F and G have smaller trees and less volume per acre than average, increasing the value of sawlogs per acre and reducing the impact of harvesting costs. Implementation of mastication, underburning, and other fuel treatments for all action alternatives would cost $1.1 million.

Total short-term project value (less the costs of DFPZ construction, noxious weed control treatments, and DFPZ preventive maintenance) is estimated at -$991,000 for alternative E; -$981,000 for alternative B; -$945,000 for alternative F; -$503,000 for alternative C; -$493,000 for alternative D; and -$467,000 for alternative G. The long-term project value includes the total net revenues or costs for implementing DFPZ construction activities, noxious weed control treatments, and DFPZ preventive maintenance, as well as the estimated costs of long-term DFPZ maintenance projected over a 50-year period. The long-term project value, including 50 years of DFPZ maintenance, is estimated at approximately -$4.5 million for alternatives B and E; -$4.8 million for alternatives C, D, and G; and -$4.4 million for alternative E.

Thinning, biomass removal, and fuel treatments for alternatives B through E would generate a total of 267 employment opportunities (jobs resulting directly from harvesting and fuel reduction treatments and jobs resulting indirectly from opportunities at sawmills and energy generation plants). In comparison, alternatives F and G would generate 265 direct and indirect jobs. Total employee-related income would be approximately $11.5 million for alternatives B through E and $11.4 million for alternatives F and G.

Effects Related to Objective 4: Implement restoration projects to achieve healthy aquatic and riparian ecosystems and improve wildlife habitat through prescribed burning.

Alternative A. Under the no-action alternative, there would be no benefits to stream and meadow conditions. Sediment would continue to directly deposit into affected water bodies and riparian areas, and conditions would continue to degrade. Conifers and roads would continue to degrade meadow habitat. Fish barriers would remain in place and continue to obstruct the movement of aquatic species to suitable upstream habitat. Understory vegetation on approximately 180 acres of habitat for the California spotted owl would remain too dense, making it difficult for owls to hunt and capture prey. These areas are located within larger areas of nesting, foraging, and roosting habitat known as Protected Activity Center YU024 (PAC YU024) and Spotted Owl Habitat Area B1 (SOHA B1).

All Action Alternatives. All action alternatives would implement the decommissioning of 19 miles of roads, stabilization of 1,200 feet of streambank, removal or upgrade of 6 culverts to improve fish passage, and restoration of 59 acres of meadow habitat. A light underburn would reduce fuel loading on 180 acres of California spotted owl habitat and improve foraging conditions from low suitability to moderate suitability.

Effects Related to Objective 5: Control the spread of noxious weeds within forest communities in order to maintain native plant diversity, natural communities, and DFPZ effectiveness.

Alternative A. The current vulnerability to noxious weed invasion is low within the treatment units due to a high level of canopy cover and ground cover. However, the relative risk of noxious weed invasion for the landscape, as a whole, would increase due to the high concentration of roads and logging operations on private land. Consequently, the overall habitat vulnerability is considered moderate to high. No control measures would be implemented in the project area to limit the spread of noxious weeds along roads or from adjacent private land.

All Action Alternatives. Proposed vegetation treatments (DFPZ construction, group selection, and individual tree selection) would disturb soil and remove overstory shade, resulting in a moderate risk of noxious weed invasion. There would also be a moderate risk of noxious weed invasion due to the building of temporary roads, road maintenance, and a short-term increase in vehicular traffic related to project activities. However, the closure and decommissioning of roads would reduce the long-term risk of noxious weed invasion through vectors. The project has been designed to use integrated management techniques to reduce the size of current populations, deplete seed banks, and kill re-sprouts on 33 acres in the project area. In alternatives B, D, and F, use of the herbicide triclopyr on a maximum of 31 of the 33 acres analyzed for weed control would increase the effectiveness of treatments and cost less ($200/acre) than using nonchemical tactics alone ($261/acre under alternatives C, E, and G).

Environmental Consequences Related to Issues Raised by the Public

The environmental consequences related to the two issues raised by the public (refer to chapter 1, section 1.8.2) are summarized below. Detailed discussions of the effects on each resource area are described in "Chapter 3: Affected Environment and Environmental Consequences."

Effects Related to Issue Statement 1: Some members of the public are opposed to the use of herbicides.

Alternative A. From 2000 through 2004, an average of 4.4 million pounds of herbicide by active ingredient were applied annually across Butte and Yuba Counties, primarily for road and utility right-of-way maintenance; rangeland improvement; noxious weed treatments; maintenance of orchards and flowerbeds, parks, and golf courses; and by individual rural home / land owners. Herbicides would not be applied for preventive maintenance of Slapjack DFPZs or noxious weed control under the no-action alternative, so there would be no project-related effects from herbicide use.

All Action Alternatives

Herbicides for DFPZ Preventive Maintenance: Alternatives B, E, and F — The herbicide imazapyr would be used to control brush regrowth on approximately 1,954 acres of DFPZs within two to three years of construction. Imazapyr would be applied at a rate of 0.25 pound of active ingredient per acre. The maximum application rate for this product is 0.75 pound of active ingredient per acre. A total of 489 pounds of active ingredients would be applied in order to implement the proposed DFPZ preventive maintenance approximately two to three years after DFPZ construction. The proposed additives (surfactant Syl-Tac® and a dye Hi-Light® Blue) are not expected to pose an adverse risk to the health and safety of workers or the public. This is based on available information from product labels and an overview by Bakke (USDA 2002) of the various types of additives likely to be used in forest herbicide applications.

The cost of the herbicide treatments is estimated at $250 per acre, for a total of approximately $489,000 for implementation of proposed DFPZ preventive maintenance. The total project values (including the present net value of accumulated future costs for long-term DFPZ maintenance) are described above in the summary of effects for objective 3.

For the vegetation types found in the Slapjack Project area, the HFQLG final supplemental EIS estimated that initial treatment of DFPZs would generally be effective for 5 years in the brush and plantation types and 10 years in mixed conifer and tanoak type. Subsequent maintenance was estimated to be needed at the same intervals (HFQLG final supplemental EIS pages 2-22 and 2-23). No applicable studies have been completed on shrub treatment under a canopy. The recently initiated "Alternatives to Fire for Fuel Reduction at California's Forest Urban Interface" (Powers et al. 2005) does give some indication of the effectiveness of different treatments. Second-growing-season results indicate that biomass from understory regrowth is much lower after the use of herbicides. Studies done in open-sky conditions, in clearcut, or in converted shrub fields indicate chemical treatment is 90–95 percent effective in reducing shrub cover over 10 to 12 years. These same studies indicate manual or mechanical treatment is about 80 percent effective in reducing shrub cover over the same period.

Herbicides for Noxious Weed Control: Alternatives B, D, and F — The herbicide triclopyr would be used to control noxious weeds in conjunction with a variety of other control tactics on a maximum of 31 of 33 acres analyzed for weed treatment. A total of 47 pounds of active ingredient would be applied annually over a five-year period, with a maximum of 233 pounds of active ingredient applied over the five-year period. The maximum application rate for this product is 4 pounds of active ingredient per acre. The proposed additives (surfactant Syl-Tac® and a dye Hi-Light® Blue) are not expected to pose an adverse risk to the health and safety of workers or the public. This is based on available information from product labels and an overview by Bakke (USDA 2002) of the various types of additives likely to be used in forest herbicide applications.

The cost of the noxious weed control program (including manual, mechanical, and chemical treatments) is estimated at $200 per acre, for a total of approximately $33,000 for implementation of the five-year noxious weed control program. The total project values are described above in the summary of effects for objective 3.

An effective noxious weed control program—such as the one proposed for the Slapjack Project—incorporates multiple control tactics rather than relying on any one control tool. For alternatives B, D, and F, broom seedlings would be hand pulled and burned in the early spring. When these tools could no longer be used due to increased fire risk and hard soil in summer and fall, brush cutters and string trimmers would be used to cut plants when water stressed. When the use of motorized string trimmers is restricted during periods of high fire danger, herbicides would effectively control broom seedlings. The use of herbicide in combination with other control tools may permit repeated treatments in a shorter period of time, increasing the likelihood of eradication.

No Herbicides for Preventive Maintenance: Alternatives C, D, and G — Herbicides would not be applied for preventive maintenance of Slapjack DFPZs. Preventive maintenance would not occur 2 to 3 years after DFPZ construction, so no costs would be incurred at that time. The total project values are described above in the summary of effects for objective 3. As discussed above, a recent study indicates that manual or mechanical treatment is about 80 percent effective in reducing shrub cover in open-sky conditions, in clearcut, or in converted shrub fields over a 10- to 12-year period, while chemical treatment is 90–95 percent effective.

No Herbicides for Noxious Weed Control: Alternatives C, E, and G — Herbicides would not be applied for noxious weed control. The cost of the noxious weed control program (incorporating manual and mechanical treatments) is estimated at $261 per acre, for an estimated total of $43,000 for implementation of the weed control program. The total project values are described above in the summary of effects for objective 3.

Under alternatives C, E, and G, the noxious weed control program would incorporate multiple control tactics including hand pulling, underburning, and mechanical treatments. There may be less chance of eradication or control of noxious weed infestations without the use of herbicides in combination with other control tools.

Effects Related to Issue Statement 2: Implementing ground-disturbing activities in subwatersheds that are approaching or over the Threshold of Concern increases the risk of adverse effects and cumulative off-site watershed effects.

Alternative A. The Forest Service Region 5 Cumulative Off-Site Watershed Effects Model (Equivalent Roaded Area or ERA) rating reflects the current conditions of cumulative off-site watershed effects in the subwatersheds and the resulting impacts on the aquatic systems. At least 11 subwatersheds are over the Threshold of Concern (an indicator used to predict the point at which cumulative off-site watershed effects could occur) and 8 are approaching the TOC in the existing condition.

Under alternative A, proposed treatments would not occur, and there would be no project-related increase in ERA values or increased risk of cumulative off-site watershed effects. However, vegetation density and accumulation of fuels would continue, and the chances of stand-replacing fire that would affect upland subwatershed areas and near-stream sensitive areas would increase compared to the existing condition. The ERA values following a stand-replacing fire would greatly exceed projected increases in ERA from proposed treatment activities.

All Action Alternatives. Under all action alternatives, 12 subwatersheds are expected to exceed the TOC and 7 are expected to approach the TOC. In the 12 subwatersheds that could exceed the TOC, the majority of the ERA scores would be from private land timber harvesting, urban development, and roads. These three disturbance types constitute 80 to 90 percent of the total ERA scores. Alternatives F and G would not implement group selection harvest in subwatersheds over the TOC. The reduction of group acres from 219 acres to 190 acres for these two alternatives would result in less than a 1 percent difference in percent of TOC between alternatives B through E and alternatives F and G. This 1 percent difference is statistically insignificant because such a small difference in already highly disturbed watershed landscapes would not result in observably different conditions on the ground.

Public Comment Period

The draft EIS was distributed in February 2006 for a 45-day comment period. Over 50 public and agency comments were received. Due to the scope and length of comments, a grouped response to comment table was developed and is included in appendix H of this EIS. The individual comment letters are available upon request and are located in the project record.

Tribal Consultation

The following federally recognized tribes and interested and affected tribes were consulted regarding the Slapjack Project: Mooretown Rancheria, Enterprise Rancheria, Berry Creek Rancheria, Chico Band of Mechoopda Indians, and the Konkow Valley Band of Maidu Tribe.

Public Involvement

The Forest Service began collaboration in 2003 with a group of organizations interested in reducing wildland fire risk to communities and the environment in Butte and Yuba Counties. The Forest Service met regularly with a core group comprised of representatives from the Natural Resource Conservation Service; California Fire Safe Council; Butte Fire Safe Council; Yuba Watershed Protection and Fire Safe Council; the Quincy Library Group; Rancherias; industrial timberland owners, including Soper Wheeler and Chy Company; and other private landowners. Other agencies involved include the Bureau of Land Management and the California Department of Forestry and Fire Protection. The Slapjack Project grew from this collaborative effort. In September 2004, the Forest Service helped organize the Eastern Butte / Yuba Fire Prevention Planning Tour, sponsored by the Butte Fire Safe Council and Yuba Watershed Protection and Fire Safe Council. The goal of the tour was to educate and promote a collaborative and coordinated planning process to address fuel reduction and fire prevention on a landscape scale.

Collaboration with the Butte Fire Safe Council and Yuba Watershed Protection and Fire Safe Council has been ongoing since 2003. Forest Service personnel have been in regular attendance at monthly Fire Safe Council meetings and have kept the councils and other stakeholders apprised of changes in project status.

In May 2005, a public meeting was held in Forbestown, California, to discuss opportunities in the six watersheds to be analyzed in the Challenge Landscape Assessment, including the Slapjack Project. Several attendees submitted comments, which were considered during the development of the proposed action and continue to shape the evaluation of the different management scenarios presented in this EIS. On September 14, 2005, a letter describing the proposed action (the “scoping” letter) was mailed to approximately 400 individuals and organizations, including local residents, Native American tribes, and federal, state, and local agencies. The letter was followed by the September 16, 2005, *Federal Register* publication of the Notice of Intent to prepare an EIS for the Slapjack Project. The Notice of Intent requested that comments on the proposed action be received within 30 days. Since publication of the Notice of Intent, more than 20 comment letters have been received.

Decision Framework

The Responsible Official for this project, Forest Supervisor James M. Peña, will decide whether to implement the Slapjack Project as identified in the proposed action, implement the project based on alternatives to the proposed action, or not implement the project at this time.

Timing

The project is scheduled to begin in the spring 2007 and be completed by 2011. The general treatment schedules for DFPZs, group selection, and individual tree selection are shown in appendix B.

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Chapter 1. Purpose and Need for Action

1.1 Introduction

This chapter describes the need for resource management activities in the proposed Slapjack Project area and identifies the project's geographic location. It also discusses the objectives and needs for each proposed activity and the measurement indicators used in the analysis for each objective. This chapter describes the applicable laws, policies, other environmental impact statements (EISs), and direction that influence the scope of this analysis. Also included is information about public involvement, scoping, and issues that guided the development of alternatives and the analyses of effects of the proposed action.

1.2 Proposed Action

The Slapjack Project is proposed as part of a broad resource management program under the authority of the *Herger-Feinstein Quincy Library Group Forest Recovery Act* (HFQLG Act). The intent of the project is to promote the ecological health of lands and economic health and stability of communities in the northern Sierra Nevada.

The United States Department of Agriculture (USDA) Forest Service, Plumas National Forest, Feather River Ranger District proposes to

- reduce fire hazards around rural communities by constructing Defensible Fuel Profile Zones (DFPZs);
- harvest trees using group selection and individual tree selection methods;
- perform associated road system improvement work; and
- carry out a range of aquatic and wildlife habitat improvement activities near Challenge, Feather Falls, and Clipper Mills, California.

The specific activities include the proposed use of ground-based and skyline logging systems to construct the DFPZs and to conduct timber harvest in individual tree selection and group selection units. Underburning, mastication, and manual cutting, piling, and burning would be used to construct DFPZs in units with no commercial timber harvest. Herbicides would be used to kill or suppress tanoak regrowth in some DFPZ units and to control infestations of noxious weeds and nonnative invasive plants, such as Scotch, Spanish, and French broom. A detailed description of the proposed action appears in "Chapter 2: Alternatives," and appendix A provides all associated project maps.

1.3 Background Information

1.3.1 Relationship of the Slapjack Project to the HFQLG Pilot Project

Congressman Herger and Senator Feinstein were authors of legislation, signed into law on October 21, 1998, that provided direction for a Pilot Project to demonstrate the management activities championed by the Quincy Library Group. The Quincy Library Group is comprised of interested local citizens who have a commitment to influence the management of the Lassen and Plumas National Forests and the Sierraville District of the Tahoe National Forest. The HFQLG Pilot Project is designed to demonstrate the effectiveness of fuelbreaks, group selection, individual tree selection, avoidance or protection of specified areas, and implementing a program for riparian restoration. The Slapjack Project was developed as part of this Pilot Project, and the Pilot Project treatment options were incorporated into the Slapjack Project design.

1.3.2 Project Location

The proposed Slapjack Project area is located in Butte and Yuba Counties, California, and within the Feather River Ranger District of the Plumas National Forest (see “Figure 1-1. Slapjack Project vicinity map” below and all other projects maps in appendix A). The project area would comprise approximately 34,725 acres of public and private land and would generally be situated between Lake Oroville to Dobbins on the west; the North Yuba River to Wambo Bar on the east; and from Barton Hill to the town of Feather Falls to the north. The proposed DFPZs would be located primarily on prominent ridges and around urban areas to protect rural wildland communities. The group selection units would be distributed throughout the DFPZs and in some adjacent areas. The individual tree selection units would occur, where needed, throughout the remaining forest matrix. The project area would include portions of Management Areas 10 (Feather Falls) and 11 (Challenge) as described in the 1988 *Plumas National Forest Land and Resource Management Plan* (commonly referred to as the “Forest Plan”).

The legal description of the project area is as follows: Township (T) 20N, Range (R) 6E, portions of Sections 15, 23, 25, 26, and 34; T20N, R8E, portion of Section 32; T19N, R6E, portions of Sections 2–5, 9, 11, and 14; T19N, R7E, portions of Sections 1, 8, 11, 12, 13, 16–21, and 27–34; T19N, R8E, portions of Sections 4, 5, and 6; and T18N, R7E, portions of Sections 2, 3, 12, 14, 22, 23, 26, and 34, Mount Diablo Base and Meridian. The area ranges in elevation between approximately 1,300 and 3,800 feet above mean sea level.

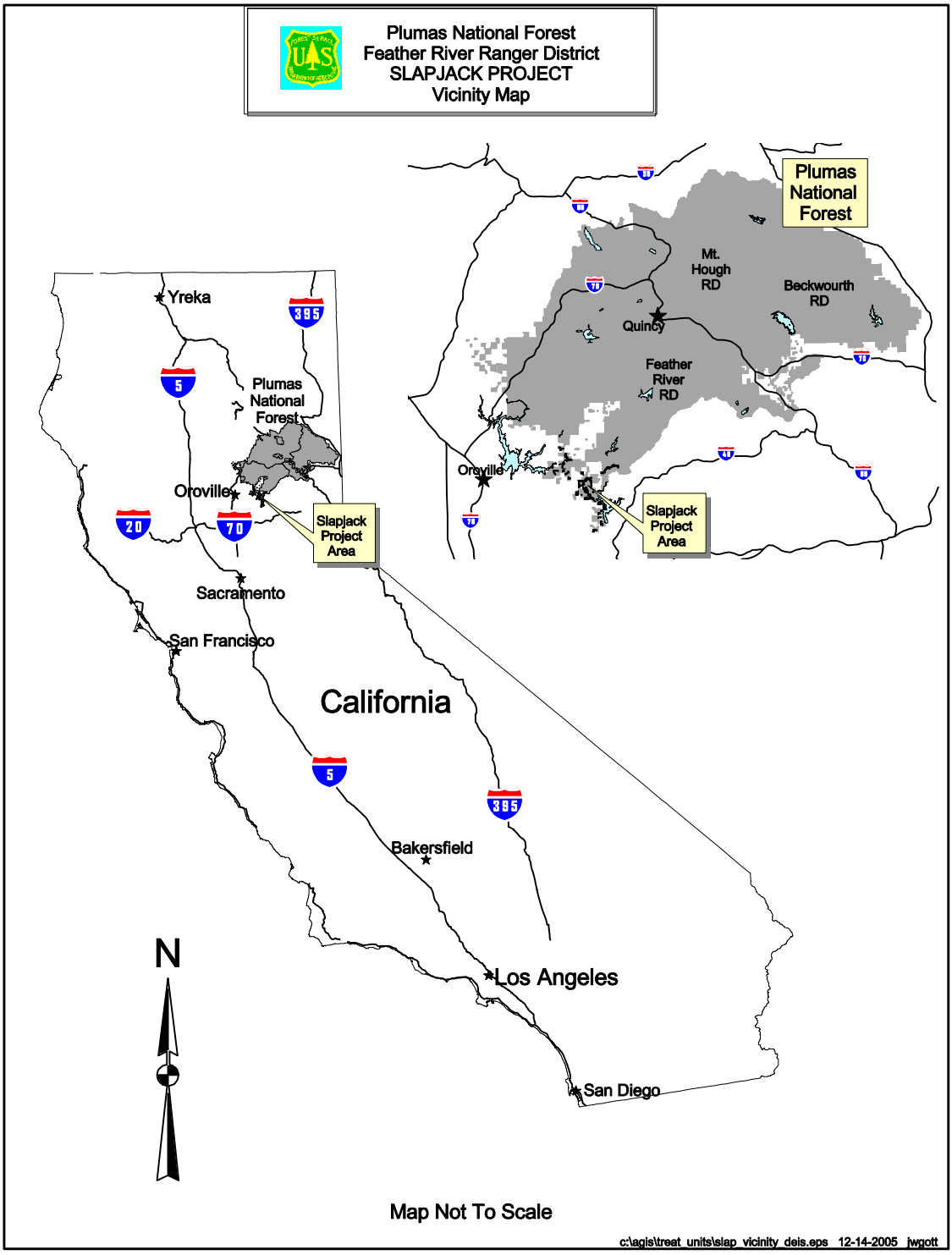

Figure 1-1. Slapjack Project vicinity map.

1.4 Purpose and Need

1.4.1 Introduction

The Forest Service Interdisciplinary Team developed five primary objectives for the purpose of and need for the Slapjack Project based on site-specific resource problems in the area, laws, and Forest Service direction. These objectives led to the development of specific treatments and activities (described in the "Alternatives" section of chapter 2) designed to maintain or establish a trend towards desired resource and social conditions.

The following sections list the project objectives, the underlying purpose and need for taking action, legislation and policy direction for the objectives, and measurement indicators. The measurement indicators are intended in the analysis to describe, quantify, and compare how well the proposed action and alternatives would meet the project objectives.

1.4.2 Project Objectives and Needs for Action

Objective 1:
Protect wildland rural communities from the risk of high-intensity wildfires.

Need for Action – Forest stands in the Slapjack Project area are crowded with brush that has become increasingly more flammable with age. In addition, the numbers of thin-barked, shade-tolerant trees (such as white fir, tanoak, and incense-cedar) have increased as a result of past fire suppression and management practices. These crowded stand conditions are increasing the risk of high-intensity fire by providing more continuous fuel from surface fuels to live fuels (brush, hardwoods, and conifers). Watershed health is at risk because a high-intensity, stand-replacing wildfire would degrade the quality of watershed runoff and soils.

There are seven communities in or adjacent to the project area (Brownsville, Challenge, Clipper Mills, Dobbins, Feather Falls, Forbestown, and Strawberry Valley). The total population in the project area is approximately 5,000 to 7,000 people, with hundreds of scattered houses and structures in the Wildland Urban Interface. Many of these local property owners are concerned about the threat of wildfire to their property due to the build up of forest fuels. A partial network of DFPZs has been proposed and implemented on the Plumas National Forest and on private lands in the project area (see figure A-8 in appendix A). The DFPZ network is currently incomplete in the Slapjack Project area.

Wildland fire control in the Slapjack Project area is the responsibility of the Nevada, Yuba Placer, and Butte Ranger units of the California Department of Forestry and Fire Protection; the Foothill Fire Protection District; and the Plumas National Forest. Current fuels conditions and access in the Slapjack Project area make firefighting difficult. Heavy brush and dense timber stands slow fireline construction and limit strategic control points, which are important for efficient wildfire control and firefighter safety. Some access roads in the project area are also overgrown with brush—this lengthens response time to wildfires and makes access difficult for suppression activities and assisting with evacuation.

Applicable Legislation and Policy Direction – 1998 HFQLG Act; 2004 Sierra Nevada Forest Plan Amendment (SNFPA) final supplemental EIS and Record of Decision; 1988 Forest Plan, as

amended by the 1999 HFQLG final EIS and Record of Decision; *National Fire Plan* of 2001; *Healthy Forest Restoration Act* of 2002.

Measurement Indicators Used in the Analysis for this Objective – Flame length, fire type (crown or ground surface), tree mortality, fuel loading, and canopy base height.

Achievement of Objective – Alternative A would not achieve the objective of protecting wildland rural communities from the risk of high-intensity wildfires. Alternatives B, C, D, E, F, and G would all meet this objective by constructing 4,419 acres of DFPZs. DFPZ construction would also reduce the threat of adverse watershed effects associated with a high-intensity wildfire. Alternatives B, E, and F propose the use of herbicide to maintain 1,954 acres of DFPZs. Alternatives C, D, and G propose to use underburning and mechanical treatments for maintenance—these alternatives would produce more particulate emissions from smoke and dust.

Objective 2:
Promote a healthy uneven-aged, multistoried, fire-resilient forest.

Need for Action – Many forest stands in the project area have unnaturally high numbers of shade-tolerant trees. These crowded stands are less fire resilient and are under stress from competition for water, light, and nutrients.

Analysis of the distribution of seral stage stands in the Slapjack Project area shows that the area is deficient in early seral stage stands (seedlings and saplings). Historically, 10 percent of the area was estimated to be in the early seral stage; however, only 2 percent of National Forest System lands in this area are currently in an early seral condition.

The Slapjack Project area is within the regional HFQLG Pilot Project. As such, an annual average of 8,700 acres of timber harvest using group selection is mandated across the Pilot Project area. The intent is to test the effectiveness of group selection in establishing an uneven-aged, multistoried, fire-resilient forest. To date, there have been no group selection harvests in the Slapjack Project area.

Applicable Legislation and Policy Direction – 1998 HFQLG Act; 2004 SNFPA final supplemental EIS and Record of Decision; and the 1988 Forest Plan, as amended by the 1999 HFQLG final EIS and Record of Decision.

Measurement Indicators Used in the Analysis for this Objective – Tree species composition, forest health (susceptibility to bark beetle infestation), stand structure, canopy cover, basal area, and tree density.

Achievement of Objective – Alternative A would not achieve the objective of promoting a healthy uneven-aged, multistoried, fire-resilient forest. Alternatives B, C, D, E, F, and G would all meet this objective by constructing the same 4,419 DFPZ acres and the same 148 individual tree selection acres. The difference in meeting this objective is in the number of group selection acres. Alternatives F and G would harvest 190 acres of group selections compared to 219 acres under alternatives B, C, D, and E.

Objective 3:
Contribute to the stability and economic health of rural communities.

Need for Action – There are several communities (within reasonable haul distance from the project area) that are highly dependent upon the forest products industry for jobs and revenues. The local factors influencing the economies of Butte and Yuba Counties include isolation from urban job markets, reliance on natural resource-based industries, and high seasonal fluctuations in employment. In the local environments, forest health and community economic health share interdependent goals. Timely timber sales in Butte and Yuba Counties contribute a proportional supply of timber to local communities that are highly dependent on the forest products industry.

Applicable Legislation and Policy Direction – 1998 HFQLG Act; 2004 SNFPA final supplemental EIS and Record of Decision; and the 1988 Forest Plan, as amended by the 1999 HFQLG final EIS and Record of Decision.

Measurement Indicators Used in the Analysis for this Objective – Number of direct and indirect jobs, total employee-related income, thinning, biomass removal, and fuel treatment revenues and costs.

Achievement of Objective – Alternative A would not contribute to the stability and economic health of rural communities. Alternatives B, C, D, and E would fully meet this objective. However, alternatives F and G would decrease the project's ability to meet this objective because 29 less acres of group selections would be harvested, resulting in a decrease in the creation of direct and indirect jobs and total employee income. Alternatives F and G would produce approximately two less jobs than alternatives B, C, D, and E. Employee income would be approximately $65,000 less under alternatives F and G than alternatives B, C, D, and E. Alternatives F and G would have an approximately $36,000 higher net value (revenues minus costs) than alternatives B, C, D, and E.

Objective 4:
Promote healthy aquatic and riparian ecosystems and reduce understory density in spotted owl habitat.

Need for Action – There are approximately 26 miles of National Forest System and nonsystem roads in the project area that have been identified as unnecessary. These roads are not being maintained and contribute to water quality impacts.

Several poorly designed or maintained culverts in the project area have created barriers for some aquatic-dependent species such as rainbow trout. The culverts are isolating fish populations and obstructing movement for their migration, reproduction, and survival.

Wet meadow habitat is being lost as a result of conifer encroachment, poorly located roads, and changes to hydrologic functions.

Past activities in the project area have caused some stream channel instability. Consequently, some streambanks are being undercut and widening.

Understory vegetation on approximately 180 acres of habitat for the California spotted owl is too dense, making it difficult for owls to hunt and capture prey. These areas are located within larger

areas of nesting, foraging, and roosting habitat known as Protected Activity Center YU024 (PAC YU024) and Spotted Owl Habitat Area B1 (SOHA B1).

Applicable Legislation and Policy Direction – 1998 HFQLG Act, *Clean Water Act*, *National Forest Management Act*.

Measurement Indicators Used in the Analysis for this Objective – Miles of roads decommissioned, feet of streambank stabilization, miles of fish habitat, acres of meadow, and acres of spotted owl habitat within PAC YU024 and SOHA B1 in high, moderate, or low suitability for foraging.

Achievement of Objective – The no-action alternative would not achieve this objective to promote healthy aquatic and riparian ecosystems because no improvements would occur that would enhance these resources. Alternatives F and G propose 29 less acres of group selections, which would reduce the Equivalent Roaded Area (ERA) and percent of the Threshold of Concern (TOC). However, overall there would be a less than 1 percent difference in the TOC between alternatives B, C, D, and E and alternatives F and G. This 1 percent difference is statistically insignificant because such a small difference in already highly disturbed watershed landscapes would not result in observably different conditions on the ground. The same number of culvert replacements for improved fish passage is proposed in all action alternatives (B through G). In all action alternatives, the treating of approximately 180 acres of California spotted owl habitat with a low-intensity underburn is expected to consume thick understory vegetation on the forest floor while maintaining the forest canopy. These changes would move conditions in these areas from low suitability for foraging to moderate suitability. Alternative A (no action) would not achieve the objective of reducing understory density in spotted owl habitat.

Objective 5:
Control the introduction and spread of noxious weeds.

Need for Action – Botanical surveys indicate the presence of Scotch, French, and some Spanish broom on approximately 10 acres. These high-priority noxious weeds are currently concentrated along roads and disturbed areas in the project area and have also been found spreading into DFPZs and group selection units. These noxious weeds can reduce the effectiveness of fuels reduction projects by forming thick walls of highly flammable vegetation. In addition, they compete with and alter native plant communities.

Applicable Legislation and Policy Direction – 1998 HFQLG Act; 2004 SNFPA final supplemental EIS and Record of Decision; 1988 Forest Plan, as amended by the 1999 HFQLG final EIS and Record of Decision; and Executive Order 13112 for the control of noxious weeds

Measurement Indicators Used in the Analysis for this Objective – Canopy cover, relative disturbance of the various project activities, and acres of weeds post-treatment.

Achievement of Objective – Alternative A would not achieve this objective. Alternatives C, E, G do not allow a true Integrated Pest Management (IPM) program and, consequently, would increase the potential cost and decrease the likelihood of achieving objective 5. Alternatives B, D, and F would likely be the most effective in achieving objective 5 because all of the control tools would be available for noxious weed management, resulting in a longer treatment period.

1.5 Laws, Regulations, EISs, and Other Direction that Influence the Scope of this EIS

1.5.1 Herger-Feinstein Quincy Library Group Forest Recovery Act

On October 21, 1998, the President of the United States signed the *Department of the Interior and Related Agencies Appropriations Act*, including section 401—the *Herger-Feinstein Quincy Library Group Forest Recovery Act* (HFQLG Act). The HFQLG Act states that the Secretary of Agriculture, acting through the Forest Service, and after completion of an EIS, shall conduct a pilot project (the HFQLG Pilot Project) for five years on federal lands in the Lassen and Plumas National Forests and the Sierraville District of the Tahoe National Forest.

The HFQLG 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. Full implementation of the HFQLG Pilot Project would result in an annual average of 8,700 acres of group selection across the Pilot Project area, consistent with protection of ecosystems, watersheds, and other forest resources; good silvicultural practices; and economic efficiency. The proposed group selection prescriptions of the Slapjack Project would contribute toward achieving this goal.

1.5.2 HFQLG EISs and Records of Decision (1999 and 2003)

The HFQLG Act final EIS was completed on August 17, 1999, and the Record of Decision was signed on August 20, 1999 (USDA Forest Service 1999a). The Record of Decision amended the land and resource management plans for the three National Forests (Plumas, Lassen, and Tahoe) and gave direction to implement the resource management activities required by the HFQLG Act. The Record of Decision on the HFQLG final supplemental EIS addressing DFPZ maintenance was adopted on July 31, 2003 (USDA Forest Service 2003a). In February 2003, the *Department of the Interior and Related Agencies Appropriations Act* was signed and extended the HFQLG Pilot Project legislation by another five years.

1.5.3 SNFPA Final Supplemental EIS (2004)

The Regional Forester signed the SNFPA final supplemental EIS Record of Decision in January 2004. The 2004 Record of Decision replaced the 2001 Record of Decision on the SNFPA final EIS and changed management direction to allow full implementation of the HFQLG Pilot Project, consistent with the goals identified in the HFQLG Act. The 2001 SNFPA final EIS and Record of Decision are incorporated by reference as adopted in the 2004 Record of Decision on the SNFPA final supplemental EIS.

The 2004 Record of Decision on the SNFPA final supplemental EIS directed the Plumas National Forest to implement the HFQLG Pilot Project, which includes creation of DFPZs for the proposed Slapjack Project, along with nearby DFPZs in the Lower Slate and South Fork project areas and treatments on private lands. These treatments are needed in order to limit the potential size and loss of resources (including homes) from large, high-intensity wildfire. The DFPZs are strategically located and designed strips of land where surface fuels (excess down woody material), ladder fuels, and canopy fuels are treated so that large, destructive canopy fires will lose intensity and transition to

surface fires. The DFPZs are wide enough to capture most short-range spot fires in the treated area and are designed to provide fire suppression personnel a safe location from which to take fire-suppression actions. DFPZs are usually located along roads, ridgetops, meadows, or rocky areas to enhance their effectiveness and accessibility.

1.5.4 Forest Plan Direction

The 1988 *Plumas National Forest Land and Resource Management Plan* (otherwise known as the "Forest Plan"), as amended by the 1999 HFQLG final EIS Record of Decision, and as amended by the 2004 SNFPA final supplemental EIS Record of Decision, guides the proposed action and alternatives. The 2004 SNFPA Record of Decision (page 68) displays the standards and guidelines applicable to the HFQLG Pilot Project area. Land allocations that apply to this proposal include Off Base and Deferred Lands, late-successional old-growth stands, California spotted owl Protected Activity Centers, Spotted Owl Habitat Areas, and National Forest System lands outside these allocations that are available for vegetation and fuels management activities.

1.5.5 Challenge Landscape Assessment (2006)

The Challenge Landscape Assessment identifies opportunities for improvement to the existing conditions found in the Slapjack Project area. The five objectives described above were derived from this report.

1.6 Decision Framework

The Responsible Official for this project, Forest Supervisor James M. Peña, will decide whether to implement the Slapjack Project as identified in the proposed action, implement the project based on alternatives to the proposed action, or not implement the project at this time.

1.7 Project Schedule

The Responsible Official expects to make a decision on this project in September of 2006, with implementation to begin in spring 2007.

1.8 Public Involvement

1.8.1 Scoping Process

The Forest Service began collaboration in 2003 with a group of organizations interested in reducing wildland fire risk to communities and the environment in Butte and Yuba Counties. The Forest Service met regularly with a core group comprised of representatives from the Natural Resource Conservation Service; California Fire Safe Council; Butte Fire Safe Council; Yuba Watershed Protection and Fire Safe Council; the Quincy Library Group; Rancherias; industrial timberland owners, including Soper Wheeler and Chy Company; and other private landowners. Other agencies involved include the Bureau of Land Management and California Department of Forestry

and Fire Protection. The Slapjack Project grew from this collaborative effort. In September 2004, the Forest Service helped organize the Eastern Butte / Yuba Fire Prevention Planning Tour, sponsored by the Butte Fire Safe Council and Yuba Watershed Protection and Fire Safe Council. The goal of the tour was to educate and promote a collaborative and coordinated planning process to address fuels reduction and fire prevention on a landscape scale.

Collaboration with the Butte Fire Safe Council and Yuba Watershed Protection and Fire Safe Council has been ongoing since 2003. Forest Service personnel have been in regular attendance at monthly Fire Safe Council meetings and have kept the Councils and other stakeholders apprised of changes in project status.

In May 2005, a public meeting was held in Forbestown to discuss opportunities in the six watersheds to be analyzed in the Challenge Landscape Assessment, including the Slapjack Project. Several attendees submitted comments, which were considered during the development of the proposed action and continue to shape the evaluation of the different management scenarios presented in this EIS. On September 14, 2005, a letter describing the proposed action (the “scoping” letter) was mailed to approximately 400 individuals and organizations, including local residents, Native American tribes, and federal, state, and local agencies. The letter was followed by the September 16, 2005, *Federal Register* publication of the Notice of Intent to prepare an EIS for the Slapjack Project. The Notice of Intent requested that comments on the proposed action be received within 30 days. More than 20 comment letters were received in response to publication of the Notice of Intent.

1.8.2 Scoping Issues

Issues are points of discussion, debate, or dispute about the potential environmental impacts of a proposed action. As such, issues influence the design and evaluation of alternatives to the proposed action. Issues can be categorized as either nonsignificant or significant. The Council on Environmental Quality (CEQ) regulations for implementing the *National Environmental Policy Act* guide federal agencies in handling nonsignificant issues by directing them to “. . . identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review” (CEQ section 1506.3; 40 Code of Federal Regulations [CFR] 1501.7).

Nonsignificant issues are those that are (1) already addressed by law, regulation, forest plan, or other higher level decision; (2) beyond the scope of the purpose and need described in the Notice of Intent; (3) not connected to the proposed action; (4) conjectural and not supported by scientific or factual evidence; or (5) irrelevant to the decision to be made.

The Forest Service Interdisciplinary Team (ID Team), through the interdisciplinary process and in coordination with the Responsible Official, looked at internal issues (brought up by the ID Team) and external issues (from public scoping comments) to provide a basis for the analysis of environmental effects (contained in chapter 3 of this EIS). To narrow the focus of the environmental analysis, the ID Team focused on issues that provided measurable elements to the proposed action and emphasized the most important environmental effects. These are elements of the ecosystem that can be measured to indicate an increase or decrease in trends in ecosystem health. To compare these elements, indicators and appropriate measures were developed to show the differences between the alternatives and provide a clear basis for a decision to be made by the Responsible Official. Thus, the

purpose and need, range of alternatives, environmental effects, and final decision will be connected using the scoping comments, internal issues, and the corresponding indicator measures. The issues for the Slapjack Project are summarized below.

Issue Statement 1: Some members of the public are opposed to the use of herbicides.

Opposition to the use of herbicides mainly centered on concerns about people and animals being exposed to or ingesting herbicides. Commenters expressed concern about the potential for herbicides to be toxic to people, especially sensitive populations such as those with compromised immune systems, children, and the elderly. Commenters expressed concern about the risk of contamination of groundwater, private water systems, and wells. There was a concern about the cumulative and long-term effects on Native people and their cultural practices due to herbicide exposure on land and through water. There was a concern about herbicides and potential toxicity to amphibians. There was concern about people who live near the project area and whether people would need to stay away from the project area.

There were also concerns that herbicide use would not be effective and that using herbicides to create the DFPZs would make them more flammable. There was concern that using herbicides to eradicate invasive species would facilitate establishment of another invasive weed species rather than restoring native species.

The indicator measures for this issue include

1. Acres and quantity of herbicide (as a means to evaluate potential exposure)
2. Cost per acre of treatment
3. Potential exposure (as estimated by production rates for different treatment methods and total number of days required to complete an activity)

Issue Statement 2: Implementing ground-disturbing activities in watersheds that are approaching or over the Threshold of Concern increases the risk of adverse effects and cumulative watershed effects.

In the existing condition, 11 subwatersheds are over the Threshold of Concern and 8 other subwatersheds are approaching the Threshold of Concern. The Forest Service Region 5 Cumulative Off-Site Watershed Effects Model (Equivalent Roaded Area) rating reflects existing subwatershed condition and resulting impacts on the aquatic systems.

The indicator measure for this issue includes

1. The Equivalent Roaded Area score compared to the Threshold of Concern using methods derived from the Region 5 Cumulative Off-Site Watershed Effects Model.

1.8.3 Public Comment Period on the Draft EIS

The draft EIS was distributed in February 2006 for a 45-day comment period. Over 50 public and agency comments were received. Due to the scope and length of comments, a grouped response to comment table was developed and is included in appendix H of this EIS, along with agency letters in compliance with 40 CFR 1503.4. The individual comment letters from non-agency commenters are available upon request and are located in the project record.

1.9 Permits, Licenses, and Other Consultation Requirements

No federal permits, licenses, or entitlements are necessary to implement the proposed project. State requirements, based on federal laws, and administered by the County Agricultural Commissioner for air quality management and herbicide use, will be followed. These requirements include burning only on permissive burn days, or receiving a special variance prior to ignition, as well as the use of Certified Pesticide Applicators for herbicide treatments. Smoke permits are required from the Feather River and Butte County Air Quality Management Districts. Timber Harvest Activity Waivers are required from the California Regional Water Quality Control Board.

The Forest Service consulted with federal and state agencies, including the United States Fish and Wildlife Service and California Department of Fish and Game, during the development of this EIS. Details of these consultations are in “Chapter 4: Consultation and Coordination.” In addition, the Forest Service consulted the following federally recognized tribes and interested and affected tribes: Mooretown Rancheria, Enterprise Rancheria, Berry Creek Rancheria, Chico Band of Mechoopda Indians, and the Konkow Valley Band of Maidu.

1.10 Document Structure

This *Slapjack Project Final Environmental Impact Statement* varies slightly from the organization established by CEQ regulations (40 CFR 1500-1508). This document has a combined “Affected Environment and Environmental Consequences” chapter in order to provide consolidated information on each resource. The list of preparers and list of agencies, organizations, and persons to whom copies of this EIS have been sent are combined into “Chapter 4: Consultation and Coordination” rather than having two very short chapters. This EIS consists of the following chapters:

- **Chapter 1: Purpose of and Need for Action**
- **Chapter 2: Alternatives**
- **Chapter 3: Affected Environment (Existing Conditions) and Environmental Consequences**
- **Chapter 4: Consultation and Coordination**
- **Acronyms, Glossary, Index, and References**
- **Appendices**

The document also includes a cover sheet, summary, and table of contents consistent with the regulations.

Chapter 2. Alternatives

2.1 Introduction

The United States Department of Agriculture (USDA) Forest Service, Plumas National Forest, Feather River Ranger District proposes to reduce fire hazards around rural communities by constructing Defensible Fuel Profile Zones (DFPZs), harvesting trees using group selection and individual tree selection methods, performing associated road system improvement work, and carrying out a range of aquatic and wildlife habitat improvement activities near Forbestown, Challenge, Feather Falls, and Clipper Mills, California.

Ground-based and skyline logging systems would be used to construct the DFPZs and to conduct timber harvest in individual tree selection and group selection units. Underburning, mastication, and manual cutting, piling, and burning would be used to construct DFPZs in the units with no commercial timber harvest. Several of the action alternatives propose the use of herbicides to kill or suppress tanoak regrowth in some DFPZ units and to control infestations of noxious weeds (also called nonnative invasive plants) such as Scotch, Spanish, and French brooms.

2.2 Description of the Alternatives

The Council on Environmental Quality (CEQ) regulations for implementing the *National Environmental Policy Act* (NEPA) require federal agencies to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 Code of Federal Regulations [CFR] 1502.14).

The Forest Service Interdisciplinary Team (ID Team) reviewed public comments and data collected during the 2002–2005 field seasons to identify issues related to the proposed action. The ID Team focused on issues that provide comparative measures between the proposed action and other management scenarios considered for this project. The ID Team, in conjunction with the Responsible Official, developed alternatives to the proposed action in response to the following issues: (1) use of herbicides and (2) management activities in watersheds over the Threshold of Concern.

To provide a clear basis for choice among the options, indicator measures were used to compare how each alternative responded to the two issues listed above. The seven alternatives listed below were analyzed in detail by resource area (see “Chapter 3: Affected Environment and Environmental Consequences”). The treatments proposed for each alternative range from maintaining existing canopy cover (up to 90 percent in the no-action alternative) to an average of 40 percent canopy cover in all action alternatives.

- **Alternative A** (the no-action alternative) addresses the CEQ requirement to analyze a no-action alternative and the potential effects of taking no action.
- **Alternative B** (the proposed action) calls for approximately 4,400 acres of DFPZ construction, 219 acres of group selection, and 148 acres of individual tree selection; transportation system improvements; the use of Intergrated Pest Management (IPM) to

control noxious weeds on 33 acres; and wildlife, aquatic, and riparian ecosystem restoration. This alternative includes the use of herbicides for preventive maintenance of DFPZs (1,954 acres) and as part of IPM to control noxious weeds on a maximum of 31 of the 33 total acres.

- **Alternative C** proposes the same suite of actions as alternative B, but herbicides would not be used for preventive maintenance of DFPZs or as a part of IPM to control noxious weeds.
- **Alternative D** (Forest Service preferred alternative) would implement DFPZs, group selection, and individual tree selection; transportation system improvements; noxious weed control, including the use of herbicides on a maximum of 31 of the 33 total acres as a part of IPM; and wildlife, aquatic, and riparian ecosystem restoration as described under alternative B. Herbicides would not be used, however, for preventive maintenance of DFPZs.
- **Alternative E** would implement DFPZs, group selection, and individual tree selection; transportation system improvements; control of noxious weeds; and wildlife, aquatic, and riparian ecosystem restoration as described under alternative B. Herbicides would not be used as a part of IPM to control noxious weeds.
- **Alternative F** would implement DFPZs and individual tree selection; transportation system improvements; control of noxious weeds; and wildlife, aquatic, and riparian ecosystem restoration as described under alternative B. However, this alternative calls for 190 acres of group selection, instead of 219 acres, because group selections have been dropped when they are located in subwatersheds predicted to be over the Threshold of Concern. There are no individual tree selection treatments located in subwatersheds over the Threshold of Concern. This alternative includes the use of herbicides for preventive maintenance of DFPZs and as a part of IPM to control noxious weeds on a maximum of 31 of the 33 total acres.
- **Alternative G** would implement DFPZs and individual tree selection; transportation system improvements; control of noxious weeds; and wildlife, aquatic, and riparian ecosystem restoration as described under alternative B. Like alternative F, this alternative calls for 190 acres of group selection because group selections have been dropped when they are located in subwatersheds predicted to be over the Threshold of Concern. There are no individual tree selection treatments located in subwatersheds over the Threshold of Concern. Herbicides would not be used for preventive maintenance of DFPZs or as a part of IPM to control noxious weeds.

2.2.1 Alternative A: No Action

Alternative A, the no-action alternative for the Slapjack Project, would not meet the intent of the 1988 *Plumas National Forest Land and Resource Management Plan* (the “Forest Plan”), as amended by the 1999 Record of Decision on the *Herger-Feinstein Quincy Library Group Forest Recovery Act Final Environmental Impact Statement* (HFQLG Act final EIS) and the 2004 Record of Decision on the Sierra Nevada Forest Plan Amendment (SNFPA) final supplemental EIS. The desired condition

set forth in the HFQLG Act of an uneven-aged (all-aged), multistory, fire-resilient forest would not be achieved, and the ecological health of the forest would not be improved and maintained.

Under alternative A, no fuels treatments, DFPZ construction, group selection or individual tree selection harvests, transportation system improvements, wildlife habitat improvements, or watershed restoration would be implemented to accomplish the purpose and need.

Under this alternative, forest conditions would continue to change in response to natural and human factors. With fire exclusion and suppression, an understory of fir and cedar has developed beneath the overstory, creating a multistoried stand with moderate to dense canopy closure. The canopy closure currently ranges from 31 to 90 percent in California Wildlife Habitat Relationship (CWHR) size class 4 and 5 stands (cover from trees less than 6 inches diameter at breast height [dbh] do not count toward CWHR canopy cover). The canopy closure for the plantations and other stands ranges from 12 to 82 percent. Trees in stands considered for treatment would continue to grow, and canopy closure in these stands, especially in overstocked stands, would continue to increase. Brush and smaller trees would be shaded out and die, thus increasing ladder fuels and fire hazard. Conifer encroachment on riparian areas and meadows would gradually increase. Compared to alternative B (the proposed action), there would be an increased risk of high-intensity wildfire, which could cause substantial loss of forest cover, potential losses in adjacent wildland rural communities, and degradation of watersheds and wildlife habitat. Insect attacks could cause tree mortality, which would increase fire hazard. No fuel reduction or restoration opportunities would be implemented. If the Slapjack Project is not implemented, the main National Forest System roads in the area would remain in a condition that is less than satisfactory, allowing poor road access for the public and fire management to persist in some areas. Roads in poor condition would continue to accelerate erosion processes, thus degrading water quality and aquatic habitat and increasing cumulative off-site watershed effects. Roads in good condition would continue to provide access for emergency response, woodcutting, mining, sightseeing, and other recreational activities.

This EIS describes the effects of the no-action alternative because it serves as a baseline for comparison of the effects of the action alternatives. Alternative A complies with the CEQ regulations for implementing NEPA (40 CFR 1502.14(d)).

2.2.2 Action Alternatives

The draft EIS presented the analysis of six action alternatives—they have been carried forward to this final EIS. The action alternatives are the same in terms of DFPZ construction and individual tree selection harvest; canopy cover and diameter limits for tree removal; road system improvements; and restoration of wildlife, aquatic, and riparian ecosystems (see table 2-1). All action alternatives address the overstory crown design criteria of 40 percent canopy cover described in “Appendix J: Fire and Fuels” of the HFQLG Act final EIS. The action alternatives differ in either the number of acres of group selection harvest treatments or by the method of DFPZ maintenance and noxious weed control; thus, they vary in cost, herbicide use, treatment effectiveness, and watershed impacts. An example of a proposed treatment schedule for typical DFPZ, individual tree selection, and group selection units is displayed in appendix B.

Table 2-1. Summary of proposed treatments, by alternative.

	Alternatives						
	A	**B**	**C**	**D**	**E**	**F**	**G**
DFPZ Construction (Acres)							
1. Manual Treatments	0	87	87	87	87	87	87
2. Mechanical Treatments	0	3,671	3,671	3,671	3,671	3,671	3,671
3. Thermal Treatments	0	661	661	661	661	661	661
4. Chemical Treatments	0	0	0	0	0	0	0
Totals	**0**	**4,419**	**4,419**	**4,419**	**4,419**	**4,419**	**4,419**
DFPZ Preventive Maintenance 2-3 Years After Construction (Acres)							
1. Chemical (imazapyr)	0	1,954	0	0	1,954	1,954	0
Group Selection Harvest (Acres)							
1. Inside DFPZ units	0	123	123	123	123	99	99
2. Outside DFPZ units	0	96	96	96	96	91	91
Total	**0**	**219**	**219**	**219**	**219**	**190**	**190**
Individual Tree Selection (Acres)							
1. Outside DFPZs	0	148	148	148	148	148	148
Noxious Weed Control (Acres)							
1. IPM: Manual, mechanical, and thermal tactics only	0	0	33	0	33	0	33
2. IPM: Manual, mechanical, thermal, and chemical tactics[a]	0	33	0	33	0	33	0
Transportation System Improvements (Miles)							
1. Temporary road construction followed by decommissioning after implementation		6	6	6	6	6	6
2. Road reconstruction	0	18	18	18	18	18	18
3. Road decommissioning	0	19	19	19	19	19	19
4. Road closure	0	7	7	7	7	7	7
5. Temporary spurs	0	4 new 4 existing	4 new 4 existing	4 new 4 existing	4 new 4 existing	4 new 4 existing	4 new 4 existing
Wildlife and Aquatic Habitat Improvements							
1. Culvert upgrades to improve fish passage	0	6	6	6	6	6	6
2. Meadow restoration (acres)	0	59	59	59	59	59	59
3. Streambank stabilization (feet)	0	1,200	1,200	1,200	1,200	1,200	1,200
4. Underburn in spotted owl habitat (acres)	0	180	180	180	180	180	180

Note:

a. The herbicide triclopyr would be used to treat a maximum of 31 of the 33 acres proposed.

2.2.2.1 Alternative B (Proposed Action): Implement DFPZs, Group Selection, and Individual Tree Selection; Maintain Portions of DFPZs with Herbicides; and Control Noxious Weeds with Herbicides, Mechanical and Manual Methods, and Prescribed Burning

Alternative B is the original action proposed to the public during the scoping process in September 2005. It is designed to move the project landscape toward a more fire-resilient condition, characterized by uneven-aged (all age), multistoried, fire-resilient stands. The indicators include cost of treatments, potential exposure (as measured by production rates and person days of labor), and extent of herbicide treatment.

Alternative B proposes the following actions:

- Reduce fire hazards by constructing approximately 15 miles of DFPZs on approximately 4,400 acres.
- Harvest trees using group selection (219 acres) and individual tree selection (148 acres) harvest methods.
- Perform road work that includes approximately 7 miles of road closure, 19 miles of road decommissioning, 18 miles of reconstruction, 6 miles of new temporary road construction followed by decommissioning, 4 miles of new temporary spur construction, 4 miles of light maintenance of existing spurs, and 2 miles of road resurfacing as part of a watershed improvement project.
- Restore and enhance aquatic, native plant, and wildlife habitat by removing or upgrading six culverts for fish passage improvement; restoring 55 acres of meadow; stabilizing 1,200 feet of streambank; and reducing fuel loads on 180 acres of spotted owl habitat through underburning.

Treatment 1 – DFPZ Construction. A DFPZ is a strategically located and designed strip of land (averaging approximately 0.25 mile wide) on which surface fuels (both living and dead), ladder fuels, and canopy fuels are treated (via removal) in order to limit the potential size and loss of resources (including homes) from large, high-intensity wildfire. DFPZs are wide enough to capture most short-range spot fires within the treated areas and are designed to bring crown fires into surface (ground) fire conditions, as well as to provide safe locations for fire suppression personnel to take fire-suppression actions during 90th percentile weather conditions. DFPZs are usually located along roads, ridgetops, meadows, or rocky areas to enhance their effectiveness and accessibility. Approximately 15 miles of DFPZs would be constructed on approximately 4,400 acres along the ridges (see figure A-1 in appendix A; this figure is comprised of five maps).

These fuel reduction units have been specifically designed to complement similar treatments occurring on the adjacent network of DFPZ projects. The Slapjack DFPZs would be part of a larger strategic system of DFPZs on the Plumas, Lassen, and Tahoe National Forests, as well as fuel-reduction treatments on adjacent private timber lands. The proposed fuel treatments would be consistent with the goals of the National Fire Plan, and have proved to be successful in recent fire activity on the Plumas National Forest.

The DFPZs would be situated to avoid HFQLG Act Off Base and Deferred Lands, California spotted owl Protected Activity Centers, cultural resource sites, Spotted Owl Habitat Areas, federally listed Threatened and Endangered plant species, and old-forest stands (California Wildlife Habitat Relationship [CWHR] size classes 5M, 5D, and 6) in late-successional old-growth rank 4 and 5 stands.

Treatments throughout the DFPZs would involve thinning from below to remove ladder and canopy fuels in order to increase ground-to-crown height, spacing between trees, and spacing between tree crowns. Treatment prescriptions would call for removal of the smaller, suppressed, and intermediate crown-class trees; removal of some codominant and dominant trees; and retention of the largest trees to achieve the target canopy cover or spacing guidelines. Thinning in DFPZs would be intended to reduce canopy cover to approximately 40 percent in those units where it presently exceeds that amount.

Plantations do not have any canopy cover restrictions and would be thinned to a residual spacing of approximately 18 to 25 feet (depending on average residual tree size) to allow retention of the healthiest, largest, and tallest conifers and black oaks. Where California black oak is present in certain DFPZs, an average basal area of 25 to 35 square feet per acre would be retained for oaks over 15 inches dbh. Smaller oaks may be retained if determined necessary for future recruitment.

An estimated 230 acres (9 percent) of the total 5,612 acres of the treatment units would be within Riparian Habitat Conservation Areas (RHCAs). Treatments in RHCAs would include underburning, hand piling, and hand thinning, except in some plantations where mastication or harvest is prescribed. In these plantations, the mechanical treatment would remove or masticate trees to within 25 to 50 feet of the edge of the stream. Underburns would be ignited above the RHCAs, and fire would be allowed to back downslope into them.

Underburning, machine pile and burning, mastication, or hand piling and burning would be used to treat residual slash, pre-existing fuels, and shrubs. After completion of burning, residual fuels less than 3 inches in diameter would not exceed 5 tons per acre. Where down logs exist, an average over the treatment unit of 10 to 15 tons per acre of large down wood would be retained. An average of four snags per acre would be retained. Firelines would be constructed around machine piles, hand piles, and underburn units to prevent fire escape.

Treatments and prescribed burn objectives would depend upon terrain and existing surface and ladder fuel conditions in each unit and would meet the design criteria presented in “Appendix J: Fire and Fuels” of the 2003 HFQLG final EIS and the 2004 SNFPA Record of Decision. The proposed treatments in DFPZs are summarized in table 2-2.

Table 2-2. Proposed treatments in Slapjack Project DFPZs.

Primary Treatment	Secondary Treatment[a]	DFPZ Treatment Acres	Acres of Group Selection	Total Acres of Treatments
Total acres of harvest in DFPZs and group selection: 2,561				
• Mechanized Thinning and Biomass Removal (CWHR Size Class 5)	Underburning or mastication	810	55	865
• Thinning and Biomass Removal (CWHR Size Class 4)	Underburning or mastication	1,256	61	1,317
• Thinning and Biomass Removal (Plantations)	Mastication	379	0	379
Total acres of mastication: 1,110				
• Mastication (Plantations)	None	407	0	407
• Mastication (Nonplantations)	Underburn	696	7	703
Total acres of hand cut, pile, and burn: 87				
• Hand cut and pile	Burn piles	87	0	87
Total acres of underburning: 661				
• Underburning	None	661	0	661
	Total Acres	**4,296**	**123**	**4,419**

Note:

a. The secondary treatment method would be determined based on residual ladder and surface fuels and available burning windows.

- **Mechanized thinning and biomass removal** – Treatments throughout the DFPZs would involve thinning from below to remove ladder and canopy fuels in order to increase ground-to-crown height, spacing between trees, and spacing between tree crowns. Approximately 40 percent canopy cover would be retained in all treatment units, except in plantations. The priority for thinning would be the removal of the smaller, suppressed, and intermediate-crown class trees, and removal of some codominant and dominant trees with crowns underneath and adjacent to healthy large trees. The preferred species for residual trees are shade-intolerant species where they exist. In order of preference, the shade-intolerant species are ponderosa pine, black oak, Jeffrey pine, sugar pine, Douglas-fir, incense-cedar, and true fir. For stands that are not in plantations, the spacing of residual conifers would be approximately 25 feet apart (plus or minus 6.25 feet), to allow for retention of the healthiest, largest, and tallest conifers and to avoid creating openings without going below a minimum of 40 percent canopy cover for the CWHR size class 4 stands. The CWHR size class 3 stands and stands in plantations do not have any canopy cover restrictions. Sawlog diameter limits would range from 9 to 29.9 inches dbh, and biomass limits would be from 3 to 8.9 inches dbh. All trees 30 inches dbh or larger would be retained, unless removal was required for operability.

- **Mastication –** Woody shrubs and trees would be masticated using mechanical ground-based equipment to grind harvest residue or thinnings, except in those portions of RHCAs where mechanical treatment would not be allowed. Shrubs and trees less than 10 inches

dbh would be masticated, unless the trees are needed for proper spacing. Most masticated trees would be less than 6 inches dbh. Spacing of residual conifers and black oaks in plantations would range from 18 feet to approximately 25 feet apart. The spacing would be wider in units with larger size trees, but 40 percent canopy cover would be retained. This would allow retention of the healthiest, largest, and tallest conifers and black oaks and would avoid creating openings. Underburn would be the final treatment where objectives (fuel loads less than 5 tons per acre) are not being met with mastication.

- **Hand cutting and piling of trees and shrubs and pile burning** – Shrubs and trees that are 1 to 6 inches dbh would be manually cut from beneath overstory trees, and/or aggregations of small-diameter conifers or plantation trees would be thinned. The cut trees, shrubs, and existing slash would be manually piled and burned. The spacing of residual conifers and black oaks would be approximately 18 feet (plus or minus 4.5 feet) to allow retention of the healthiest, largest, and tallest conifers and black oaks and to avoid creating openings.

- **Underburning** – A prescribed burn under an existing canopy of trees (hardwoods or conifers) would be designed to reduce excess live and dead vegetation. Firelines would be constructed by mechanical or manual methods. This type of burning would be initiated when fuel moistures are low enough to carry fire and still be within prescription parameters. Burning would only be initiated on “Burn Days” designated by the California State Air Quality Control Board.

- **Firelines**

  – *Hand lines* would be scraped to mineral soil to a minimum width of 2 feet and vegetation cleared to a minimum width of 6 feet. Dead fuel would be scattered away from the mineral soil scrape to reduce fireline intensities.

  – *Machine lines* would be scraped to mineral soil to a minimum width of 6 feet and vegetation cleared to a minimum width of 10 feet.

- **Hand thinning and piling in RHCAs** – Depending on local site conditions, hand thinning would be used in the RHCAs where mechanical equipment is excluded. In such areas, conifers from 3 feet in height to 6 inches in diameter would be hand thinned to a spacing of about 15 feet. All hardwoods and riparian vegetation would be retained. Wherever possible, hand piles would be located away from riparian vegetation to prevent scorching.

- **Preventive maintenance of DFPZs** – Herbicides are proposed to maintain DFPZ effectiveness on 1,954 acres in stands where tanoak makes up 10 percent or more of the stand composition by basal area, and where canopy cover would be reduced to 40 percent. Herbicides have been shown to be most efficient and effective in delaying or preventing the buildup of understory fuels (by changing vegetation from shrubs to grasses, forbs, or ferns) when used within approximately two years of the initial treatment (HFQLG final supplemental EIS, page 22). The 28 DFPZ units (1,954 acres) proposed for preventive maintenance are listed in appendix B and shown on figure A-2 in appendix A. For the

2,456 acres in the DFPZ units not proposed for herbicide treatment, maintenance would follow the schedule outlined in the HFQLG final supplemental EIS for mechanical, hand, and prescribed fire treatments, with the first maintenance occurring approximately 10 to 20 years after DFPZ construction. Because these activities would not be implemented for about 10 years, they are not proposed at this time.

– Tanoak and shrub regrowth on approximately 1,954 acres in the project area would be treated with the herbicide imazapyr. A non-ionic surfactant would be added to the mix to increase the effectiveness of imazapyr by helping it spread over and penetrate the leaves. Two additives (or adjuvants – substances that help the effectiveness of herbicides) would be used for this project: the surfactant SYL-TAC® (or equivalent seed oil / silicone blend) and the marker dye Hi-Light® Blue (or equivalent) to indicate where herbicides have been applied. Imazapyr is the herbicide most widely used in forestry applications in Butte, Plumas, and Yuba Counties. The Slapjack Project proposes to use the same application rates of imazapyr (see table C-1 in appendix C) as analyzed in the HFQLG final supplemental EIS; therefore, a separate human health risk assessment is not required. The hazard analysis, exposure assessment, dose response assessment, risk characterizations, tables, and worksheets that pertain to imazapyr are hereby incorporated by reference from appendix G of the HFQLG final supplemental EIS. More information about herbicides and public and worker safety is found in the "Human Health and Safety" section of chapter 3 and appendix C of this EIS.

- **Threatened, Sensitive, Proposed, and Special Interest (collectively called "Rare") plant species** – Certain rare plant species have been located in the proposed DFPZ units, and treatment would depend on the abundance of plants in the treatment unit and the particular characteristics of the species. Mitigations (see appendix F), including Limited Operating Periods and controlled areas, would delay proposed treatment until the species is no longer in leaf and flowering. Another mitigation would include marking plants to protect them from proposed treatments. In some cases, an underburn may be prescribed to reduce excess live and dead vegetation. Firelines would be constructed by manual means only to avoid damaging rare plants. This type of burning would be initiated when fuel moistures are low enough to carry fire within prescription parameters, preferably in the fall.

Treatment 2 – Group Selection. Group selection would be conducted on approximately 219 acres in and adjacent to the DFPZ treatment units (see table 2-3 below and figure A-1 in appendix A; figure A-1 consists of five maps). The group selection units are listed in tables B-4 and B-5 in appendix B. Group selection would involve the harvest of trees less than 30 inches dbh from small (less than 2 acres) areas dispersed throughout the project area, resulting in uneven aged (all-aged) forests across the landscape. The groups would range in size from 0.5 acre to 2 acres and average about 1.5 acres. Group selection would be designed to promote regeneration of an additional cohort (group) of shade-intolerant, fire-resilient species and to develop a variety of stand structures across the landscape to increase resilience to disturbances such as fire, drought, and pests. Where possible, black oaks would be avoided in the placement of the groups. In DFPZ treatment units, the total acreage of group selections would not exceed 10 percent of the total DFPZ unit area. Outside of

DFPZs, groups would be placed at a rate of approximately 11.4 percent of the unit area, although they could be placed at up to 20 percent of the stand area in some units. Groups would generally be located on the fringe of DFPZs and away from roads and other primary control points (refer to "Appendix J: Fire and Fuels" of the HFQLG final EIS).

Table 2-3. Proposed acres of group selection timber harvest.

Allocation	Analyzed Stand Acres	Acres Available for Group Selection	Group Selection Acres	Number of Groups
Inside of DFPZs	4,600	2,289	123	83
Outside of DFPZs[a]	1,012	843	96	64
Totals	**5,612**	**3,132**	**219**	**147**

Note:

a. In three units, individual tree selection would be conducted in the forested area surrounding the proposed group selection openings. See the section below titled "Treatment 3 – Individual Tree Selection (Area Thinning)" for more information.

There are approximately 3,132 acres available for group selection in the Slapjack Project area. This total takes certain land allocations into account, meaning that implementation of group selection may not be possible on all 5,612 acres that were analyzed for group selection placement (refer to table 2-3 above). Group selection harvest units would not be located in HFQLG Act Off Base and Deferred Lands; spotted owl and northern goshawk Protected Activity Centers; Spotted Owl Habitat Areas; recreation sites; Challenge Experimental Forest; CWHR size class 2 stands; Riparian Habitat Conservation Areas; areas containing cultural resources; Threatened, Endangered, Proposed or Sensitive plant populations; and late-successional old-growth size rank 4 and 5 stands.

The treatment types that would be implemented in group selection units are described below. The generalized silvicultural prescription schedules are included in appendix B.

- **Timber harvest** – Trees (including hardwoods) that would be removed would be less than 30 inches dbh, except larger trees may be removed on an incidental basis to allow for operability, if approved by a Plumas National Forest employee officially designated under the appropriate timber sale or service contract by the Contracting Officer. Desirable conifers (those that are undamaged, healthy, and shade intolerant) and all black oaks greater than 30 inches dbh would be retained.

- **Site preparation** – Machine piling and burning or hand piling and burning would be used to treat residual slash, pre-existing fuels, and shrubs in group selection openings. After completion of burning, residual fuels (less than 3 inches in diameter) would not exceed 5 tons per acre. Where down logs exist, an average over the treatment unit of 10 to 15 tons per acre of large down wood would be retained. In stands scheduled for mastication, or stands that would not receive any secondary treatment, hand lines would be constructed around machine piles and hand piles to prevent fire escape.

- **Reforestation** – Approximately five years after harvest in group selection openings, a combination of natural regeneration and plantings would be used to achieve desired

stocking levels of new stands dominated by shade-intolerant fire-resilient species (such as ponderosa pine, Douglas-fir, black oak, and sugar pine).

- **Release** – These treatments would be used to control vegetation that is competing with planted and naturally regenerated trees. Competing plants would include noxious weeds that are present or have re-invaded the area after site preparation treatments. To be effective, release treatments would involve the removal of vegetation in a 5-foot radius around each tree. Release work should be timed and coordinated with fire management staff to reduce burn intensities and improve plantation survival.

Treatment 3 – Individual Tree Selection (Area Thinning). Individual tree selection harvest, or area thinning (called for in the Record of Decision on the SNFPA final supplemental EIS, table 2 on pages 68–69), would be conducted on about 148 acres in three units surrounding some group selections in the Slapjack Project area that are outside of DFPZs (see figure A-1 in appendix A and table B-6 in appendix B). Individual tree selection would enhance the health and vigor of the stand. A sanitation cut, combined with thinning from below, would be designed to prevent the spread of insects and disease and reduce overstocking. Treating areas immediately around group selection would leave the stand in a more vigorous state by removing the diseased, decadent, and suppressed trees and would also improve the economic efficiency of the project.

Harvesting would be done with whole-tree ground-based and cable logging systems. Slash from harvesting activities would be piled and burned. The individual tree selection prescriptions would be designed to meet Forest Plan standards set forth in the 2004 Record of Decision on the SNFPA final supplemental EIS (page 69). This would include the retention of 50 percent canopy cover after treatment (averaged within the unit) and retention of all live trees with a dbh of 30 inches, except if removal is needed for operability. Slash and some existing fuels would be piled to reduce ground fuels if the amount is over the retention standards for wildlife, hydrology, and soil resources.

Treatment 4 – Transportation System Improvements. In most cases, the existing system of roads, landings, and skid trails would be used to access treatment units and for product removal. There are approximately 200 miles of roads in the project area. The proposed transportation system improvement work is listed below and identified on figure A-3 in appendix A (this figure is comprised of three maps).

- Approximately 7 miles of existing system roads would be closed with barriers upon project completion.

- Approximately 19 miles of existing system or nonsystem roads would be decommissioned during project implementation.

- Approximately 18 miles of existing system roads would be reconstructed prior to project use. Reconstruction would consist of brushing, blading the road surface, improving drainage, and replacing/upgrading culverts where needed. Another 2 miles would be resurfaced as part of a watershed improvement opportunity.

- Approximately 6 miles of new temporary road construction would occur, followed by decommissioning after project completion.

- Approximately 4 miles of temporary spurs would be constructed, and 4 miles of existing spurs would receive light maintenance to clear the road bed of young vegetation and debris.

- Harvest landings in group selection units and DFPZs would be constructed or reconstructed as needed.

The Plumas National Forest is currently undergoing an off-highway vehicle (OHV) route inventory and designation process. Through project planning, the public was given the opportunity to participate and comment on proposed road closures and decommissioning for this project. The Forest Supervisor has provided direction on the Plumas National Forest that no roads proposed for decommissioning or closure will be closed until the route designation process has been completed, with the exception of situations where the following criteria apply:

- Dead-end spurs or routes that show no evidence of OHV use, but which are contributing to resource damage.

- User-created routes in areas that are already closed by existing Forest Orders.

- Routes that are creating unacceptable resource damage, to the extent that a delay in their closure would result in unacceptable and irretrievable impacts on the resource.

The Interdisciplinary Team evaluated the approximately 19 miles of roads proposed for decommissioning against the above three criteria. Three road segments (19N00, 20N04B, and 20N25), totaling 1.5 miles, were found to meet the criteria. These roads are proposed for decommissioning prior to completion of the route inventory and designation process because of the extent of resource damage. These roads are listed in table 3-44 in chapter 3 and shown on figures A-3a through A-3c in appendix A. The route inventory designation process is anticipated to precede finalization of Slapjack Project implementation to determine what will be done with the other 17.5 miles proposed for decommissioning that did not meet the three criteria above.

Treatment 5 – Control of Noxious Weeds (Nonnative Invasive Plant Species). A total of 33 acres in the project area are proposed for noxious weed control (see figure A-4 in appendix A for the locations of proposed noxious weed treatment units and table B-4 in appendix B for the list of units). The noxious weeds that are known to occur in the proposed treatment units include Scotch, French, and Spanish broom; yellow starthistle; and English ivy. Of those, Scotch broom (*Cytisus scoparius*), French broom (*Genista monpessulana*), and Spanish broom (*Spartium junceum*) are of particular concern. These species thrive in disturbed areas and can form dense, impenetrable thickets of vegetation. When present in large concentrations, it is suspected that these species can modify fire frequency and intensity. About 10 acres of broom are currently known to occur in treatment units, with additional populations on surrounding private land.

Although there is relatively little broom in the proposed treatment units at this time, the disturbance associated with this project has the potential to create conditions favorable for broom proliferation. For that reason, this alternative includes a noxious weed control strategy based on an Integrated Pest Management (IPM) approach that seeks to use a variety of tools and tactics. Proposed weed control treatments are designed to prevent existing populations of broom and other noxious

weeds from becoming established and spreading uncontrolled. Control tactics using IPM techniques and the target species are described below:

- Hand pulling would be used on the various broom species, English ivy, barbed goat grass, and rush skeleton weed. This can be an effective control tactic for plants that do not reproduce by rhizomes (thick underground stems that produce roots and stems that develop into new plants). Plants would be pulled prior to dispersing seeds.

- Weed wrenches are tools specifically designed for manually removing deep-rooted woody perennial plants such as Scotch broom. Weed wrenches would be used on mature plants in the spring and winter when they are relatively easy to remove. A disadvantage of this technique is the inadvertent burial of broom seeds when plants are pulled out.

- Backpack torches use propane and a torch on a long wand. These units produce high-temperature flames that have been shown to be an effective tool on broom seedlings. These torches would be used in the winter and spring when there is no threat of fire escape.

- Brush cutters / string trimmers are motorized, hand-held cutting tools that can be used on annual grasses, yellow starthistle, and woody shrubs such as broom. The timing of the application is critical for success. For instance, cutting broom in the late summer when it is water stressed has been shown to be a very effective.

- Underburning / prescribed fire can effectively control broom and other species if timed properly. There frequently is a flush of weed seedlings after underburns that must be killed before they set seeds.

- Herbicides applied with backpack sprayers may be used on broom seedlings on a maximum of 31 acres in 17 treatment units (figure A-4 and table B-4). It is likely that herbicides would be used on fewer than 31 acres, concentrating on those units with existing broom infestations. A foliar (leaf) application of triclopyr BEE in the fall would effectively control French, Scotch, and Spanish broom seedlings.

The Slapjack Project proposes to use the same application rates of triclopyr (see table C-2 in appendix C) as analyzed in the HFQLG final supplemental EIS; therefore, a separate human health risk assessment is not required. The hazard analysis, exposure assessment, dose response assessment, risk characterizations, tables, and worksheets that pertain to triclopyr are hereby incorporated by reference from appendix G of the HFQLG final supplemental EIS.

Treatment 6 – Wildlife, Aquatic, and Riparian Ecosystem Restoration.

Aquatic and riparian ecosystem restoration – Watersheds in the project area have been heavily influenced by past logging activities, roads, mining, wildfires, urban development, and hydrologic facilities (such as penstocks and pipelines). These influences have modified stream conditions, resulting in alteration of flow, sediment loading, sediment transport and deposition, channel morphology, channel stability, substrate composition, stream temperatures, and riparian condition in

watersheds. The Slapjack Project includes the following restoration activities to improve aquatic and riparian ecosystem conditions in the project area.

- **Fish passage improvements** – Six culverts in the project area have been identified for upgrades to provide fish access to upstream habitat. The proposed wildlife, aquatic, and riparian ecosystem restoration activities are shown on figure A-1e in appendix A.

  – *Culvert 1: Indian Creek, 19N03 road crossing (T19N, R7E, Section 21 SE 1/4)* – Improving or replacing this culvert would add 1 mile of upstream habitat to the 0.25 mile of habitat currently existing below the culvert.

  – *Culvert 2: Indian Creek, 19N09 road crossing (T19N, R7E, Section 27 NW 1/4)* – Improving or replacing this culvert would add another 0.25 mile of upstream habitat to the 1.5 miles of habitat currently existing below the culvert.

  – *Culvert 3: Deadwood Creek, 20N24 road crossing (Y20N, R8E, Section 33 SW 1/4)* – Improving or removing this culvert would provide 0.75 mile of upstream habitat. This culvert would be a candidate for removal because the 20N24 road has been decommissioned.

  – *Culverts 4 and 5: Hampshire Creek and tributary, 20N25 road crossing (T19N R7E, Section 1)* – Two culverts on this road are undersized and causing streambank erosion downstream. This road has been identified for stabilization and closure. The culvert on Hampshire Creek would be upgraded, and the streambank would be stabilized to prevent further degradation of water quality and evaluated for fish passage improvement. Road 20N25 is contributing a large amount of sediment into the stream and wetland and would be stabilized. The road, road crossings, and wetland are located on both private and National Forest System lands and would need to be analyzed with the landowner (Soper Wheeler).

  – *Culvert 6: Hampshire Creek, 20N24 road crossing (T19N, R7E, Section 1)* – Fish are currently found upstream of the culvert, but the drop below the culvert does not meet standards for fish passage. Upgrading this culvert would connect upstream and downstream habitat and improve fish passage.

- **Streambank stabilization** – Streambank erosion is a natural wearing away of soil and rock that form streambanks. Poorly maintained or improperly designed or located roads and stream crossings have accelerated this natural erosion process in some areas, leading to an alteration in flow, sediment loading, sediment transportation and deposition, channel morphology, channel stability, substrate composition, and riparian conditions. These conditions have degraded both water quality and aquatic habitat. To address known problems in the project area, the proposed action includes an element of streambank stabilization to restore bank stability to streambanks with rock, coir (coconut fiber) logs, and vegetation.

- *Streambank 1: Units 29, 30, and 26 (T19N, R7E, Sections 19, 20, 30, and 31)* – These units have streams that are incised with eroding banks and headcuts that are migrating upstream. Rock and/or coir log check dams would be needed to stabilize the streams.

- *Streambank 2: Unit 85 (T19N, R7E, Section 6)* – A temporary road below a meadow is disrupting natural channel flow and causing streambank erosion. A headcut is moving upstream towards a meadow. The headcut would be repaired with rock and the temporary road stabilized.

- **Road decommissioning or closure** – There are numerous unsurfaced roads in the Slapjack Project area contributing to the degradation of water quality and aquatic habitat. The proposed road decommissioning, closures, or reconstruction would contribute to watershed restoration, meadow enhancement, fish passage, and streambank stabilization. The elevation in the project area is low, which makes it is accessible year-round. The heavy public use of roads in the project area is causing rutting during wet weather. For those roads that would be decommissioned and/or closed, the roadbed would be stabilized or removed, culverts would be pulled, and stream crossings would be stabilized. Roads proposed for closure or decommissioning would be evaluated against the ongoing OHV route inventory and designation process described above under "Treatment 4 – Transportation System Improvements."

- **Meadow enhancement** – Conifer encroachment has led to a loss of meadow habitat. To help reverse this loss, competing conifers would be removed from selected meadow areas by hand cutting to encourage desired late seral meadow vegetation. Streambanks would be stabilized with large rocks, willow cuttings, and/or coir logs to restore hydrologic function and to maintain and improve this habitat.

  The following opportunities for meadow enhancement have been identified:

  - *Meadow 1* – Approximately 15 acres of meadow habitat in units 26, 29, 30, 329, 11, 52, and 85 are proposed for treatment.

  - *Meadow 2* – Approximately 17 acres in size and located along the 20N24 road in the northern section of the Slapjack Project area, northeast of Ponderosa Reservoir at T20N R6E S25 1/4 SW. The meadow would be enhanced by removing brush and competing conifers along the perimeter.

  - *Meadow 3* – Approximately 8 acres in size and located east of meadow 1, along the 20N24 road in the northern section of the Slapjack Project area at T20N R6E S25 1/4 SE. The meadow would benefit from removal of manzanita, *Ceanothus*, and some encroaching conifers.

  - *Meadow 4* – Approximately 14 acres in size and located southeast of meadow 2. It is connected to meadow 2 by an unnumbered road and is adjacent to power lines at T20N R6E S25 1/4 SE, T20N R7E S30 1/4 SW. The meadow would be enhanced by removal of encroaching conifers.

– *Meadow 5* – A small meadow (less than 1 acre) located southwest of meadow 1 at T20N R6E S36 1/4 NE. It could be enhanced by removing brush and competing conifers along the perimeter.

Habitat enhancement for the California spotted owl – The dry forest types found in the project area have been altered as a result of past logging, livestock grazing, and fire suppression. These past changes in forest structure have lead to increases in fuel hazards and the probability of future stand-replacing fires. A catastrophic fire could remove suitable habitat for species associated with late-successional forests, specifically the California spotted owl. Although owl prey requires some level of vegetative cover, an understory that is too dense makes it difficult for owls to forage.

A low-intensity prescribed burn would be used as a tool to reduce fuel loads—accumulated woody debris and thick understory vegetation—in a California spotted owl Protected Activity Center (PAC) and Spotted Owl Habitat Area (SOHA) (see figure A-9 in appendix A). This activity is an opportunity to facilitate fire's natural return and improve forest ecosystem health, thereby enhancing suitable habitat for the owl. There could be an initial short-term effect as a result of disturbance from fuels treatment, but the treatments could also result in long-term habitat enhancement for the owls and their prey.

The following areas are proposed for fuels treatment (see figure A-9):

- Unit 24, PAC YU024 (34 acres)
- Unit 925, PAC YU024 (57 acres)
- Unit 62, SOHA B1 (89 acres)

2.2.2.2 Alternative C: Implement DFPZs, Group Selection, and Individual Tree Selection as in the Proposed Action; Maintain DFPZs without Herbicides; and Control Noxious Weeds without Herbicides

Like alternative B, alternative C calls for the construction of approximately 4,400 acres of DFPZs and implementation of 219 acres of group selection and 148 acres of individual tree selection (see figure A-1 in appendix A for the location of these treatment units). Road work and aquatic and wildlife habitat improvement activities would also occur as described for alternative B. However, unlike alternative B, alternative C does not propose the use of herbicides to control noxious weeds or brush regrowth on 1,954 acres of the DFPZs. Noxious weeds would instead be controlled on 33 acres in the project area using a variety of methods, including backpack torches and hand pulling.

Alternative C does not propose specific treatments for the future maintenance of DFPZs. Decisions regarding long-term DFPZ maintenance—including the specific treatments to be used—would be made when the time for maintenance of the natural stands is reached (approximately 10–20 years after initial treatment). Therefore, herbicide use for preventive maintenance of the DFPZs is not included in this alternative because herbicides have been shown to be most efficient and effective in delaying or preventing the buildup of understory fuels when used within about two years of the initial treatment (HFQLG final supplemental EIS, page 22).

Alternative C addresses the public concern that herbicides used to control noxious weeds and remove brush in the DFPZs would result in adverse effects on humans and the environment. Alternative C addresses a public comment that maintenance of DFPZs can be done by mechanical and prescribed burning. The indicators include cost of herbicide use compared to other means of treatment and potential exposure (as measured by production rates and person days of labor).

2.2.2.3 Alternative D: Implement DFPZs, Group Selection, and Individual Tree Selection as in the Proposed Action; Maintain DFPZs without Herbicides; and Control Noxious Weeds with Herbicides

Alternative D is the Forest Service preferred alternative. It proposes the same DFPZ construction, group selection, individual tree selection, road work, and aquatic and wildlife habitat improvement activities as alternative B. It also includes the use of herbicides in combination with other IPM (Integrated Pest Management) treatments to control noxious weeds on 31 of 33 acres. Unlike alternative B, alternative D does not propose the use of herbicides to control brush regrowth on 1,954 acres of the DFPZs.

Alternative D does not propose specific treatments for the future maintenance of DFPZs. Decisions regarding long-term DFPZ maintenance—including the specific treatments to be used—would be made when the time for maintenance of the natural stands is reached (approximately 10–20 years after initial treatment). Therefore, herbicide use for preventive maintenance of the DFPZs is essentially precluded under this alternative because herbicides have been shown to be most efficient and effective in delaying or preventing the buildup of understory fuels when used within about two years of the initial treatment (HFQLG final supplemental EIS, page 22).

Alternative D addresses the public concern that using herbicides to maintain DFPZs would result in adverse effects on humans and the environment. It addresses a public comment that maintenance of DFPZs can be done by mechanical methods and prescribed burning. The indicators include cost of treatments, potential exposure (as measured by production rates and person days of labor), and extent of herbicide treatment.

2.2.2.4 Alternative E: Implement DFPZs, Group Selection, and Individual Tree Selection as in the Proposed Action; Maintain DFPZs with Herbicides; and Control Noxious Weeds without Herbicides

Alternative E proposes the same DFPZ construction, group selection, individual tree selection, road work, and aquatic and wildlife habitat improvement activities as alternative B. Alternative E also proposes the use of the herbicide imazapyr to control brush regrowth on 1,954 acres of the DFPZs within two to three years of initial treatment. Selection of this alternative would determine if brush regrowth in the Slapjack Project DFPZs would be treated in the short term (two to three years after construction). This alternative does not prescribe specific treatment methods for the long-term maintenance of the DFPZs.

Unlike alternative B, herbicides would not be one of the treatments used as a part of IPM to control noxious weeds. Noxious weeds would instead be controlled on 33 acres in the project area using a variety of nonchemical methods, including backpack torches and hand pulling.

Alternative E addresses the public concern that using herbicides to control noxious weeds would result in adverse effects on humans and the environment and that alternate methods are available. The indicators include cost of treatments, potential exposure (as measured by production rates and person days of labor), and extent of herbicide treatment.

2.2.2.5 Alternative F: Implement DFPZs, Group Selection, and Individual Tree Selection as in the Proposed Action, except Group Selection Would Not Occur in Subwatersheds over the Threshold of Concern; Maintain DFPZs with Herbicides; and Control Noxious Weeds with Herbicides

Alternative F proposes the same DFPZ construction, individual tree selection, road work, and aquatic and wildlife habitat improvement activities as alternative B. It also includes the use of the herbicide imazapyr to control brush regrowth on 1,954 acres of DFPZs and the herbicide triclopyr in combination with other IPM tactics to control noxious weeds on 33 acres (see figure A-1 in appendix A for the location of the treatment units). Selection of this alternative would determine if brush regrowth in the Slapjack Project DFPZs would be treated in the short term (two to three years after construction). This alternative does not prescribe specific treatment methods for the long-term maintenance of the DFPZs.

Unlike alternative B, this alternative would implement approximately 190 acres of group selection harvest, instead of 219 acres, because units located in subwatersheds predicted to be over the Threshold of Concern were dropped. Acres of individual tree selection units were not affected because no units are proposed in subwatersheds predicted to be over the Threshold of Concern.

Alternative F addresses the concern that implementing ground-disturbing activities in watersheds that are approaching or over the Threshold of Concern would increase the risk of adverse effects and induce cumulative off-site watershed effects. The Equivalent Roaded Area values compared to the Threshold of Concern serve as the indicator for this alternative.

2.2.2.6 Alternative G: Implement DFPZs, Group Selection, and Individual Tree Selection as in the Proposed Action, except Group Selection Would Not Occur in Subwatersheds over the Threshold of Concern; Maintain DFPZs without Herbicides; and Control Noxious Weeds without Herbicides

Alternative G proposes the same DFPZ construction, individual tree selection, road work, and aquatic and wildlife habitat improvement activities as alternative B. Alternative G was developed to address watershed concerns, much like alternative F. Alternative G would implement approximately 190 acres of group selection harvest, instead of 219, because units located in subwatersheds predicted to be over the Threshold of Concern were dropped. Acres of individual tree selection units were not affected because no units are proposed in subwatersheds predicted to be over the Threshold of Concern.

Alternative G does not propose the use of herbicides as a part of IPM to control noxious weeds or the regrowth of brush on 1,954 acres of the DFPZ. Noxious weeds would instead be controlled on 33 acres in the project area using a variety of methods, including backpack torches and hand pulling.

Alternative G does not propose specific treatments for the future maintenance of DFPZs. Decisions regarding long-term DFPZ maintenance—including the specific treatments to be used—would be made when the time for maintenance of the natural stands is reached (approximately 10–20 years after initial treatment). Therefore, herbicide use for preventive maintenance of the DFPZs is not included in this alternative because herbicides have been shown to be most efficient and effective in delaying or preventing the buildup of understory fuels when used within approximately two years of the initial treatment (HFQLG final supplemental EIS, page 22).

Alternative G addresses the concern that implementing ground-disturbing activities in subwatersheds that are approaching or over the Threshold of Concern would increase the risk of cumulative off-site watershed effects. It also addresses the public concern that using herbicides as a part of IPM to control noxious weeds and to maintain DFPZs would result in adverse effects on humans and the environment. The indicators include cost of treatments, potential exposure (as measured by production rates and person days of labor), extent of herbicide treatment, and Equivalent Roaded Area values compared to the Threshold of Concern.

2.3 Alternatives Considered but Eliminated from Detailed Study

The CEQ regulations require federal agencies to rigorously explore and objectively evaluate all reasonable alternatives and to briefly discuss the reasons for eliminating any alternatives that were not developed in detail (40 CFR 1502.14). Public comments received in response to the proposed action provided suggestions for alternative methods for achieving the purpose and resolving the need for action. Several alternatives suggested by the public that did not meet the purpose and need for the project are summarized below.

2.3.1 Use of Alternative Herbicides

Imazapyr banned in Norway – Some public comments expressed concern about the use of imazapyr. The public comments stated that “Imazapyr has been identified by the Pesticide Action Network as being a dangerous chemical because of the risk of groundwater contamination and acute human toxicity.” In addition, “Imazapyr was denied re-registration in Norway due to unacceptable risk for ground water contamination, caused by high mobility and persistence in soil.”

The formulation of imazapyr that was banned in Norway was Arsenal 250 (Chemical Abstract Service [CAS] number 81334-34-1). The formulation of imazapyr that was listed by the Pesticide Action Network as being a dangerous chemical is the pure or parent formulation of imazapyr (CAS 81334-34-1). The isopropylamine salt of imazapyr (CAS number 81510-83-0) is not listed by the Pesticide Action Network.

Another consideration for banning certain pesticides in Norway is the low degradation of pesticides under Norwegian climatic conditions and soil types. The Slapjack Project proposes to use a different formulation of imazapyr (Arsenal AC) with a CAS number of 81510-83-0. This form of imazapyr is the isopropylamine salt of imazapyr, which has no Pesticide Action Network listing. The California Department of Pesticide Regulation has taken California’s’ unique climatic conditions into account in the registration of imazapyr (Arsenal AC) for use in California. For information regarding

pesticide registration in California, see the "State Requirements" section (3.7.2.3) under "Regulatory Framework" (3.7.2) in the "Human Health and Safety" section (3.7) of this EIS.

Organic herbicides – Some public comments suggest that the Plumas National Forest should evaluate the use of nontoxic organic herbicides and other weed-control methods used by organic farming practices. For example, St. Gabriel Laboratories produces an organic herbicide called "BurnOut," which is not registered for forestry use by the California Department of Pesticide Regulation. In addition, some organic herbicides may be more toxic to humans than some of the synthesized herbicides. The signal word that appears on labels signifies how acutely toxic the pesticide is and what toxicity category it belongs to. The signal word for Arsenal AC (Imazapyr) is "Caution," which indicates low toxicity. The signal word for BurnOut is "Danger," which indicates that the pesticide is extremely toxic.

The Material Data Safety Sheet lists a number of health hazards for BurnOut, which contains acetic acid and is flammable and extremely corrosive. Contact with this product will result in severe eye irritation and possible permanent damage. Contact with this product will cause severe skin irritation and/or chemical burns. Breathing vapors will cause significant respiratory irritation and pulmonary edema with prolonged exposure. Ingestion of this product could cause burns and destroy tissue in the mouth, throat, and digestive tract.

Corn meal gluten – Some public comments suggested using corn meal gluten as an herbicide. Corn gluten inhibits germination of herbaceous plants and would not be effective on woody plants, shrubs, or hardwoods (tanoak) that exist in the Slapjack Project area. The Cottonwood Fire Vegetation Management final EIS (2005) also considered using corn gluten as an herbicide but determined it to be an ineffective treatment.

2.3.2 Alternative with 50 Percent Canopy Cover Retention and a Removal Limit of 20 Inches DBH and Below

An alternative was proposed that DFPZs in CWHR size class 4 and 5 stands be thinned to a 50 percent canopy cover, with a maximum harvest limit of 20 inches dbh. This alternative was analyzed on the Plumas National Forest in both the Watdog Project on the Feather River Ranger District and the Empire Project on the Mt. Hough Ranger District. In both analyses, it was shown that this alternative would neither meet the purpose of the project nor resolve the need for the project. The alternative would not fully implement fuel treatments to be tested under the HFQLG Pilot Project. The analyses indicated a higher probability of crown fire. It also reduced the economic contribution. Trees in the size range of 20 to 30 inches dbh have over twice the value of smaller trees and much greater board foot volume. Though fewer of these large trees have to be removed compared to smaller diameter trees, they greatly increase the economic feasibility and efficiency of the project by providing much-needed value. The Watdog Project demonstrated an approximate 115 percent loss of net revenues and 50 percent loss in potential job creation under an alternative that proposes a 50 percent canopy cover and a 20-inch dbh limit compared to an alternative that proposes a 40 percent canopy cover and dbh limit of 30 inches. Similarly, the Empire Project showed an approximate 40 percent loss in net revenues and 10 percent loss in job creation. The economic feasibility of the Slapjack Project is likewise tied to the removal of trees with a dbh limit of 20 to 30 inches, as data indicate they make up approximately one-third of the total sawlog volume.

Furthermore, these analyses indicated that there would be little difference in adverse environmental effects, at a landscape or project area level, in treating stands to 40 percent canopy with a dbh limit of 30 inches versus treating stands to achieve a 50 percent residual canopy cover with a dbh limit of 20 inches. Therefore, this alternative was not analyzed in detail for the Slapjack Project.

2.3.3 Alternative with 60 Percent Canopy Cover Retention and a Removal Limit of 20 Inches DBH and Below

During the public comment period for the Slapjack Project draft EIS, a request was made to consider a 60 percent or greater canopy cover retention. This alternative was considered by the ID Team but not analyzed in detail for the Slapjack Project. The reason is because the outcome would be the same as described for the 50 percent canopy retention and dbh limit of 20 inches, but at slightly higher levels. In particular, the effectiveness of the DFPZ would be compromised to levels that would not allow the ability to bring a crown fire into a surface fire condition and not meet the project objectives.

2.3.4 Alternative That Considers Different Treatments in DFPZs to Address Cumulative Off-site Watershed Effects

During the scoping period, a commenter suggested implementing different treatments in the DFPZ units in order to reduce ground disturbance and address cumulative off-site watershed effects. However, non-mechanical treatments, such as underburning, may not adequately treat ground fuels, ladder fuels, reduce biomass, or meet the desired conditions described in “Appendix J: Fire and Fuels” in the HFQLG final EIS without a preliminary treatment such as mastication or harvest. Mortality of residual trees after an underburn would also be expected to increase. In dense stand conditions, such as those found in many Slapjack Project treatment units, underburning without pre-treatment could increase mortality of large, residual, fire-resilient trees. Underburning prescriptions establish specific weather conditions that need to be adhered to in order for burning to occur (the “burn window”). The burn window varies from year to year and limits the amount of underburning that can be prescribed and achieved. In addition, Air Quality Management Districts enforce standards that limit the amount of burning that can take place at any given time.

2.3.5 Alternative Consistent with the 2001 Sierra Nevada Forest Plan Amendment (SNFPA)

During the scoping process for the Slapjack Project EIS, one commenter suggested analyzing an alternative that would fully implement the 2001 SNFPA Record of Decision. In 2004, the Record of Decision for the SNFPA final supplemental EIS was signed, and the Lassen and Plumas National Forests and the Sierraville Ranger District of the Tahoe National Forest were directed to implement the HFQLG Pilot Project, consistent with the HFQLG Act and alternative 2 of the HFQLG EIS (SNFPA Record of Decision, page 66). The decision specifically addressed five problem areas—one in particular was to protect, increase, and perpetuate old-forest ecosystems and provide for the viability of native plant and animal species associated with old-forest ecosystems (such as the California spotted owl) (SNFPA Record of Decision 2001). The 2001 SNFPA alternative suggested by the public was eliminated from detailed study for the following reasons:

1. Preliminary planning for the Slapjack Project began in 2003, under the direction of the 2001 SNFPA. Maps created at that time indicated that approximately 20 percent of the Slapjack Project treatment units would fall within the 2001 SNFPA land allocation of *Wildland Urban Interface Defense Zone*. For fuels treatments within the Defense Zone, trees up to 30 inches dbh could be removed, and no requirements for maintaining a minimum canopy cover would apply. For these units, treatment under the 2001 SNFPA would be essentially the same (in terms of upper diameter limit and canopy cover) as the action alternatives considered in this final EIS. The Slapjack Project action alternatives retain approximately 40 percent canopy cover and trees 30 inches dbh and larger. Although the 2001 SNFPA did not set a minimum canopy limit in the Defense Zones, project analysis indicates that reducing canopy cover below 40 percent is not warranted for the Slapjack Project DFPZs because of the gentle to moderate slopes that dominate the project area (see section 2.3.6).

2. Preliminary planning maps indicate that approximately 80 percent of the Slapjack Project treatment units would fall within the 2001 SNFPA land allocation of *Wildland Urban Interface Threat Zone*. The standards and guidelines for the Threat Zone include a 20-inch upper diameter limit and a 50 percent minimum canopy cover limit. In these units, implementing treatments according to Threat Zone standards and guidelines would result in the same outcome as the "Alternative with 50 Percent Canopy Cover Retention and a Removal Limit of 20 Inches DBH," which is described in section 2.3.2 that is, increased probability of crown fire and reduced economic contribution). Therefore, implementing the Slapjack Project under the 2001 Framework would neither fully meet the purpose nor resolve the need for the project.

3. Threat Zone standards also state that canopy cover can only be reduced by 20 percent. For the Slapjack Project, 10 units would be affected by the 20 percent canopy reduction standard. Existing canopy cover in these units ranges from 70 to 90 percent. This means that post-treatment canopy cover in these 10 units would range from 50 to 70 percent, further compromising the effectiveness of the DFPZ. Generally, in DFPZs adjacent to gentle to moderate slopes, 40 percent canopy cover provides adequate crown separation to prevent active crown fires from carrying through the DFPZ in 90th percentile weather conditions.

4. In addition, several projects planned under the standards and guidelines of the 2001 SNFPA are currently being implemented on the Feather River Ranger District. As these projects are implemented, fire managers are finding that the restrictions on upper diameter limits, canopy minimum limits, and canopy cover reduction are limiting their ability to construct effective DFPZs in some cases. In order to retain 50 percent canopy, for example, fire managers have had to leave trees that connect fuels on the forest floor to the tree crowns—trees located beneath the drip lines of larger trees or immediately adjacent to the canopies of other trees. Because of the heavy understory regrowth in many Slapjack Project treatment units, retaining 50 percent canopy cover in these stands would compromise DFPZ effectiveness, in part because it would not allow adequate treatment of ladder fuels.

2.3.6 Alternative That Reduces Canopy Cover to 30 Percent in Treatment Units within the Wildland Urban Interface

Forest Service personnel considered an alternative that would reduce canopy cover to 30 percent in treatment units in the Wildland Urban Interface surrounding communities in the Slapjack Project area. Like the DFPZ prescriptions for all action alternatives, treatments would be designed to thin from below to remove ladder fuels and crown or canopy fuels to increase ground-to-crown height, spacing between trees, and spacing between tree crowns, and to use group selection to create size and structure diversity.

Treatment of DFPZs should result in a fairly open stand, dominated by larger, fire-tolerant tree species. Post-treatment canopy cover generally should not exceed 40 percent, although adjustments in stand density based on local conditions may be appropriate (Weatherspoon and Skinner 1996). Generally, in DFPZs adjacent to gentle to moderate slopes, 40 percent canopy cover provides adequate crown separation to prevent active crown fires from carrying through the DFPZ in 90th percentile weather conditions.

However, in especially steep terrain, fires act to “pre-heat” the canopies of the trees upslope, causing the fire to transition to the tree crowns as it moves up the slope. In these situations, reducing crown separation below 40 percent on the ridge top will cause the crown fire to transition to a surface fire more quickly than in stands with higher canopy cover. Because of the gentle to moderate slopes that dominate the Slapjack Project area, reducing canopy cover below 40 percent is not warranted for the Slapjack Project DFPZs.

2.4 Design Features, Mitigation Measures, and Monitoring

Appendix F summarizes all design features, mitigations, and monitoring analyzed in “Chapter 3: Affected Environment (Existing Conditions) and Environmental Consequences” of this EIS. The design features, mitigations, and monitoring would be applied to avoid, minimize, or rectify impacts on affected resources from implementation of any of the alternatives. Their purpose and effectiveness is described in specific resource sections of chapter 3. Mitigations are common to all action alternatives unless otherwise noted. A detailed description of project mitigations can be found in appendix F.

Two stages of monitoring are discussed in appendix F: implementation and effectiveness. Implementation monitoring is used to determine the degree and extent to which the application of standards and guidelines and mitigation measures are meeting management direction and intent. Effectiveness monitoring is used to determine the degree to which implemented resource management activities are meeting objectives. The effectiveness of standards, guidelines, or mitigations cannot be assessed without first confirming that those standards and guidelines were actually implemented. Information from monitoring will help guide future activities and/or adjust current management practices.

The overall goals of monitoring activities are to

- provide information useful to managers responsible for applying the principles of adaptive management;
- assist the public in gauging the success of implementing the resource management activities as designed; and
- assess the effectiveness of the resource management activities in achieving resource objectives.

Programmatic HFQLG monitoring will occur at the same time as project-specific monitoring (HFQLG final EIS 1999). Since the main HFQLG monitoring sites are determined randomly, it is not known yet how many of these sites would be included in the Slapjack Project area.

2.5 Comparison of Alternatives Considered in Detail

The measurement indicators identified in chapter 1 (sections 1.4.2 and 1.8.2) are used to describe how well the alternatives meet the purpose and need and address the issues identified in chapter 1. Again, the five project objectives are:

1. Protect rural communities in the Wildland Urban Interface by reducing the risk of a high-intensity wildfire.
2. Move the project area toward the desired future condition of a healthy, fire-resilient ecosystem.
3. Provide an adequate timber supply that contributes to the economic stability of rural communities.
4. Implement restoration projects to achieve healthy aquatic and riparian ecosystems and improve wildlife habitat through prescribed burning.
5. Control the spread of noxious weeds within forest communities in order to maintain native plant diversity, natural communities, and DFPZ effectiveness.

The following two issues were identified during the scoping period:

Issue Statement 1: Some members of the public are opposed to the use of herbicides.

Issue Statement 2: Implementing ground-disturbing activities in watersheds that are approaching or over the Threshold of Concern increases the risk of adverse effects and cumulative watershed effects.

The following narrative summarizes the effects of each alternative for the five objectives and two issue statements. Table 2-4 provides a comparison of alternatives in terms of meeting project objectives and summarizes the effects of each alternative considered in detail, while table 2-5 summarizes project effects related to the issues identified during scoping.

2.5.1 Summary of Environmental Consequences Related to Project Objectives

2.5.1.1 Objective 1 - Protect rural communities in the Wildland Urban Interface by reducing the risk of a high-intensity wildfire.

Alternative A (No Action). Surface fuels, ladder fuels, and canopy fuels would not be modified over the short term; therefore, potential fire behavior would not change from the current condition. Fires would be expected to be more intense, resulting in a higher percentage of tree mortality. The Slapjack Project area would remain mostly in Condition Classes 2 and 3 and would have a moderate to high risk of losing key ecosystem components because the vegetation characteristics and fuel composition would not change. Flame lengths (2 to 7 feet) and canopy base height conditions (1 to 3 feet) under the no-action alternative would allow surface fires to move into the crowns. Fuel and fire conditions under the no-action alternative would allow wildland fires to develop into either passive or active crown fires. Passive crown fires torch out individual or small groups of trees as the surface fuels burning under them provide the convective heat to ignite the above-ground fuels. Active crown fires spread from tree to tree in conjunction with the convective heat of the surface fuels burning under them. A wildfire occurring under 90th percentile weather conditions would be expected to kill 20-25 percent of trees between 10 and 29 inches dbh.

All Action Alternatives. Flame lengths would be reduced from 2–7 feet, to 1–4 feet, by reducing surface fuels through underburning, piling and burning, or mastication. Fuel loading would be reduced by more than 57 percent across all units. The proposed treatments of hand and mechanical thinning, biomass removal, and mastication would increase canopy base height in most of the units from 1–3 feet to over 19 feet. Combined, the reduction in fuel loading and increased canopy base height would decrease the likelihood that surface fires would develop into crown fires. A wildland fire occurring under 90th percentile weather conditions would be expected to kill approximately 9 percent of trees between 10 and 29 inches dbh.

2.5.1.2 Objective 2 - Move the project area toward the desired future condition of a healthy, fire-resilient ecosystem

Alternative A. Currently, treatment units show a high proportion of smaller tree size classes, high fuel ladder potential, and interlocking crowns capable of sustaining crown fires. Maintaining the existing stand structure would favor shade-tolerant species such as white fir, tanoak, and incense-cedar. There would be little opportunity for the naturally dominant pine species to reestablish and regenerate themselves, except what may occur through natural large-scale disturbance events such as wildfire. In the absence of action, declining stand growth and vigor would put parts of the project area at high risk of insect and disease infestations. Stand health would continue to decline in overstocked aggregations of trees within moderately stocked and densely stocked stands, eventually resulting in individual tree mortality. Mortality would increase the fuel loading, but endemic mortality would keep a continuous supply of dead trees for wildlife foraging and nesting.

Canopy cover in the treatment units ranges between 47 and 87 percent in CWHR size class 4 and 5 stands and from 20 to 82 percent in CWHR size class 3 (thin group), plantations (masticate group), and other stands (underburn group). Without treatment, the canopy closure in these stands, especially in the plantations, would continue to increase, shading out brush and smaller trees, which would die

and increase the ladder fuels and fire hazard. Trees in the suppressed and intermediate crown classes would continue to provide ladder fuels into the overstory crown canopy.

All Action Alternatives. The effects discussed in this section would likely be the same for alternatives B, C, D, and E. Alternatives F and G call for fewer acres of group selection (190 acres compared to 219 in the other action alternatives), so they would result in slightly less change in species composition, forest health, and stand structure than described for alternatives B, C, D, and E.

In the treatment units, species composition would shift toward more shade-intolerant, fire - resistant species. Thinning would favor the retention of under-represented conifers (sugar pine and Douglas-fir), as well as oaks in those plantations dominated by ponderosa pine. Thinning would also favor retention of the most vigorous trees, rather than simply achieving desired spacing. This would result in increased species representation in the stands than what currently exist. The openings created by group selection would allow sunlight to reach the forest floor, creating favorable conditions for the establishment and growth of shade-intolerant, fire-adapted species.

Reducing tree density would improve tree growth and vigor, reduce susceptibility to drought and bark beetle attack, and reduce fire hazard. For all action alternatives, approximately 67 percent of the existing basal area would be retained for CWHR size class 4 and 5 stands. All action alternatives would meet the requirements of retaining 30 percent of the existing basal area for CWHR size class 4 stands and 40 percent of existing basal area for CWHR size class 5 stands.

Post-treatment canopy cover would average 40 percent in DFPZs, 50 percent in individual tree selection units, and 60 percent in Riparian Habitat Conservation Areas (plantations only). All action alternatives would meet the canopy requirements for CWHR size class 4 and CWHR size class 5 stands listed in table 2 of the SFNPA Record of Decision.

Thinning from below would remove ladder and canopy fuels. This would increase ground-to-crown height, spacing between trees, and spacing between tree crowns. All action alternatives would increase the quadratic mean diameters for treatment units (in CWHR size class 4 and 5 stands) from 11–12 inches dbh to 22–29 inches dbh. This indicates that there would be a higher proportion of medium- to large-size trees in the stand, which would reduce the ladder fuels and fire hazard.

2.5.1.3 Objective 3 - Provide an adequate timber supply that contributes to the economic stability of rural communities.

Alternative A. This alternative would not reduce critical fuel loadings or harvest any timber. No funds would be generated for the U.S. Treasury or returned to local counties. No additional employment opportunities or wages paid to the primary and service industries employees would be circulated through the local economy. No timber products (commercial firewood, biomass chips, or sawlogs) would be provided to the local economy.

All Action Alternatives. The action alternatives would generate approximately 9.8 million board feet of sawlogs and 34,000 tons of biomass from the DFPZ, group selection, and individual tree selection units.

Net harvest revenues for thinning and biomass removal would generate $632,000 for alternatives B through E. Net harvest revenue for alternatives F and G would be slightly higher at

$668,000. The group selections dropped from alternatives F and G have smaller trees and less volume per acre than average, increasing the value of sawlogs per acre and reducing the impact of harvesting costs. Implementation of mastication, underburning, and other fuel treatments for all action alternatives would cost $1.1 million.

The total short-term project value, less the costs of DFPZ construction, noxious weed control treatments, and DFPZ preventive maintenance, is estimated at -$991,000 for alternative E; -$981,000 for alternative B; -$945,000 for alternative F; -$503,000 for alternative C; -$493,000 for alternative D; and -$467,000 for alternative G. The long-term project value includes the total net revenues or costs for implementing DFPZ construction activities, noxious weed control treatments, and DFPZ preventive maintenance, as well as the estimated costs of long-term DFPZ maintenance projected over a 50-year period. Long-term project value, including 50 years of DFPZ maintenance, is estimated at approximately -$4.5 million for alternatives B and E, -$4.8 million for alternatives C, D, and G, and -$4.4 million for alternative E.

Thinning, biomass removal, and fuel treatments for alternatives B through E would generate a total of 267 employment opportunities (jobs resulting directly from harvesting and fuel reduction treatments and jobs resulting indirectly from opportunities at sawmills and energy-generation plants). In comparison, alternatives F and G would generate 265 direct and indirect jobs. Total employee-related income would be approximately $11.5 million for alternatives B through E and $11.4 million for alternatives F and G.

2.5.1.4 Objective 4 - Implement restoration projects to achieve healthy aquatic and riparian ecosystems and improve wildlife habitat through prescribed burning.

Alternative A. Under the no-action alternative, there would be no benefits to stream and meadow conditions. Sediment would continue to directly deposit into affected water bodies and riparian areas, and conditions would continue to degrade. Conifers and roads would continue to degrade meadow habitat. Fish barriers would remain in place and continue to obstruct the movement of aquatic species to suitable upstream habitat. Understory vegetation on approximately 180 acres of habitat for the California spotted owl would remain too dense, making it difficult for owls to hunt and capture prey. These areas are located within larger areas of nesting, foraging, and roosting habitat known as Protected Activity Center YU024 (PAC YU024) and Spotted Owl Habitat Area B1 (SOHA B1).

All Action Alternatives. All action alternatives would implement the decommissioning of 19 miles of roads; stabilization of 1,200 feet of streambank; removal or upgrade of 6 culverts to improve fish passage; and restoration of 59 acres of meadow habitat. A light underburn would reduce fuel loading on 180 acres of California spotted owl habitat and improve foraging conditions from low suitability to moderate suitability.

2.5.1.5 Objective 5 - Control the spread of noxious weeds within forest communities in order to maintain native plant diversity, natural communities, and DFPZ effectiveness.

Alternative A. The current vulnerability to noxious weed invasion is low within the treatment units due to a high level of canopy cover and ground cover. However, the relative risk of noxious weed invasion for the landscape as a whole increases due to the high concentration of roads and logging operations on private land. Consequently, the overall habitat vulnerability is considered moderate to high. No control measures would be implemented in the project area to limit the spread

of noxious weeds along roads or from adjacent private land. Long-lived seeds would remain in the soil until the next high intensity fire, at which point conditions would be ideal for proliferation

All Action Alternatives. Proposed vegetation treatments (DFPZ construction, group selection, and individual tree selection) would disturb soil and remove overstory shade, resulting in a moderate risk of noxious weed invasion. There would also be a moderate risk of noxious weed invasion due to the building of temporary roads, road maintenance, and a short-term increase in vehicular traffic related to project activities. However, the closure and decommissioning of approximately 26 miles of road would reduce the long-term risk of noxious weed invasion through vectors.

The project has been designed to use integrated management techniques to reduce size of current populations, deplete seed banks, and kill re-sprouts on 33 acres in the project area. In alternatives B, D, and F, the use of the herbicide triclopyr on a maximum of 31 of the 33 acres analyzed for weed control would increase the effectiveness of treatments and cost less ($200/acre) than using nonchemical tactics alone (compared to $261/acre under alternatives C, E, and G).

2.5.2 Summary of Environmental Consequences Related to Project Issues

2.5.2.1 Issue 1: Opposition to the use of herbicides

Alternative A. From 2000 through 2004, an average of 4.4 million pounds of herbicide by active ingredient were applied annually across Butte and Yuba Counties, primarily for road and utility right-of-way maintenance; rangeland improvement; noxious weed treatments; maintenance of orchards and flowerbeds, parks, and golf courses; and by individual rural home / land owners. Herbicides would not be applied for preventive maintenance of Slapjack DFPZs or noxious weed control under the no-action alternative, so there would be no project-related effects from herbicide use.

All Action Alternatives.

Herbicides for DFPZ Preventive Maintenance: Alternatives B, E, and F — The herbicide imazapyr would be used to control brush regrowth on approximately 1,954 acres of the DFPZs within 2 to 3 years of construction. Imazapyr would be applied at a rate of 0.25 pound of active ingredient per acre—the maximum application rate for this product is 0.75 pound of active ingredient per acre. A total of 489 pounds of active ingredients would be applied in order to implement the proposed DFPZ preventive maintenance approximately two to three years after DFPZ construction. The proposed additives (surfactant Syl-Tac® and a dye Hi-Light® Blue) are not expected to pose an adverse risk to the health and safety of workers or the public. This is based on available information from product labels and an overview by Bakke (USDA 2002) of the various types of additives likely to be used in forest herbicide applications.

The cost of the herbicide treatments is estimated at $250 per acre, for a total of approximately $489,000 for implementation of proposed DFPZ preventive maintenance. The total project values (including the present net value of accumulated future costs for long-term DFPZ maintenance) are described above in the section for the environmental consequences of objective 3.

For the vegetation types found in the Slapjack Project area, the HFQLG final supplemental EIS estimated that initial treatment of DFPZs would generally be effective for 5 years in the brush and

plantation types and 10 years in mixed conifer and tanoak type. Subsequent maintenance was estimated to be needed at the same intervals (HFQLG final supplemental EIS pages 2-22 and 2-23). No applicable studies have been completed on shrub treatment under a canopy. The recently initiated "Alternatives to Fire for Fuel Reduction at California's Forest Urban Interface" (Powers et al. 2005) does give some indication of the effectiveness of different treatments. Second-growing-season results indicate that biomass from understory regrowth is much lower after the use of herbicides. Studies done in open-sky conditions, in clearcut, or in converted shrubfields indicate chemical treatment is 90–95 percent effective in reducing shrub cover over 10 to 12 years. These same studies indicate manual or mechanical treatment is about 80 percent effective in reducing shrub cover over the same period.

Herbicides for Noxious Weed Control: Alternatives B, D, and F — The herbicide triclopyr would be used to control noxious weeds in conjunction with a variety of other control tactics on a maximum of 31 of 33 acres analyzed for weed treatment. A total of 47 pounds of active ingredient would be applied annually over a five-year period, with a maximum of 233 pounds of active ingredient applied over the five-year period. The maximum application rate for this product is 4 pounds of active ingredient per acre. The proposed additives (surfactant Syl-Tac® and a dye Hi-Light® Blue) are not expected to pose an adverse risk to the health and safety of workers or the public. This is based on available information from product labels and an overview by Bakke (USDA 2002) of the various types of additives likely to be used in forest herbicide applications.

The cost of the noxious weed control program (including manual, mechanical, and chemical treatments) is estimated at $200 per acre, for a total of approximately $33,000 for implementation of the five-year noxious weed control program. The total project values are described above in the section on environmental consequences of objective 3.

An effective noxious weed control program—such as the one proposed for the Slapjack Project—incorporates multiple control tactics rather than relying on any one control tool. For alternatives B, D, and F, broom seedlings would be hand pulled and burned in the early spring. When these tools could no longer be used due to increased fire risk and hard soil in summer and fall, brush cutters and string trimmers would be used to cut plants when water stressed. When the use of motorized string trimmers is restricted during periods of high fire danger, herbicides would effectively control broom seedlings. The use of herbicide in combination with other control tools may permit repeated treatments in a shorter period of time, increasing the likelihood of eradication.

No Herbicide Use for Preventive Maintenance: Alternatives C, D, and G — Herbicides would not be applied for preventive maintenance of Slapjack Project DFPZs. Preventive maintenance would not occur 2 to 3 years after DFPZ construction, so no costs would be incurred at that time. The total project values are described above in the section for the environmental consequences of objective 3. As discussed above, a recent study indicates that manual or mechanical treatment is about 80 percent effective in reducing shrub cover in open-sky conditions, in clearcut, or in converted shrubfields over a 10- to 12-year period, while chemical treatment is 90–95 percent effective.

No Herbicides for Noxious Weed Control: Alternatives C, E, and G — Herbicides would not be applied for noxious weed control. The cost of the noxious weed control program (incorporating manual and mechanical treatments) is estimated at $261 per acre, for an estimated total of $43,000 for

implementation of the weed control program. The total project values are described above in the section for the environmental consequences of objective 3.

Under alternatives C, E, and G, the noxious weed control program would incorporate multiple control tactics that include hand pulling, underburning, and mechanical treatments. There may be less chance of eradication or control of noxious weed infestations without the use of herbicides in combination with other control tools.

2.5.2.2 Issue 2. Implementing ground-disturbing activities in watersheds that are approaching or over the Threshold of Concern increases the risk of adverse effects and cumulative watershed effects.

Alternative A. The Forest Service Region 5 Cumulative Effects Model (Equivalent Roaded Area or ERA) rating reflects the current conditions of the subwatersheds and the resulting impacts on the aquatic systems. At least 11 subwatersheds are over the Threshold of Concern (or TOC – an indicator of increased risk of cumulative watershed effects) and 8 are approaching the TOC in the existing condition.

Under alternative A, proposed treatments would not occur, and there would be no project-related increase in ERA values or in the risk of cumulative watershed effects. However, vegetation density and accumulation of fuels would continue, and the chances of stand-replacing fire that might affect upland watershed areas and near-stream sensitive areas would remain similar or increase compared to the existing condition. The ERA values following a stand-replacing fire would greatly exceed the TOC and greatly exceed projected increases in ERA from proposed treatment activities.

All Action Alternatives. Under all action alternatives, 12 subwatersheds are expected to exceed the TOC, and 7 are expected to approach the TOC. In the 12 subwatersheds expected to exceed the TOC, the majority of the ERA scores would be from private land timber harvesting, urban development, and roads. These three disturbance types constitute 80 to 90 percent of the total ERA scores. Alternatives F and G would not implement group selection harvest in watersheds over the TOC. The reduction of group acres from 219 acres to 190 acres for these two alternatives would result in less than a 1 percent difference in ERA scores between alternatives B through E and alternatives F and G.

Table 2-4. Comparison of environmental consequences of alternatives related to project objectives.

	Alternative A (No Action)	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F	Alternative G
Objective 1: Protect wildland rural communities from the risk of high-intensity wildfires.	Flame lengths would remain at 2–7 feet and continue to increase.	Flame lengths in fuel treatments would decrease to 1–4 feet.	Flame lengths in fuel treatments would decrease to 1–4 feet.	Flame lengths in fuel treatments would decrease to 1–4 feet.	Flame lengths in fuel treatments would decrease to 1–4 feet.	Flame lengths in fuel treatments would decrease to 1–4 feet.	Flame lengths in fuel treatments would decrease to 1–4 feet.
	Mortality: Wildfire would kill 20–25% of trees between 10–29 inches dbh.	Mortality from wildfire would decrease to 9% of 10- to 29-inch trees.	Mortality from wildfire would decrease to 9% of 10- to 29-inch trees.	Mortality from wildfire would decrease to 9% of 10- to 29-inch trees.	Mortality from wildfire would decrease to 9% of 10- to 29-inch trees.	Mortality from wildfire would decrease to 9% of 10- to 29-inch trees.	Mortality from wildfire would decrease to 9% of 10- to 29-inch trees.
	Fire type: Conditions would allow wildland fires to develop into either passive or active crown fires.	Conditions in treatment units would not support development of passive or active crown fires.	Conditions in treatment units would not support development of passive or active crown fires.	Conditions in treatment units would not support development of passive or active crown fires.	Conditions in treatment units would not support development of passive or active crown fires.	Conditions in treatment units would not support development of passive or active crown fires.	Conditions in treatment units would not support development of passive or active crown fires.
	Fuel loading exceeds desired condition of 5 tons/acre.	Fuel loading would decrease by approximately 57%.	Fuel loading would decrease by approximately 57%.	Fuel loading would decrease by approximately 57%.	Fuel loading would decrease by approximately 57%.	Fuel loading would decrease by approximately 57%.	Fuel loading would decrease by approximately 57%.
	Canopy base height would remain at 1–3 feet.	Canopy base height would increase to more than 19 feet.	Canopy base height would increase to more than 19 feet.	Canopy base height would increase to more than 19 feet.	Canopy base height would increase to more than 19 feet.	Canopy base height would increase to more than 19 feet.	Canopy base height would increase to more than 19 feet.
Objective 2: Promote a healthy uneven-aged, multistoried, fire-resilient forest.	Shade-tolerant species (such as white fir, tanoak, and incense-cedar) would continue to dominate stands. Little opportunity for naturally dominant pine species to reestablish and regenerate.	Tree species composition would shift towards more shade-intolerant and fire-resistant species. Increase in pine understory in the group selection areas.	Tree species composition would shift towards more shade-intolerant and fire-resistant species. Increase in pine understory in the group selection areas.	Tree species composition would shift towards more shade-intolerant and fire-resistant species. Increase in pine understory in the group selection areas.	Tree species composition would shift towards more shade-intolerant and fire-resistant species. Increase in pine understory in the group selection areas.	Tree species composition would shift towards more shade-intolerant and fire-resistant species. Change would be slightly less than other alternatives because of fewer acres of group selection.	Tree species composition would shift towards more shade-intolerant and fire-resistant species. Change would be slightly less than other alternatives because of fewer acres of group selection.

Table 2-4. Comparison of environmental consequences of alternatives related to project objectives (continued).

	Alternative A (No Action)	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F	Alternative G
Objective 2: Promote a healthy uneven-aged, multistoried, fire-resilient forest (continued).	Stand growth and vigor would continue to decline and be at a high risk for insect and disease infestations.	Stand growth and vigor would be maintained or improved, making stands less susceptible to drought, insect attacks, and disease spread.	Stand growth and vigor would be maintained or improved, making stands less susceptible to drought, insect attacks, and disease spread.	Stand growth and vigor would be maintained or improved, making stands less susceptible to drought, insect attacks, and disease spread.	Stand growth and vigor would be maintained or improved, making stands less susceptible to drought, insect attacks, and disease spread.	Forest health would be slightly less than other alternatives because of fewer acres of group selection.	Forest health would be slightly less than other alternatives because of fewer acres of group selection.
	Stand structure (such as fuel ladder), canopy cover, basal area, and tree density do not meet desired conditions with fuel ladders and interlocking crowns capable of sustaining crown fires.	Reduced canopy cover, tree densities, basal area, and fuel ladder potential would decrease crown fire occurrence and severity and overall fire hazard risk.	Reduced canopy cover, tree densities, basal area, and fuel ladder potential would decrease crown fire occurrence and severity and overall fire hazard risk.	Reduced canopy cover, tree densities, basal area, and fuel ladder potential would decrease crown fire occurrence and severity and overall fire hazard risk.	Reduced canopy cover, tree densities, basal area, and fuel ladder potential would decrease crown fire occurrence and severity and overall fire hazard risk.	Changes in stand structure, canopy cover, basal area, and tree density would occur on fewer acres (29 acres of groups were dropped for this alternative).	Changes in stand structure, canopy cover, basal area, and tree density would occur on fewer acres (29 acres of groups were dropped for this alternative).
Objective 3: Contribute to the stability and economic health of rural communities.	No jobs created, no employee income, and no return to the U.S. Treasury.	Increase in overall economic activity in the HFQLG Pilot Project area, with 267 jobs created and $11.5 million in employee-related income. Short-term cost to U.S. Treasury of -$981, 000.	Increase in overall economic activity in the HFQLG Pilot Project area, with 267 jobs created and $11.5 million in employee-related income. Short-term cost to U.S. Treasury of -$503,000.	Increase in overall economic activity in the HFQLG Pilot Project area, with 267 jobs created and $11.5 million in employee-related income. Short-term cost to U.S. Treasury of -$493,000.	Increase in overall economic activity in the HFQLG Pilot Project area, with 267 jobs created and $11.5 million in employee-related income. Short-term cost to U.S. Treasury of -$991,000.	Increase in overall economic activity in the HFQLG Pilot Project area, with 265 jobs created and $11.4 million in employee-related income. Short-term cost to U.S. Treasury of -$945,000.	Increase in overall economic activity in the HFQLG Pilot Project area, with 265 jobs created and $11.4 million in employee-related income. Short-term cost to U.S. Treasury of -$467,000.
Objective 4: Promote healthy aquatic, riparian, and wildlife ecosystems.	Poorly designed / maintained roads would continue to cause erosion and other problems.	Decommissioning of 19 miles of road.	Decommissioning of 19 miles of road.	Decommissioning of 19 miles of road.	Decommissioning of 19 miles of road.	Decommissioning of 19 miles of road.	Decommissioning of 19 miles of road.
	Several streambanks would continue to be undercut and widened by erosion	Stabilization of 1,200 feet of streambank.	Stabilization of 1,200 feet of streambank.	Stabilization of 1,200 feet of streambank.	Stabilization of 1,200 feet of streambank.	Stabilization of 1,200 feet of streambank.	Stabilization of 1,200 feet of streambank.

Table 2-4. Comparison of environmental consequences of alternatives related to project objectives (continued).

	Alternative A (No Action)	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F	Alternative G
Objective 4: Promote healthy aquatic, riparian, and wildlife ecosystems (continued).	Several culverts would continue to obstruct movement of fish and other aquatic species.	Removal or upgrade of 6 culverts to improve fish passage.	Removal or upgrade of 6 culverts to improve fish passage.	Removal or upgrade of 6 culverts to improve fish passage.	Removal or upgrade of 6 culverts to improve fish passage.	Removal or upgrade of 6 culverts to improve fish passage.	Removal or upgrade of 6 culverts to improve fish passage.
	Loss of wet meadow habitat would continue due to conifer encroachment, poorly located roads.	Restoration of 59 acres of meadow habitat.	Restoration of 59 acres of meadow habitat.	Restoration of 59 acres of meadow habitat.	Restoration of 59 acres of meadow habitat.	Restoration of 59 acres of meadow habitat.	Restoration of 59 acres of meadow habitat.
	Low suitability for foraging on 180 acres of owl habitat in PAC YU024 and SOHA B1.	Improved foraging conditions on 180 acres of spotted owl habitat in PAC YU024 and SOHA B1.	Improved foraging conditions on 180 acres of spotted owl habitat in PAC YU024 and SOHA B1.	Improved foraging conditions on 180 acres of spotted owl habitat in PAC YU024 and SOHA B1.	Improved foraging conditions on 180 acres of spotted owl habitat in PAC YU024 and SOHA B1.	Improved foraging conditions on 180 acres of spotted owl habitat in PAC YU024 and SOHA B1.	Improved foraging conditions on 180 acres of spotted owl habitat in PAC YU024 and SOHA B1.
Objective 5: Control the introduction and spread of noxious weeds**.**	Control of noxious weeds would not occur; some weed populations would decline as canopy cover increases.	Use of chemical and nonchemical control tactics would reduce the size of current populations, deplete seed bank, and kill re-sprouts.	Use of nonchemical control tactics would reduce the size of current populations, deplete seed banks, and kill re-sprouts to a lesser degree than alternatives B, D, and F.	Use of chemical and nonchemical control tactics would reduce the size of current populations, deplete seed bank, and kill re-sprouts.	Use of nonchemical control tactics would reduce the size of current populations, deplete seed bank, and kill re-sprouts to a lesser degree than alternatives B, D, and F.	Use of chemical and nonchemical control tactics would reduce the size of current populations, deplete seed bank, and kill re-sprouts.	Use of nonchemical control tactics would reduce the size of current populations, deplete seed bank, and kill re-sprouts to a lesser degree than alternatives B, D, and F.
		Use of the herbicide triclopyr would increase effectiveness of treatments and cost less ($200/acre) than using nonchemical tactics alone.	Nonchemical treatments would be less effective and cost more ($261/acre) than treatment using combination of chemical and nonchemical tactics.	Use of the herbicide triclopyr would increase effectiveness of treatments and cost less ($200/acre) than using nonchemical tactics alone.	Nonchemical treatments would be less effective and cost more ($261/acre) than treatment using combination of chemical and nonchemical tactics.	Use of the herbicide triclopyr would increase effectiveness of treatments and cost less ($200/acre) than using nonchemical tactics alone.	Nonchemical treatments would be less effective and cost more ($261/acre) than treatment using combination of chemical and nonchemical tactics.

Table 2-4. Comparison of environmental consequences of alternatives related to project objectives (continued).

	Alternative A (No Action)	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F	Alternative G
Objective 5: Control the introduction and spread of noxious weeds (continued)**.**	Long-lived seeds would remain in the soil until the next high-intensity fire, at which point conditions would be ideal for proliferation.	Less expansion of populations over long-term compared to no action.	Less expansion of populations over long-term compared to no action.	Less expansion of populations over long-term compared to no action.	Less expansion of populations over long-term compared to no action.	Less expansion of populations over long-term compared to no action.	Less expansion of populations over long-term compared to no action.

Table 2-5. Summary of environmental consequences related to issues identified during scoping.

	Alternative A (No Action)	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F	Alternative G
Issue 1: Opposition to the use of herbicides	Extent of herbicide treatment: No herbicides would be applied. The Slapjack Project would not occur.	Herbicides would be used for DFPZ preventive maintenance on 1,954 acres and for noxious weed control on a maximum of 31 acres.	No herbicide application for DFPZ preventive maintenance. Noxious weeds would be controlled with nonchemical tactics.	No herbicide application for DFPZ preventive maintenance. Herbicide would be used for noxious weed control on a maximum of 31 acres.	Herbicides would be used for DFPZ preventive maintenance on 1,954 acres. Noxious weeds would be controlled with nonchemical tactics.	Herbicides would be used for DFPZ preventive maintenance on 1,954 acres and for noxious weed control on a maximum of 31 acres.	No herbicide application for DFPZ preventive maintenance. Noxious weeds would be controlled with nonchemical tactics.
	Cost of using herbicides: No treatments would occur; therefore, no project-related costs would be incurred.	Short-term DFPZ preventive maintenance would cost $489,000 ($250/acre). The 5-year noxious weed control program would cost $33,000 ($200/acre).	Short-term DFPZ preventive maintenance would not occur. Cost of 5-year nonchemical noxious weed control program would be $43,000 ($261/acre).	Short-term DFPZ preventive maintenance would not occur. The 5-year noxious weed control program would cost $33,000 ($200/acre).	Short-term DFPZ preventive maintenance would cost $489,000 ($250/acre). Cost of 5-year nonchemical noxious weed control program would be $43,000 ($261/acre).	Short-term DFPZ preventive maintenance would cost $489,000 ($250/acre). The 5-year noxious weed control program would cost $33,000 ($200/acre).	Short-term DFPZ preventive maintenance would not occur. Cost of 5-year nonchemical noxious weed control program would be $43,000 ($261/acre).
	Potential exposure (as estimated by total number of days required to complete an activity): No project-related exposure because treatments would not occur.	DFPZ construction, preventive maintenance, and noxious weed control would require 5,159 person days to complete.	DFPZ construction and noxious weed control would require 4,275 person days to complete. DFPZ preventive maintenance would not occur.	DFPZ construction and noxious weed control would require 4,182 person days to complete. DFPZ preventive maintenance would not occur.	DFPZ construction, DFPZ preventive maintenance, and noxious weed control would require 5,252 person days to complete.	DFPZ construction, DFPZ preventive maintenance, and noxious weed control would require 5,159 person days to complete.	DFPZ construction and noxious weed control would require 4,275 person days to complete. DFPZ preventive maintenance would not occur.

Table 2-5. Summary of environmental consequences related to issues identified during scoping (continued).

	Alternative A (No Action)	Alternative B	Alternative C	Alternative D	Alternative E	Alternative F	Alternative G
Issue 2: Implementing ground-disturbing activities in watersheds over the Threshold of Concern (TOC).	No treatments are proposed; therefore, no project-related change in ERA (Equivalent Roaded Area) scores for 11 subwatersheds above the TOC and 8 subwatersheds approaching the TOC under the existing condition.	There are 12 subwatersheds expected to exceed the TOC and 7 subwatersheds expected to approach the TOC. The Slapjack Project activities and past activities on the Plumas National Forest would contribute between 1% and 20% of the ERA score.	There are 12 subwatersheds expected to exceed the TOC and 7 subwatersheds expected to approach the TOC. The Slapjack Project activities and past activities on the Plumas National Forest would contribute between 1% and 20% of the ERA score.	There are 12 subwatersheds expected to exceed the TOC and 7 subwatersheds expected to approach the TOC. The Slapjack Project activities and past activities on the Plumas National Forest would contribute between 1% and 20% of the ERA score.	There 12 subwatersheds expected to exceed the TOC and 7 subwatersheds expected to approach the TOC. The Slapjack Project activities and past activities on the Plumas National Forest would contribute between 1% and 20% of the ERA score.	There are 12 subwatersheds expected to exceed the TOC and 7 subwatersheds expected to approach the TOC. Dropping 29 acres of groups would result in less than a 1% difference in ERA compared to alternatives B through E.	There are 12 subwatersheds expected to exceed the TOC and 7 subwatersheds expected to approach the TOC. Dropping 29 acres of groups would result in less than a 1% difference in ERA compared to alternatives B through E.

Chapter 3. Affected Environment and Environmental Consequences

3.1 Introduction

This chapter summarizes the physical, biological, social, and economic environments of the Slapjack Project area and the effects on that environment that would result from implementation of any of the alternatives. This chapter also presents the scientific and analytical basis for comparison of the alternatives presented in "Chapter 2: Alternatives."

Each resource section in this chapter provides a summary of the project-specific reports, assessments, and input prepared by Forest Service specialists, which are incorporated by reference in this final environmental impact statement (EIS). The following reports and memoranda are incorporated by reference: Botanical Biological Evaluation, Botany Report, and Noxious Weed Risk Assessment; Biological Assessment / Biological Evaluation (BA/BE) for Fish and Wildlife; Human Health and Safety Risk Assessment, Hydrology Report; Silviculture Report; Soils Report; Fire and Fuels Report; Recreation, Visuals, Lands, and Minerals Report; and the Heritage Resources Report. These reports or memoranda are part of the project record on file at the Feather River Ranger District in Oroville, California. Copies are available upon request by contacting Susan Joyce, Project Leader, at (530) 532-7437.

3.1.1 Scope of Analysis

The "Affected Environment" section under each resource topic describes the existing, or baseline, condition against which environmental effects were evaluated and from which progress toward the desired condition can be measured. Environmental consequences form the scientific and analytical basis for comparison of alternatives, including the proposed action, through compliance with standards set forth in the 1988 *Plumas National Forest Land and Resource Management Plan* (also referred to as the "Forest Plan"), as amended, and a summary of monitoring required by the *National Environmental Policy Act of 1969* (NEPA) and *National Forest Management Act of 1976* (see appendix G of this EIS for the findings). The environmental consequences discussion centers on direct, indirect, and cumulative effects, along with applicable mitigation measures. Effects can be neutral, beneficial, or adverse. The "Irreversible and Irretrievable Commitments of Resources" section is located at the end of this chapter. These terms are defined as follows:

- **Direct effects** are caused by the action and occur at the same place and time as the action.
- **Indirect effects** are caused by the action and are later in time, or further removed in distance, but are still reasonably foreseeable.
- **Cumulative effects** are those that result from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions.

- **Irreversible commitments of resources** are permanent or essentially permanent resource use or losses. They cannot be reversed, except in the extreme long term. Examples include mineral extraction or loss of soil productivity.

- **Irretrievable commitments of resources** are losses of productivity or use for a period of time. One example is road construction on suitable timber lands. Timber growth on the land is irretrievably lost while the land is used as a road, but the timber resource is not irreversibly lost because the land could grow trees again in the near future.

3.1.2 Description of Alternatives

The following are brief descriptions of the seven alternative management scenarios analyzed for this proposal.

- **Alternative A** (the no-action alternative) addresses the NEPA requirement to analyze a no-action alternative and the potential effects of taking no action.

- **Alternative B** (the proposed action) calls for approximately 4,400 acres of Defensible Fuel Profile Zone (DFPZ) construction, 219 acres of group selection, and 148 acres of individual tree selection; transportation system improvements; and wildlife, aquatic, and riparian ecosystem restoration. This alternative includes the use of herbicides for preventive maintenance of DFPZs (1,954 acres) and as a tactic to control noxious weeds on a maximum of 31 of the 33 total acres analyzed for weed management.

- **Alternative C** proposes the same suite of actions as alternative B; however, herbicides would not be used for preventive maintenance of DFPZs nor would they be used to control noxious weeds.

- **Alternative D** (Forest Service preferred alternative) would implement DFPZs, group selection, and individual tree selection; transportation system improvements; and wildlife, aquatic, and riparian ecosystem restoration as described under alternative B. Herbicides would not be used for preventive maintenance of DFPZs, but herbicides would be used as a tactic to control noxious weeds.

- **Alternative E** would implement DFPZs, group selection, and individual tree selection; transportation system improvements; and wildlife, aquatic, and riparian ecosystem restoration as described under alternative B. Herbicides would be used for DFPZ maintenance, but they would not be used to control noxious weeds.

- **Alternative F** would implement DFPZs and individual tree selection; transportation system improvements; and wildlife, aquatic, and riparian ecosystem restoration as described under alternative B. However, this alternative calls for 190 acres of group selection, instead of 219 acres, because group selections located in watersheds predicted to be over the Threshold of Concern (TOC) have been dropped. This alternative includes the use of herbicides for preventive maintenance of DFPZs and as a tactic to control noxious weeds.

- **Alternative G** would implement DFPZs and individual tree selection; transportation system improvements; and wildlife, aquatic, and riparian ecosystem restoration as described under alternative B. Like alternative F, this alternative calls for 190 acres of group selection because groups located in watersheds predicted to be over the TOC have been dropped. Herbicides would not be used for preventive maintenance of DFPZs nor would they be used to control noxious weeds.

3.1.3 Cumulative Effects Analysis

The cumulative effects analysis area varies for each resource. Past activities are considered part of the existing condition and are discussed in the “Affected Environment (Existing Conditions)” and “Environmental Consequences” section under each resource. Figure A-5 in appendix A depicts the DFPZ projects on the Feather River Ranger District that are in progress, planned, or proposed. The analysis of cumulative effects is consistent with the direction provided in the Council on Environmental Quality's (CEQ) June 24, 2005, memorandum titled, “Guidance on the Consideration of Past Actions in Cumulative Effects Analysis.” In the memorandum, the CEQ provides guidance on the extent to which federal agencies are required to analyze the environmental effects of past actions when they describe the cumulative environmental effects of a proposed action in accordance with Section 102 of the NEPA and the CEQ regulations for implementing the procedural provisions of NEPA, 40 CFR parts 1500-1508. The CEQ memorandum is hereby incorporated by reference.

3.2 Air Quality

3.2.1 Introduction

Prescribed fire is one of the primary activities proposed for the Slapjack Project that would have a direct impact on air quality. Underburning would be conducted during fall, spring, or winter—the most favorable times in terms of smoke dispersion. A secondary source of impacts on air quality would be from dust and internal combustion engine emissions during project harvest, mastication, and road construction activities.

3.2.2 Regulatory Framework

Air quality is managed through a complex series of federal, state, and local laws and regulations. The U.S. Environmental Protection Agency (EPA) has the primary federal role of ensuring compliance with the requirements of the *Clean Air Act*. The EPA issues national air quality regulations, approves and oversees State Implementation Plans, and conducts major enforcement actions. State and local Air Pollution Control Districts and Air Quality Management Districts (AQMDs) have the primary responsibility of carrying out the development and execution of State Implementation Plans, which provide for the attainment and maintenance of air quality standards.

The original *Air Quality Act* was passed in 1963. This act was followed by the *Clean Air Act* and its amendments of 1970, 1977, and 1990. The *Clean Air Act* is the primary legal instrument for air resource management. It requires the EPA to identify pollutants that have adverse effects on public health and welfare and to establish air quality standards for each pollutant. The EPA has issued National Ambient Air Quality Standards for sulfur dioxide, carbon monoxide, ozone, nitrogen dioxide, lead, and particulate matter (PM) that is 10 microns (PM_{10}) in diameter or smaller. If the National Ambient Air Quality Standards are violated in an area, that area is designated as "nonattainment" for that pollutant, and the state must develop a plan for bringing that area back into "attainment." Title 17 of the California Air Pollution Control Laws sets similar standards for these pollutants.

The 1977 *Clean Air Act* amendments set up a process to designate Class I and Class II areas for air quality management. Class I areas receive the highest levels of protection under the Prevention of Significant Deterioration program, which regulates air quality through application of criteria for specific pollutants and use of the Best Available Control Methods. Class I areas include international parks, national parks larger than 6,000 acres, and national wilderness areas larger than 5,000 acres.

The 1990 amendment of the *Clean Air Act* published the General Conformity Determination. It states that in federal nonattainment areas, before actions can be taken on federal lands that have the potential to emit pollutants to the atmosphere, a determination must be made that the emissions will not exceed a *de minimis* (threshold) level measured in tons per year. If the action exceeds the *de minimis* level, then a conformity determination is required to document how the federal action will not (1) cause or contribute to any new violation of any standard in any area; (2) increase the frequency or severity of any existing violation of any standard in any area; or (3) delay timely attainment of any standard or any required interim emission reductions or other milestones in any area. If the project emissions are below *de minimis* levels, the project would be considered exempt from conformity determination with the State Implementation Plan. Activities that affect air quality in

the project area are (1) prescribed burning on National Forest lands for reforestation, hazard reduction, and wildlife habitat improvement; (2) dust from construction and use of unpaved roads and harvest activities; and (3) wildfire occurrence.

On the Plumas National Forest, the 1988 *Plumas National Forest Land and Resource Management Plan* (also referred to as the "Forest Plan," page 4-46), the 2004 Sierra Nevada Forest Plan Amendment (SNFPA) final supplemental EIS, and the 1999 HFQLG Act final EIS provide direction for coordination and cooperation with local Air Quality Management Districts.

The following operating procedures are from the HFQLG Act final EIS (1999) and the SNFPA final EIS (2004):

1. Mitigate dust from project activities by including standard dust abatement requirements in sale and project contracts.

2. Conduct prescribed burns when favorable smoke dispersal is forecasted, especially near sensitive Class I areas.

3. Use appropriate smoke modeling software to predict smoke dispersion.

4. Minimize smoke emissions by following Best Available Control Methods.

5. Avoid burning on high visitor use days and notify the public before burning.

6. Consider alternatives to burning.

7. Incorporate burn plan data into appropriate modeling software.

8. Comply with Title 17 of the 2004 California Air Pollution Control Laws and interim air quality policy and local smoke management programs.

9. Follow the Memorandum of Understanding on prescribe burning with the California Air Resources Board (CARB) and the USDA Forest Service, Pacific Southwest Region.

3.2.3 Methodology for Assessing Impacts on Air Quality

3.2.3.1 Scope of the Analysis

The analysis for the Slapjack Project uses one indicator for air quality: criteria pollutant totals required for compliance with federal, state, and local laws and regulations. The analysis also discloses the effects of herbicide use on air quality.

The analysis area for air quality is the area potentially affected by smoke emissions, fugitive dust, and emissions from proposed treatments. This includes the Slapjack Project area and the air basins in which the project area is located. The project area lies entirely within the Sacramento Valley air basin (see figure 3-1). This air basin is administered by local Air Quality Management Districts with oversight regulation by CARB (see figure 3-2). The Slapjack Project is located in the Butte County and Feather River Air Quality Management Districts.

Source: California Air Resources Board, http://www.arb.ca.gov/maps/abasibw.pdf

Figure 3-1. California Air Basins and Counties.

Source: California Air Resources Board, http://www.arb.ca.gov/maps/adistbw.pdf

Figure 3-2. California Air Quality Management Districts and Counties.

The air quality analysis for activities associated with each alternative includes identification of adjacent and downwind air basins of concern (class one and nonattainment areas), comparison of the amount of smoke and particulate matter to be produced as a result of fuels treatment and other project activities in DFPZs and group selection units, and a discussion of the consequences of wildfire produced emissions compared to prescriptive fire.

3.2.3.2 Analysis Methods and Assumptions

The predicted emissions from prescribed burning and harvest emissions in the proposed project area have been estimated using emission factors from EPA Document 42 and are based on an estimated 90 percent consumption of machine and hand piles and 85 percent of surface fuels for underburning. Underburning would be done over a period of five years; the amount of particulates is based on approximately 500 acres burned annually. The prescribed fire would be done in the spring, fall, or winter months because these are the best times of year for smoke dispersion. Each year the burning would take place over a period of months, with treated areas spread throughout the project area.

The following are the assumptions used for determining emissions from timber operations and prescribed burns:

1. The emission factors used to determine effects from the project were taken from EPA Document 42 (EPA 1995) for prescribed burning, and from the *National Environmental Policy Act Air Quality Desk Reference Guide* (CH2M Hill 1995; table 3.3.2-1 for timber harvest operations).
2. All harvest thinning equipment will be diesel powered, and thinning treatments will occur over a five-year period.
3. Harvest operations include harvesting, processing, skidding, loading, hauling, and road watering.
4. Slash piles are constructed free of dirt, with 90 percent consumption.
5. The emissions from burning will result from burning approximately 500 acres annually on a five-year plan and will not be continuous (that is, separated by space and time).
6. There will be emissions from daily burning on approximately 100 acres. This would not be continuous but separated by seasons.

3.2.4 Existing Conditions

The Slapjack Project area is located in Butte and Yuba Counties, California, approximately 18 miles east of Marysville.

Butte and Yuba Counties are currently in federal nonattainment status for ozone, a product of volatile organic compounds or nitrogen oxides. There are no published emission factors that isolate ozone. Standards have been set, however, for the ozone precursors such as the volatile organic compounds and nitrogen oxides.

Air quality can be severely impacted by particulate matter and other pollutants during large wildfire events. Impacts from the 1992 Pendola fire on the Plumas and Tahoe National Forests affected air quality 60 miles away in Sacramento, California. Fugitive dust caused by construction and use of unpaved roads can produce PM_{10} in quantities great enough to impair the visual quality of the air. These effects are localized and can be mitigated by effective dust abatement methods. Dust generated by skidding, loading, and site preparation activities also contributes to fugitive dust; however, the level contributed by these activities is unknown.

3.2.4.1 Conformity Determination

As stated above, Yuba and Butte Counties are currently in federal nonattainment status for ozone (a product of volatile organic compounds or nitrogen oxides). The current allocation for volatile organic compounds or nitrogen oxides is 50 tons per year.

PM_{10} has been established as one of the six criteria pollutants because of adverse human health effects. The emission levels for PM_{10} are not mandated in the project area. Butte and Yuba Counties are currently in attainment for PM_{10}, and efforts to reduce PM_{10} would be implemented to prevent future health threats.

The activities that currently affect air quality in the project area are (1) prescribed burning on National Forest lands for hazard reduction; (2) dust from construction, use of unpaved roads, and harvest activities; and (3) wildfire occurrence.

Prescribed burning affects air quality in ways similar to wildfires, but prescribed burning offers many advantages over wildfire. This is because the effects of prescribed fire on air quality can be manipulated to reduce adverse effects. The Best Available Control Measures (BACM) are guidelines that have been developed to reduce the adverse effects of prescribed burns. The BACM are based on the “Prescribed Burning Background Document” and “Technical Information Document for Prescribed Burning Best Available Control Measures” (EPA 1992a, 1992b). The BACM are based on avoidance, dilution, and emission reduction strategies. Smoke mitigation techniques include consideration of atmospheric conditions, season of burn, fuel and duff moisture, daily wind shifts, appropriate ignition techniques, and rapid mop-up. Following these BACM, and identifying them in burn plans, is critical in preventing adverse air quality effects.

3.2.5 Environmental Consequences

3.2.5.1 Alternative A (No Action)

Direct and Indirect Effects. Under this alternative, no increase in ozone precursors or PM_{10} emission levels would be produced from prescribed burning of activity-generated fuels, harvest operations, or understory burning. Alternative A would not result in a reduction of surface fuels, so the potential for substantial degradation of air quality from future wildfire would not be reduced. The no-action alternative would not provide any opportunities for reducing existing forest fuels and the hazard they pose in wildland fires. During the flaming phase of a catastrophic wildfire, air quality degradation can exceed federal and state standards as far as 60 miles downwind. Wildfire usually occurs under very stable atmospheric conditions, which tend to disperse smoke; consequently, this can not be regulated by local Air Quality Management Districts. The potential ozone precursors from a wildfire are shown in table 3-1.

Table 3-1. Potential ozone precursors and PM_{10} from wildfire emissions.

Nitrogen Oxides	Volatile Organic Compounds	Particulate Matter (PM_{10})
82 tons	1,531 tons	1,307 tons

Alternative A (No Action)
- No treatments would be implemented.

Alternative B (Proposed Action)
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds with herbicides (up to 31 acres), mechanical and manual methods, and prescribed burning

Alternative C
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs without herbicides
- Control noxious weeds without herbicides

Alternative D
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs without herbicides
- Control noxious weeds with herbicides (up to 31 acres)

Alternative E
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds without herbicides

Alternative F
- Construct DFPZs
- Implement group selection (190 acres), except in watersheds over the Threshold of Concern
- Implement individual tree selection (148 acres); no proposed ITS units are located in watersheds over the Threshold of Concern
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds with herbicides (up to 31 acres)

Alternative G
- Construct DFPZs
- Implement group selection (190 acres), except in watersheds over the Threshold of Concern
- Implement individual tree selection (148 acres); no proposed ITS units are located in watersheds over the Threshold of Concern
- Maintain DFPZs without herbicides
- Control noxious weeds without herbicides

Cumulative Effects. Under alternative A, the project area would be subjected to long-term deposition of surface fuels. Forest fuels would continue to increase with biomass production and would out-produce the decomposition rates in this climate. The long-term chronic effects of wildfires would be higher PM_{10} emissions, mostly due to large areas of exposed soil and ash in the aftermath of a high-intensity wildfire.

3.2.5.2 All Action Alternatives

Direct Effects. Two methods of prescribed burning would be used to accomplish fuel load reduction: underburning and pile burning (piles created by machine and by hand). Underburning would be used to reduce both natural and activity-generated fuels where it is not cost effective or physically practical to pile and burn. The objective of underburning would be to reduce fuel loadings while protecting the residual overstory trees from damage caused by heat and flames or damage from equipment. Pile burning would produce less particulate matter per acre than underburning because piled material can be ignited with lower fuel moistures, which ensures complete and efficient consumption

The release of particulate matter into the air during prescribed burning can have adverse effects on visibility and public health. As described above, the volume of particulate matter is related to which burning method is used and the extent of the burning. Particulate concentrations in the Sacramento Valley air basin (see figure 3-1 above) are influenced by climatic conditions and other emission-generating activities occurring in the air basin. Particulate concentrations are regulated through compliance with CARB and local Air Quality Management Districts.

The prescribed burning proposed in all action alternatives would be used to reduce fuel loadings to an acceptable level. Under favorable smoke-dispersal conditions, the smoke would likely affect air quality during ignition and for approximately three days following ignition. Another impact of all action alternatives would be the emissions and dust caused by project activities. Emissions from burning and equipment used for other project activities (such as thinning and mastication) may be occurring at the same time, which would elevate the level of particulate matter. By following the burn plan and Air Quality Management District requirements for burning and managing other project activities, it is unlikely that emissions caused by the project would exceed California Air Quality Standards for the two Air Quality Management Districts. By implementing prescribed burning for the Slapjack Project at 500 acres or less annually, the particulates from prescribed burning would not exceed the *de minimis* threshold values, and thus the project would meet conformity.

The prescribed fire proposed for the Slapjack Project would produce a total of 28.36 tons of volatile organic compounds (VOC), 10.0 tons of nitrogen oxides (NO_x), and 64.68 tons of PM_{10} annually (see table 3-2). The potential annual criteria pollutant totals for timber operations (emissions from trucks and other equipment) would vary according to the acres of treatments performed each year (table 3-3). Table 3-4 presents the total criteria pollutants for prescribed burning and timber operations. *De minimis* levels for VOC and NO_x are 50 tons per year. As shown, the emission levels for VOC and NO_x are below the *de minimis* levels; therefore, the Slapjack Project is exempt from conformity determination. Emission levels are not mandated in the project area because Butte and Yuba Counties are in attainment for PM_{10}.

Table 3-2. Potential annual criteria pollutant totals (prescribed burning [approximately 500 acres annually]).

Year	Nitrogen Oxides	Volatile Organic Compounds	PM_{10}
	Tons		
1	10.0	28.36	64.68
2	10.0	28.36	64.68
3	10.0	28.36	64.68
4	10.0	28.36	64.68
5	10.0	28.36	64.68

Table 3-3. Potential criteria pollutant totals, timber operations.

Year	Nitrogen Oxides	Volatile Organic Compounds	PM_{10}
	Tons		
1	7.1	0.40	0.40
2	7.1	0.40	0.40
3	4.7	0.20	0.31
4	4.7	0.20	0.31
5	2.3	0.10	0.15

Table 3-4. Potential annual criteria pollutant totals for timber operations and prescribed burning combined.

Year	Nitrogen Oxides	Volatile Organic Compounds	PM_{10}
	Tons		
1	17.1	28.76	65.08
2	17.1	28.76	65.08
3	14.7	28.56	64.99
4	14.7	28.56	64.99
5	12.3	28.46	64.83

Table 3.5 is a comparison of the conformity determination and shows estimated emissions from the burning in the project area that would be done on a daily basis, at any given time. The assumption is that no more than 100 acres would be burned on any given day; this is based on previous burning experience on the Feather River Ranger District.

Table 3-5. Daily criteria pollutant total (prescribed burning [approximately 100 acres daily]).

Nitrogen Oxides	Volatile Organic Compounds	PM_{10}
Tons		
2.0	5.67	12.94

Indirect Effects. In the event of a wildfire, the stands in the Slapjack Project area that were treated by mastication, pile burning, or underburning would produce less particulate matter emissions than untreated areas outside the project area.

Cumulative Effects. The VOC, NO_x, and PM_{10} emissions from all action alternatives would contribute to particulate matter loading locally and regionally. Local effects could include cumulative emissions from prescribed burning resulting from past practices, natural surface fuel buildup, and activities on federal, state, and private lands near the Slapjack Project area. The PM_{10} atmospheric concentrations currently do not exceed national standards; however, emissions could exceed CARB standards if (1) weather conditions predicted by CARB meteorologists do not prevail, or (2) emissions do not disperse as predicted, and/or (3) emissions from other Air Quality Management Districts adversely impact air quality in local districts. Forest Service and CARB smoke-dispersal forecasting would be used as part of the burn plan to mitigate effects within the regulatory framework.

3.2.5.3 Alternative A (No Action): Effects on Air Quality from Herbicide Use

Direct, Indirect, and Cumulative Effects. Herbicides would not be used for DFPZ preventive maintenance or noxious weed control; therefore, no direct, indirect, or cumulative effects on air quality related to herbicide use would occur.

3.2.5.4 All Action Alternatives

Direct Effects. The effects of alternatives B, E, and F are combined for this section because they propose the use of herbicides for preventive maintenance of DFPZs, and the effects on air quality would be very similar. No direct effects on air quality due to herbicide use are expected because herbicides are not proposed for units with prescribed burn treatments. Alternatives C, D, and G do not propose herbicide use for DFPZ preventive maintenance. Therefore, no direct effects are expected. Alternative D, however, does propose the use of herbicides to control noxious weeds on a maximum of 31 acres outside of DFPZs, and herbicides would likely be used as a follow-up treatment if underburning does not effectively control the noxious weeds. Herbicide use may precede prescribed burning in some units that cannot be burnt in the first year or two of treatments.

Indirect Effects. An indirect effect of herbicide use in alternatives B, E, and F, compared to alternatives C, D, and G, would be fewer emissions in subsequent follow-up and maintenance underburns due to biomass reduction in shrubs in areas where herbicides would be used to treat tanoak and brush for preventive maintenance of DFPZs, as well as to control noxious weeds on up to 31 acres in the project area. There would also be less risk of escape from lofted embers from torching shrubs and less risk of mortality in residual trees from burning shrubs in follow-up and maintenance underburns.

In alternatives C, D, and G, the follow-up or maintenance underburn in units without prior herbicide treatments would produce more emissions from burning live biomass (shrubs). There would also be an increased risk of escape from lofted embers from torching shrubs and increased risk of mortality in residual trees.

3.2.6 Past, Present, and Reasonably Foreseeable Future Actions

Past prescribed burning projects in and around the Slapjack Project area would have no effect on current air quality because of the temporal effects of dead and live biomass combustion. There are no other prescribed burning projects planned in the project area that would be occurring during implementation of the Slapjack Project. The local Air Quality Management Districts would also regulate prescribed burning on private property and on other National Forest System lands that are close enough to impact and/or worsen emissions in the two Air Basins during Slapjack Project implementation. Any cumulative effects from burning in the Slapjack Project area would be temporary and, when performed in accordance with Air Quality Management District regulations, would not violate any air quality standards.

3.2.7 Summary of Cumulative Effects

Without considering the possibility of future wildfires, the no-action alternative would have no cumulative effects on particulate matter and visibility. The action alternatives would have cumulative effects on air quality in the project area and local air basin (Sacramento Valley), but the effects would be managed to be within the regulatory standards of CARB. The dust and emissions from project activities would be mitigated by requiring that standard operating procedures be included with timber sale or service contract packages. The cumulative effect of all action alternatives is that PM_{10} and $PM_{2.5}$ would contribute to particulate matter loading locally, regionally, the direct area that could possibly reach as far as 50 miles around the project area. Emissions could possibly reach smoke-

sensitive areas such as Brownsville, Camptonville, Clipper Mills, Dobbins, Feather Falls, Forbestown, Strawberry Valley and possibly other smoke-sensitive areas. These effects would be reduced by using the nine operating procedures mentioned above in the “Regulatory Framework” section and by working with the local Air Quality Management Districts. The local effects would include cumulative emissions from prescribed burning conducted on federal, state, and private lands near the Slapjack Project area. The PM_{10} and $PM_{2.5}$ atmospheric concentrations currently do not exceed national standards. However, emissions could exceed the CARB standards if (1) weather conditions predicted by CARB meteorologists do not prevail, (2) emissions do not disperse as predicted, and/or (3) emissions from other Air Quality Management Districts adversely impact air quality in local districts. Forest Service and CARB smoke-dispersal forecasting would be used as part of the burn plan to mitigate effects within the regulatory framework. Without considering the possibility of future wildfires, the no-action alternative would have no cumulative effects on particulate matter and visibility. The action alternatives could have cumulative effects on air quality in the project area and local air basins (Sacramento Valley and possibly Mountain Counties air basin), but these impacts would be managed within CARB regulatory standards. Dust from the project activities would be mitigated by standard operating procedures through sale and other project contracts.

3.3 Botanical Resources and Noxious Weeds

3.3.1 Introduction

Forest Service Manual 2672.42 specifies that a biological evaluation (BE) must be prepared to determine if a project may affect any Forest Service Sensitive species, and a biological assessment (BA) must be prepared to address effects on U.S. Fish and Wildlife Service (USFWS) Threatened, Endangered, or Proposed species. The purpose of this section is to describe the effects of the proposed project on all Threatened, Endangered, Proposed, and Sensitive plant species of record for the Slapjack Project area. These species will be collectively referred to as "rare" species. The objectives of the BA/BE are to

- ensure that Forest Service actions do not contribute to loss of viability of any native or desired nonnative plant or animal species;
- ensure that Forest Service actions do not hasten the federal listing of any species; and
- provide a process and standard through which rare species receive full consideration throughout the planning process, thus reducing negative impacts on species and enhancing opportunities for mitigation.

This "Botanical Resources and Noxious Weeds" section presents a summary of the results of the BA/BE for botanical resources, which is on file at the Feather River Ranger District office in Oroville, California. The BA/BE includes a complete discussion of (1) USFWS Threatened, Endangered, and Proposed species and Forest Service Region 5 Sensitive species with potential habitat in the project area; (2) project effects on Plumas National Forest Special Interest species ("Appendix A: Botany Report" in the BA/BE); and (3) noxious species ("Appendix C: Noxious Weed Risk Assessment" in the BA/BE).

Floristic botanical surveys were conducted in the proposed treatment units in 2002, 2003, and 2004 for USFWS Threatened, Endangered, Proposed, and Sensitive species; Forest Service Region 5 Sensitive species; and Plumas National Forest Special Interest species. All species were identified at the time of survey, and some areas were visited more than once depending on potential habitat for rare species. Also, unique habitats and noxious weeds were surveyed by Forest Service botany staff and Ecosystems West Consulting. Nonvascular plant surveys were conducted in 2004 by Colin Dillingham. Fungi surveys were conducted in 2004 by Forest Service botany staff. Roadside noxious weed surveys were conducted in 2002 and 2003 (see "Appendix C: Noxious Weed Risk Assessment" of the Botany BA/BE). All surveys were conducted at the appropriate time of the year to identify rare species. The Management Indicator Species (MIS) on the Plumas National Forest are identified in the 1988 *Plumas National Forest Land and Resource Management Plan* (the "Forest Plan"). The MIS are also Forest Service Sensitive plant species. Consequently, any discussion of Sensitive or rare species includes MIS.

Approximately 77 percent of this area is private land with a high degree of commercial timber production. The Threatened plant, Layne's butterweed (*Senecio layneae*), occurs on approximately 13.7 acres in the analysis area, of which 0.3 acre is located in a potential underburn unit. There are an additional 478 acres of known rare plants in the analysis area, of which 37 acres are located in

potential treatment units. The estimates of acres of known rare plants are based on 2005 Geographic Information System (GIS) data.

3.3.2 Regulatory Framework

3.3.2.1 Sensitive Species

The 1988 Forest Plan, as amended, provides forestwide general direction to

- Maintain viable populations of Sensitive plant species (page 4-34).

The Forest Plan also includes forestwide standards and guidelines to

- Protect Sensitive and Special Interest plant species as needed to maintain viability (page 4-34).
- Inventory and monitor Sensitive plant populations on a project-by-project basis (page 4-34).
- Develop species management guidelines to identify population goals and compatible management activities / prescriptions that will maintain viability (page 4-34).

3.3.2.2 Noxious Weed Management

The *Herger-Feinstein Quincy Library Group Forest Recovery Act Final Environmental Impact Statement* (HFQLG Act final EIS) and the 2004 Record of Decision on the Sierra Nevada Forest Plan Amendment (SNFPA) final supplemental EIS amended the management direction in the Forest Plan to address management of noxious weeds and invasive exotic (nonnative) weeds. Management direction for noxious weed and invasive exotic weed management is found on page 2-9 of the HFQLG Act final EIS and page 36 of appendix A of the SNFPA Record of Decision. Table 2.4 of the HFQLG Act final EIS states:

> "D. Manage National Forest system lands so that management activities do not introduce or spread noxious or invasive exotic weeds using the following guidelines during site-specific planning and implementation:
>
> Inventory: As part of site-specific planning, inventory project areas and adjacent areas (particularly access roads) for noxious and invasive exotic weeds.
>
> Control: If noxious weeds are found in or adjacent to a site-specific project area, evaluate treatment options relative to the risk of weed spread without treatment. Evaluate control methods at the site-specific planning level.
>
> Prevention/Cleaning: Require off-road equipment and vehicles (both Forest Service owned and contracted) used for project implementation to be weed-free. Clean equipment and vehicles of all attached mud, dirt and plant parts. Use standard timber sale contract clause C6.343-Cleaning of Equipment in timber sale contracts.

Prevention/Road Construction: Require all earth-moving equipment, gravel, fill or other materials to be weed-free. Use onsite sand, gravel, rock or organic matter, where possible. Evaluate road locations for weed risk factors.

Prevention/Revegetation: Use weed-free equipment, mulches, and seed sources. Avoid seeding in areas where revegetation will occur naturally, unless noxious weeds are a concern. Save topsoil from disturbance and put it back to use in onsite revegetation, unless contaminated with noxious weeds.

Prevention/Staging Areas: Do not stage equipment, materials, or crews in noxious weed infested areas where there is risk of spread to areas of low infestation."

Appendix A of the SNFPA 2004 Record of Decision (page 36) establishes goals for noxious weed management using an integrated weed management approach according to the priorities set forth in Forest Service Manual 2081.2:

- Priority 1 – Prevent the introduction of new invaders.
- Priority 2 – Conduct early treatment of new infestations.
- Priority 3 – Contain and control established infestations.

Provisions for implementing these goals are embodied in the noxious weed management standards and guidelines of the SNFPA 2004 Record of Decision.

3.3.3 Methodology for Assessing Impacts on Botanical Resources and Noxious Weeds

3.3.3.1 Scope of the Analysis

The geographic boundary of the analysis area for botanical resources consists of the level 6 subwatersheds surrounding the Slapjack Project area. These subwatersheds, which total approximately 144,000 acres, include McCabe Creek, Ponderosa Reservoir, New Bullard's Bar Reservoir, Frey Creek, Lower Dry Creek, and Dobbins Creek. The subwatersheds were selected as the analysis area due hydrologic connectivity and the potential for treatment effects on rare plant species to be magnified down stream. For example, herbicides applied in a watershed will express their effects within that same watershed or at some point downstream.

Timeframe. Determining the duration of effects requires estimating the length of time the effects of the proposed action and alternative could last. More specifically, this length of time would extend as long as the effects of the action alternatives are, either singly or in combination with other anticipated effects, distinguishable from effects of the no-action alternative. In general, analysis should extend until the resource has recovered from the impact of the proposed action or any of the alternatives.

The additive effects of past actions (such as wildfire suppression, timber harvest, mining, nonnative plant introductions, and ranching) have shaped the present landscape and corresponding populations of rare plants. It is impossible to quantify the effects of historic activities on rare plants

because no records are available to describe what the “natural state” consisted of. Undoubtedly, some plant species have always been rare due to particular ecological requirements or geographic isolation. Past actions have made some common plants rarer and encouraged others to be more common. For example, fire suppression has encouraged the proliferation of shade-tolerant, fire-intolerant species, and as a result, environmental conditions necessary for general openings and phase species regeneration is missing, and these plant species are most likely rarer as a result.

3.3.3.2 Analysis Methods

The Slapjack Project area was reviewed using aerial photographs, soils maps, and known occurrences to help determine potential habitat for rare species. In the field, areas identified as potential habitat were surveyed at a high level of intensity (complete survey). Areas identified as potential habitat include openings in the forest, serpentine soils, meadows, riparian areas, seeps, and springs. Other areas with little to no potential habitat were surveyed at a less intense level (cursory survey). Plant location data were recorded using Global Positioning Systems, and the data were then entered into the GIS. The treatment units were added to the GIS to analyze proximity to rare species and identify potential detrimental treatments and designate “Controlled Areas.” Areas of concern were brought forward at planning meetings, and necessary modifications were made to the project design. Past actions were summarized by decade starting in 1980.

3.3.4 Affected Environment (Existing Conditions)

The current landscape in the analysis area reflects a variety of past actions that include timber sales, mining operations, cattle grazing operations, and fire suppression. Highly effective mechanized fire suppression has changed the composition of the forests in the project area, as well as much of the Northern Sierra Nevada. The open fire-resilient forests have been replaced by dense stands of shade-tolerant species such as white fir. Botanical surveys reveal that these dense stands lack understory vegetation.

Approximately 77 percent of the analysis area is private land, with a high degree of commercial timber production. Federal lands in the area have very dense canopy cover. As described in table 2 of the Draft Challenge Landscape Assessment (2006), approximately 10 percent of the area is described as moderate stand density (40–59 percent canopy cover), and 84 percent of the area is described as dense (60–100 percent cover). Stand density is a consequence of fire suppression and a reflection of productive soils and high annual rainfall.

Table 3-6 lists the rare plant species that occur in the analysis area. These rare species would be protected by

- avoidance through flagging and signing in the field;
- imposing Limited Operating Periods to allow rare species to finish their life cycle; or
- changing the prescription (for example, conducting an underburn in the spring rather than the fall).

Table 3-6. Acres of rare plant species in the 144,490-acre botanical resources analysis area and proposed treatment units.

Common Name	Species	Guild[a]	Analysis Area (total acres)	Treatment Units (total acres)
Ahart's sulfur flower	*Eriogonum umbellatum* var. *ahartii*	Serpentine	0.5	0
Bacigalupi's yampa	*Perideridia bacigalupii*	Serpentine	0.3	0.1
Brandegee's clarkia	*Clarkia biloba* ssp. *brandegeae*	General openings	0.13	0
Brownish beaked-rush	*Rhynchospora capitellata*	Riparian forest	0.4	0
Butte County fritillary	*Fritillaria eastwoodiae*	Gap-phase	260	27
Clustered lady's slipper	*Cypripedium fasciculatum*	Interior forest / Riparian forest	0.13	0
Henderson's bent grass	*Agrostis hendersonii*	Riparian forest	0.1	0
Humboldt lily	*Lilium humboldtii* ssp. *humboldtii*	Gap-phase / General openings	19.1	8.1
Layne's butterweed	*Senecio layneae*	Serpentine	13.7	0.5
McNab cypress	*Cupressus macnabiana*	Serpentine	19	0
Mosquin's clarkia	*Clarkia mosquinii*	General openings	82	1
Northern Sierra rayless daisy	*Erigeron petrophilus* var. *sierrensis*	Serpentine	11	0.1
Sanborn's onion	*Allium sanbornii* var. *sanbornii*	Serpentine	1.3	0
Tall checker bloom	*Sidalcia gigantea* sp. *nova*	Riparian	0.02	0
Three-leaved beakseed	*Bulbostylis capillaris*	Riparian	0.2	0
Tooth wort	*Cardamine* sp. *nova*	Gap-phase	70	0.6
White-stemmed clarkia	*Clarkia gracilis* ssp. *albicaulis*	General openings	0.13	0
Round-leaved sundew	*Drosera rotundifolia*	Riparian forest	0.01	0

Note:

a. The species discussed in this analysis were grouped by guilds. The term “guild” is used to group species that use similar resources in a similar way. Plant species in the same guild are found in similar habitat types and have similar environmental requirements (HFQLG Act final supplemental EIS, 2004 Biological Evaluation, page 33). The guilds are described below.

In some cases, depending on the species and the management prescription, no protection would be given for disturbance-tolerant rare plant species. Specific recommendations for each occurrence are found in appendix B of the Botany Biological Evaluation (the “Botany Protection Plan”).

3.3.5 Environmental Consequences: General Effects

The general direct, indirect, and cumulative effects of project-related activities on rare plants are described below.

Direct Effects. Rare plants can be directly impacted when they are driven over, covered, have trees fall on them, or are burned. These actions can physically break, crush, or uproot the plants, and the impacts on individual plants can reduce their growth and development population size, and potentially, the viability of the species across the landscape. The plants may also experience reduced or eliminated seed-set and reproduction. If the disturbance is severe, it can kill rare plants. For annual

Alternative A (No Action)
- No treatments would be implemented.

Alternative B (Proposed Action)
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds with herbicides (up to 31 acres), mechanical and manual methods, and prescribed burning

Alternative C
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs without herbicides
- Control noxious weeds without herbicides

Alternative D
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs without herbicides
- Control noxious weeds with herbicides (up to 31 acres)

Alternative E
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds without herbicides

Alternative F
- Construct DFPZs
- Implement group selection (190 acres), except in watersheds over the Threshold of Concern
- Implement individual tree selection (148 acres); no proposed ITS units are located in watersheds over the Threshold of Concern
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds with herbicides (up to 31 acres)

Alternative G
- Construct DFPZs
- Implement group selection (190 acres), except in watersheds over the Threshold of Concern
- Implement individual tree selection (148 acres); no proposed ITS units are located in watersheds over the Threshold of Concern
- Maintain DFPZs without herbicides
- Control noxious weeds without herbicides

plant species, the timing of impacts is critical. Management actions that take place after annuals have set seed have much less impact than management actions performed prior to seed-set.

Indirect Effects. Indirect effects (both positive and negative) on rare plants may be caused by changes in vegetation composition, solar exposure, hydrologic patterns, fire regime, or soil characteristics of the habitat. Indirect effects can also occur from noxious weed invasion (see “Appendix C: Noxious Weed Risk Assessment” in the Slapjack Project BA/BE for Threatened, Endangered, and Sensitive Plant Species [2006]) or from impacts on pollinators or mycorrhizae associated with the various species.

Cumulative Effects. A cumulative effect results from the incremental effect of the action when added to the effects of other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes the other actions and regardless of land ownership on which the other actions occur. An individual action when considered alone may not have a significant effect, but when its effects are considered in sum with the effects of other past, present, and reasonably foreseeable future actions, the effects may be significant (40 CFR 1508.7 and 1508.8 and FSH 1909.15 Section 15.1).

Cumulative, direct, and indirect effects can be minimized by following Forest Service standards and guidelines and by implementing mitigation measures to monitor or offset impacts on rare plant species. With these protective measures in place, cumulative effects are less likely to be adverse. Current management direction is designed to eliminate or reduce possible negative cumulative impacts by protecting sensitive plant species from direct and indirect impacts. The following discussion provides an explanation of why this type of management is effective in reducing cumulative impacts.

3.3.6 Affected Environment (Existing Conditions): Gap-phase and General-openings Guild Species

Gap-phase species are disturbance followers that do not respond well to major disturbances but do increase with infrequent, small-scale disturbance. These are matrix species (those not confined to separated or patchy habitats) that depend on periodic disturbance, followed by stable conditions. The disturbance event causes an increase in light reaching the ground and a gap in plant cover, which creates favorable conditions for new seedlings to grow. After the seedlings are established, stable conditions favor seedling growth to maturity and reproductive status. Some forest edge species or species that occur under open canopies along artificial forest margins, such as stabilized roadsides and old skid trails, are included in the gap-phase guild.

There are approximately 349 acres of gap-phase species in the analysis area and approximately 35.7 acres in the proposed treatment units.

The general-openings guild contains opportunistic species that germinate or invade open areas. The openings may result from natural events such as landslides, avalanches, or windstorms, as well as from mechanical soil disturbance and opening of the canopy. Species in this guild also respond well to secondary fire effects, such as sunlight from canopy loss and bare soil from duff loss. Some forest-edge species or species that occur under open canopies along artificial forest margins, such as stabilized roadsides and old skid trails, are included in this guild. The primary threats to this guild are road use, construction, and maintenance; mechanical vegetation treatments; development; off-highway vehicle use; reforestation; lack of fire; stock trampling; mining; and prescribed burns in spring (2004 HFQLG final supplemental EIS B/BE pages 35–40). There are approximately 82 acres of general-openings guild species in the analysis area and 1 acre in a proposed treatment unit.

The following summarizes the rare species that are known to occur or have potential habitat in the analysis area. For each species, information is provided on abundance, global range/distribution, distribution in the analysis area, trend, fragility and habitat specificity. Data were obtained from the Forest Service Region 5 proposed (2005) Sensitive species list. Sensitive species with potential habitat in the analysis area were discussed in the Slapjack Project BA/BE.

Butte County fritillary (*Fritillaria eastwoodiae*)

Abundance There are 75 known occurrences on the Plumas National Forest and 7 on the Tahoe National Forest. There are at least 2 locally known, though undocumented, occurrences on the Shasta-Trinity National Forest. It is also known to occur on private lands in the foothills. Some of the foothill occurrences have been obliterated with development. *Rarefind 2005* lists 101 occurrences. Despite this large number of occurrences, most are small and the individuals can be easily counted. On the Plumas National Forest, there are typically less than 10 flowering stalks in each occurrence, and the total number of sexually reproductive plants is very low. Tahoe National Forest occurrences number less than 20 plants to hundreds of plants.

Range/ Distribution The known range of Butte County fritillary has historically been the counties of Shasta, Butte, Yuba, Nevada, Placer, and Tehama in five distinct stable population centers. There is also a single report of it occurring in Napa

County. In the Sierra and Cascade foothills, it is known to occur from 360 to 4,320 feet in elevation. It is found on unprotected private land inholdings and National Forest System lands mostly within the boundaries of the Plumas National Forest. The range is roughly a 9-mile band on the western side of the Plumas National Forest in the Feather River Ranger District. Four of the seven Tahoe National Forest occurrences are clustered in an area that is less than a 1-mile radius (may be sub-occurrences). The northernmost populations are near Shasta Lake in the Shasta Lake Ranger District of the Shasta-Trinity National Forest. These are not documented in *Rarefind 2005*.

Within the Analysis Area — There are approximately 260 acres in the analysis area, with approximately 27 acres in proposed treatment units.

Trend — Some of the historical occurrences on the Plumas National Forest have not been relocated. This has happened either in areas where the tree canopy has been removed, or conversely, where the canopy has closed in and covered the ground with litter. Some of the plants on the Plumas National Forest are not reproducing. Plants are also not reproducing on the Tahoe National Forest. Quite often, the habitats where this plant is flowering are areas of moderate or light disturbance (such as old timber cuts). Plants that are found in habitat with heavier tree canopy or shrub cover are often not flowering (basal leaves only). It appears that plants need some canopy openings to maintain viability.

Fragility / Habitat Specificity — The habitat of this species is not particularly specific. It has been found on serpentine substrate (soil high in magnesium and low in calcium) and is sometimes associated with the guild of serpentine plants. However, it is not restricted to serpentine and has been found on a variety of volcanic and granitic soils. It is typically found on dry slopes in open canopied mixed conifer forest, or semi-shaded chaparral in foothill woodland. The main habitat indicator appears to be a partly open canopy with moderate litter.

Tooth wort (*Cardamine #3*)

Guild — Gap phase.

Abundance — On the Plumas National Forest, it is known to occur on the Feather River and Mount Hough Ranger Districts. There are approximately 100 acres of plants on the Feather River Ranger District.

Range/ Distribution — According to *Plumas County and Plumas National Forest Flora* (Clifton 2003), the plants with the marbled leaves with green and purple are found from Shasta County to Nevada County in deep woods. It has also been observed in semi-open stands of trees in skidder trails and fire lines. Plants under heavy canopy cover are typically not reproductive.

Within the Analysis Area	There are approximately 70 acres in the analysis area, with 0.6 acre in proposed treatment units.
Trend	Unknown.
Fragility / Habitat Specificity	It is found in openings in mixed conifer forest. This species has been found in areas that have had soil disturbance.

Humboldt lily (*Lilium humboldtii* ssp. *humboldtii*)

Guild	Gap phase / general openings.
Abundance	Surveys on the Feather River Ranger District in 2004 have identified several new occurrences. There are approximately 19 acres in the analysis area and 8 acres in proposed treatment units.
Range/ Distribution	It is known to occur on the southern Cascade Range in Tehema County to the Sierra Nevada in Fresno County.
Within the Analysis Area	There are approximately 19 acres in the analysis area, with 8 acres in proposed treatment units.
Trend	Unknown.
Fragility/ Habitat Specificity	It grows in dry wooded slopes and openings in ponderosa pine and oak woodlands. In 2004 it was observed in a 1- to 2-year-old clear cut north of Challenge, CA. Plants were growing vigorously, with many inflorescences (flowers), and were over 6 feet in height. Plants observed in heavily shaded areas do not flower.

Brandegee's clarkia (*Clarkia biloba* ssp. *brandegeae*)

Guild	Gap phase / general openings.
Abundance	The Tahoe National Forest has four occurrences (population numbers range from over 100 to over 10,000 plants) on National Forest System lands and an unknown number of occurrences on private lands within the forest boundary. The Plumas National Forest has two occurrences (occurrences contain hundreds of individuals each) on National Forest System lands and four occurrences on private lands within the forest boundary.
Range/ Distribution	This plant is known to occur in the counties of Butte, Placer, Yuba, El Dorado, and Nevada.

Within the Analysis Area There are three recorded sites in the analysis area; two of these sites were not relocated with botanical surveys in 2004. The known site (about 0.13 acre) is located along a road and is approximately 0.5 mile from the nearest proposed treatment unit.

Trend Unknown.

Fragility/ Habitat Specificity This plant is found in low elevation openings in chaparral and cismontane woodlands (Skinner and Pavlik 1994). Most occurrences are located on road cutbanks and may be vulnerable to road maintenance. These habitats are generally not part of the National Forest System.

Mosquin's clarkia (*Clarkia mosquinii*)

Guild General openings.

Abundance There are 33 known occurrences scattered throughout about 120 square miles; 25 of these are on the Plumas National Forest. Most reported occurrences include one to several small distinct sub-occurrences of this species.

Range/ Distribution There is limited distribution of this plant in Butte and Plumas Counties. It often occurs in road cuts and on decomposing granite.

Within the Analysis Area There are approximately 82 acres of Mosquin's clarkia in the analysis area, with 1 acre in proposed treatment units.

Trend Occurrences appear to be stable over the few years since this species (until recently considered to be extinct) was rediscovered in 1992. Few new occurrences have been located since 1994. Two new extensions of populations were found in July of 2002.

Fragility/ Habitat Specificity The species is probably a fire-follower. The type and intensity level of fire that this species favors has not been determined. Wildfire suppression has probably restricted its natural habitat, with roadsides becoming refugia.

3.3.7 Environmental Consequences: Effects of DFPZ Construction, Group Selection, and Individual Tree Selection Treatments on Gap-phase and General-openings Guild Species

The DFPZ treatments include mastication, underburning, thinning, biomass removal, hand-cut pile burn, fire line construction, and road construction. These effects are examined in detail in the Slapjack Botany BA/BE.

3.3.7.1 Alternative A (No Action)

Direct Effects. There would be no direct effects on gap-phase and general-openings guild species.

Indirect Effects. There would be a gradual decline in the absence of disturbance and lack of fire. There would be an increased risk to catastrophic fire and subsequent noxious weed invasion.

Cumulative Effects. The cumulative effects discussion is at end of this section.

3.3.7.2 All Action Alternatives

There are approximately 28 acres of Butte County fritillary in proposed DFPZ and group selection units; 20 of these acres are in under-burn units. In group selection units, there is approximately 0.5 acre of Butte County fritillary, 1 acre of Humboldt lily, and 0.5 acre of tooth wort.

Direct Effects. Heavy equipment used for mastication, thinning, and biomass removal could destroy the above-ground parts of plants. These perennial plants may be negatively impacted if the above-ground parts are removed prior to seed set or if plants are uprooted. Rare plants could be killed during underburning and by road construction if the plants are located in the roadbed.

The timing of prescribed burns would be critical since annuals would not be affected by fall burns that take place after they have set seed, but they could be affected in the spring when they are growing and flowering. However, new research indicates that spring burns are often cooler and patchier than fall underburns. If prescribed burns are too hot, the impact on rare plant species could be greater because high-intensity fires could sterilize the soil, thereby killing the seed bank. Firelines and piles would be placed to avoid known occurrences of rare plants. Controlled areas for piles have been identified by unit (see appendix B of the Botany BA/BE in the project record) and would be designated in the field prior to pile construction.

Indirect Effects. The proposed transportation system improvements would create habitat and an avenue for dispersal of noxious weeds. Also, fireline construction, where bare mineral soil may be exposed, could create habitat for noxious weeds in the short term. To prevent the spread of noxious weeds, treatment units with known infestations would be designated for “hand lines” only, and no mechanical (bulldozer) lines would be constructed. Mastication and harvest equipment could also inadvertently introduce noxious weeds that would likely compete with native species. Areas of known infestations in proposed treatment units would be identified on project maps and on the ground as controlled areas where equipment would be excluded. Known noxious weed infestations would be buffered by 25 feet from the last plant to account for dispersal of seeds. These controlled areas would be treated with hand equipment. Also, units with known infestations are considered to be “infested,” and equipment would be washed in that infested unit before it is moved to an uninfested unit. These mitigation measures would help prevent the spread of noxious weeds during DFPZ construction and timber removal.

If masticated fuels are burned as a follow-up treatment, rare plants may be killed and the soil sterilized as a result of high temperatures. The correlation between masticated fuel depth and soil heating was investigated by Busse et al. (2005); it was found that, “The potential for biological damage from soil heating during fire exists following mastication, particularly in dry soil with mulch depth of 7.5 cm [centimeters] or greater.” This issue has been recognized and is addressed through the gathering of plot data that includes a measure of tons of biomass per acre. According to the Feather River Ranger District silviculturist (M. Mateyka, personal communication, 2005), the cut-off between mastication and removal treatments is 14 tons/acre. Mastication may inadvertently introduce noxious

weed species that would likely compete with native plant species. Mastication could reduce competition to resources such as light, water, and nutrients, resulting in an overall benefit to these species. On the Feather River Ranger District, Butte County fritillary has been shown to respond favorably to mastication treatment. Quite often, the habitats where this plant is flowering are areas of moderate or light disturbance, such as old timber cuts. Plants that are found in areas with heavier tree canopy or shrub cover are often not flowering (basal leaves only), so it appears that plants need some canopy openings to maintain viability. Road construction could create habitat and a dispersal avenue for noxious weeds.

Some shrubs and small conifers could be killed by underburns, thereby reducing competition for general-openings and gap-phase guild species.

Cumulative Effects. The cumulative effects discussion is at end of this section.

3.3.8 Environmental Consequences, Herbicide Use for DFPZ Maintenance and Noxious Weed Control on Gap-phase and General-openings Guild Species

3.3.8.1 Alternative A (No Action)

Direct and Indirect Effects. There would be no direct or indirect effects on gap-phase and general-openings guild species from the use of herbicides to maintain DFPZs and control noxious weeds.

Cumulative Effects. The cumulative effects discussion is at end of this section.

3.3.8.2 Alternatives C and G (No Herbicide Use)

Direct Effects. Herbicides are not proposed for use under alternatives C and G, so there would be no direct effects.

Indirect Effects. Noxious weeds would be controlled through integrated techniques that exclude the use of herbicides. There would likely be a greater cost per acre to control noxious weeds. In the absence of herbicides, DFPZs would be maintained through mastication and underburning. These effects would be the same as those discussed above in section 3.3.7.

Cumulative Effects. The cumulative effects discussion is at end of this section.

3.3.8.3 Alternatives B, D, and F (Herbicides Would be Used)

Approximately 1,954 acres would be treated with imazapyr at the rate of 0.25 pound acid equivalent (AE) / acre (see the “Glossary” for an explanation of acid equivalent). Up to 31 acres of broom seedlings may be treated per year for five years with triclopyr BEE at the rate of 1.5 pounds AE / acre. The effects are discussed below. The effects of surfactant Syl-tac® (Hasten® and Syl-gard®) and the marker dye Hi-light® Blue are also discussed below. There are approximately 5 acres of Butte County fritillary in an herbicide treatment unit. All known occurrences of rare plant species would be surrounded by a no-spray buffer of 50 feet.

Direct Effects. The direct effects of herbicide contact could include death or decreased fitness and a subsequent susceptibility to pathogens, insects, or inability to compete for resources. There would be no direct effects on known rare plant populations. All known occurrences would be protected by a no-spray buffer of 50 feet. The buffer width is based on information from the Syracuse Environmental Research Associates Ecological Risk Assessment (SERA 2004b) and is described below. There would also be no effect from the primary breakdown product from triclopyr 3,5,6-trichloro-2-pyridinol (commonly abbreviated as TCP) because this product does not have the phytotoxic potency of the parent material (SERA 2003).

There would be no direct or indirect effects from Syl-tac® (a blend of Hasten® and Syl-gard®). Hasten® is a modified vegetable oil that may be a mild irritant to the eyes. This material is not likely to produce secondary breakdown products that would act as toxins to rare plant species. Syl-gard® is a silicone-based surfactant that promotes the even spreading of the spray solution. It is considered slightly irritating to skin and severely irritating to eyes. There is no information presented on the toxicity of this material or degradation products to rare species; however, the use of buffers would drastically reduce any risk.

There should be no direct or indirect effects from Hi-light® Blue. According to David Bakke, Forest Service Region 5 pesticide coordinator, “This material is a water-soluble dye that contains no listed hazardous substances. It is considered to be virtually nontoxic to humans. The dye used in Hi-light® Blue is commonly used in toilet bowl cleaners and as a colorant for lakes and ponds” (SERA 1997).

The effects of imazapyr herbicide on rare plants was discussed in the 2003 HFQLG final supplemental EIS (which referred to rare plants as Special Status plants), and the analysis presented in this Slapjack Project EIS tiers to that document. In general, there is a lack of information on the toxicity of imazapyr to rare plants. According to the final supplemental EIS (USDA Forest Service 2003a), “A risk assessment was not completed, since quantitative values and levels of risk did not seem to be as apparent in the literature” (USDA Forest Service 2003a, page 129). Consequently, rare plants are assumed to be herbicide-sensitive species (USDA Forest Service 2003a, page 137). The SERA ecological risk assessments for imazapyr (SERA 2004b) and triclopyr BEE (SERA 2003) are incorporated by reference. These documents provide some information on potential toxicity to rare plants. It states that imazapyr is practically nontoxic to conifers, but it is toxic to many other nontarget plants (SERA 2004b, page 4-1). For the analysis presented in the SERA document, all rare species were assumed to be highly sensitive. The sugar beet is highly sensitive to herbicides and is used as a surrogate to measure toxicity levels. In agricultural settings, the sugar beet is planted in fields to detect the residual presence of chemicals in the soil. If the sugar beets show signs of herbicide toxicity, growers know not to plant their high-dollar crops. The SERA risk assessment uses a measure called the NOEC to measure the concentration at which damage occurs to rare species. (NOEC stands for “No Observable Effects Concentration” and is the dose that will not produce any negative “observable” effects.) If an applied dose of chemical (whether through drift or direct application) exceeds the NOEC, then there is some risk of plant damage. For example, the NOEC for imazapyr is 0.00049 pound acid equivalent per acre (ae/acre) (SERA 2004b, page 4-20). The application rate analyzed in the 2003 HFQLG final supplemental EIS is 0.25 pound ae/acre. A direct application of imazapyr at this rate would exceed the NOEC and certainly inflict damage, if not death of plants. The

NOEC for triclopyr BEE is 0.0039 pound ae/acre. The application rate for the project is 1.5 pounds ae/acre—this too would exceed the NOEC.

Herbicide drift is a recognized hazard for rare plant species. The SERA document states, “The primary hazard to nontarget terrestrial plants is unintended drift deposition or spray drift” (SERA 2004b, page 4-13). The HFQLG final supplemental EIS states, “The hazard posed to terrestrial plant species from herbicide application is primarily related to drift.” It goes on to explain that impacts can be minimized by

- avoidance with the use buffers,
- spraying when wind is absent or blowing away, and
- using application methods other than spraying.

The third option (using application methods other than spraying) is not discussed because all herbicide applications would be applied by hand using backpack sprayers. The creation of buffers of an appropriate size and timing chemical applications to avoid adverse affects are explained below.

Determining if the size of the buffer is warranted. A study performed by Segawa et al. (2001) examined dissipation and off-site movement of selected forestry herbicides on three national forests in the Sierra Nevada. All applications were made with backpack sprayers. The study collected vegetation samples after spraying to examine herbicide drift. Samples were collected at four distances from the application, ranging from 5 to 100 feet. A total of 168 samples were collected, and herbicide drift was detected 16 times. The majority of these positive detections were within 5 to 40 feet of the application. There were two positive detections between 80 and 100 feet of the application. These findings are supported by the SERA document (SERA 2004b). Drift calculations from the SERA document determine potential drift from backpack sprayers under two wind conditions. When applications are made in 0 to 5 mile per hour (mph) winds, droplets can move 23 feet. Applications made in a 15 mph wind can potentially drift up to 68 feet (SERA 2004b, page 4-14). Based on this information, a 0 to 5 mph maximum wind has been incorporated into the project design, and 50-foot buffers would be applied to all known occurrences of rare plant species.

The risk to rare plants due to percolation of materials through the soil profile. The mobility of imazapyr and triclopyr was not analyzed in detail in the SERA ecological risk assessments (SERA 2003, 2004b). According to the SERA assessment, percolation is not considered a risk to rare plants because chemicals are transported below the root zone (SERA page 4-14).

The risk to rare plants from herbicide runoff after a rain event. There is a very low risk to rare plants from herbicide run-off after a rain event for the following reasons:

- All applications would be made in the summer and late fall. These are the dry times of the year in the Northern Sierra Nevada.
- Applications would be applied directly to target species; consequently, there would be very little chemical reaching the forest floor.

- The percent of effective ground cover for potential herbicide units is 90 percent. Any herbicide that does contact the forest floor would likely contact organic matter and be less subject to runoff (see the "Soils Report" in the project record for percent of effective ground cover by unit).

The potential for off-site movement of herbicides transported on soil particles that are blown by the wind is analyzed in the SERA environmental risk assessments. Off-site movement from blown soil particles is very unlikely in the Slapjack Project area because high canopy cover acts as a shelter from the wind, and high levels of ground cover reduce the likelihood of soil movement.

Indirect Effects. Little is known about the pollination biology for the majority of the rare plant species discussed here. It is possible that some pollinators could be negatively impacted by herbicide application. Herbicide applications would target woody shrubs and tanoak. A reduction in the numbers of these species could create habitat for general-opening and gap-phase guild species.

Cumulative Effects. The cumulative effects discussion is at end of this "Botanical Resources and Noxious Weeds" section.

3.3.9 Existing Condition: Riparian Forest and Interior Forest Guild Species

Riparian forests are comprised of broad-leaved winter deciduous trees that form closed canopies and are associated with low- to mid-elevation perennial and intermittent streams. Most stands are even-aged, which reflects the influence that floods have on reproduction. For the purposes of this analysis, aquatic and lotic (living in running water) habitats are included in this guild. The major threats to this guild include hydrologic alteration, trails and trail users, mechanical treatments, roads, livestock trampling, and mining. There is one known occurrence of clustered lady slipper in the analysis area, which is approximately 0.01 acre in size. The other species have potential habitat but no known occurrences.

The interior forest guild species are found in protected microclimates and infrequently disturbed substrates. Because of mycorrhizal associations (a mutually beneficial association of a fungus and the roots of a plant, such as a conifer), these species are intolerant of edge effects that change temperature, moisture, and other microclimate conditions. The primary threats to this guild are mechanical vegetation treatments, reforestation, grazing, stock trampling, catastrophic fire, firefighting and suppression activities, fuels reduction activities, prescribed fire, road development and maintenance, off-highway vehicle use, trails and trail users, camping, plant collecting, mining, and erosion. The clustered lady slipper is also considered in the interior forest guild. Potential habitat exists for the mountain lady slipper, olive phaeocollybia, and Siskiyou mountains huckleberry.

3.3.9.1 Fragility/Habitat Specificity

In the Sierra Nevada, the clustered lady slipper is found on moist north-facing slopes, drainages, and meadows in mixed conifer or red fir forest between the elevations of 4,500 and 7,000 feet. This plant is not as habitat-specific in the Klamath Range and in Oregon.

Round-leaved sundew (*Drosera rotundifolia*)

Guild	Riparian.
Abundance	It is known to occur in about 25 locations on the Plumas National Forest.
Range/ Distribution	Round-leaved sundew is known to occur in Europe, Asia, and North America. It is well distributed in the eastern United States. In the western United States, it is known to occur in California north to Alaska and east to Montana and Utah. Within California, it is known to occur in the North Coast, North Coast Ranges, Klamath Ranges, Cascade Range, and Sierra Nevada.
Within the Analysis Area	There is one known occurrence, approximately 0.01 acre in size, in the Slapjack Project area.
Trend	Unknown.
Fragility / Habitat Specificity	Round-leaved sundew is found in bogs, fens, and wet meadows. Threats to this species include plant collectors, changes in hydrology, sedimentation, and cattle trampling.

Clustered lady slipper (*Cypripedium fasciculatum*)

Guild	Interior forest and riparian.
Abundance	The occurrence numbers are from Draft Conservation Assessment (Kaye 2004). There are 16 documented occurrences on the Six Rivers National Forest, with population sizes that range from 2 to 60 plants; only 3 of the occurrences have been verified, the rest are historic or have not been relocated. The Shasta-Trinity National Forest has 29 occurrences, with population sizes ranging from 1 to 50 (average 10 plants); only half of the occurrences have been verified. The Klamath National Forest has 97 occurrences, with population sizes ranging from 1 to 141 plants (from Klamath National Forest population records). The Mendocino National Forest has 50 occurrences totaling less than 1,400 stems. The Lassen National Forest has 1 occurrence, with a population size of about 50 plants. The Plumas National Forest has 101 occurrences, with population sizes ranging from 2 plants to over 3,000. The Tahoe National Forest has 8 occurrences, with population sizes of 1, 13, and less than 200.
Range/ Distribution	Known to occur in eight states in California, from Del Norte County to Sierra County. Also occurs in Colorado, Idaho, Montana, Utah, Oregon, Washington, and Wyoming. The Tahoe National Forest supports the southern-most occurrences of this species' range.
Within the Analysis Area	There is one known occurrence in the analysis area (about 0.13 acre) and no occurrences in the proposed treatment units.

Trend Declining. The *Federal Register* (9/30/93) lists the habitat for this plant as declining. Details of population trends across its range are unknown. It can be assumed that the trend for this species is downward, given the complicated life history of this species, including the establishment of mycorrhizal relationships, limited establishment factors, apparent intolerance to intense disturbance, and occurrence of this species on lands available for timber harvest. The population on the Tahoe National Forest is declining due to habitat disturbance. The Lassen National Forest population was 60 plants in 1998 and 50 plants in 2001. However, on Plumas National Forest, many of the occurrences have been revisited and most relocated year after year. Two occurrences on the Plumas are large, having more than 2,000 stems and the other over 3,000 stems. Small population sizes with risk of local extirpation, coupled with monitoring inconsistency and the fact that some of the populations have not been visited in over a decade, contribute to concerns for this species.

Fragility / Habitat Specificity Clustered lady slipper habitat is very broad, occurring on various parent materials from ultramafic, schist, and limestone-derived soils. In Oregon and California, this species is associated with Douglas-fir-dominated and mixed conifer forests in the mid to late seral stands with structures that allow some light to reach the forest floor. Occurrences have also been documented in riparian areas. Exceptions to this general habitat description do exist, which demonstrates the difficulty in identifying leading habitat characteristics. Mycorrhizal fungi play a pivotal role in the biology of orchids. Several stages in the orchid's life-cycle, especially early stages of seedling development, depend on associations with fungi. Given this essential dependence, the habitat needs of the fungi must also be met.

Brownish beaked-rush (*Rhyncospora capitellata*)

Guild On the Plumas National Forest, it is known to occur on the Feather River Ranger District in several locations.

Range/ Distribution Found throughout the eastern United States, the species is disjunct (occurrences are discontinuous) in California and Oregon. The known California distribution includes Butte, Mariposa, Nevada, Plumas, Shasta, Sonoma, Tehama, and Trinity Counties.

Within the Analysis Area About 0.4 acre.

Trend Unknown.

Fragility / Habitat Specificity The species is found in lower montane coniferous forests, meadows, seeps, marshes, fens, and swamps.

Henderson's bent grass (*Agrostis henersonii*)

Guild	Riparian forest.
Abundance	It is known to occur in several locations on the Feather River Ranger District of the Plumas National Forest.
Range/ Distribution	This species is known to occur in the California counties of Butte, Calaveras, Merced, Placer, Plumas, and Shasta and the county of Tehama in Oregon.
Within the Analysis Area	There is 0.1 acre in the analysis area and no occurrences in the proposed treatment units.
Trend	Unknown.
Fragility / Habitat Specificity	This taxon is found in vernally moist swales in granitic rock.

Three-leaved beakseed (*Bulbostylis capillaris*)

Guild	Riparian forest.
Abundance	On the Plumas National Forest, it is known from Little Bald Rock, Big Bald Rock, Hartman Bar Ridge, and near Tamarack Flat.
Range/ Distribution	It is known to occur in California from Fresno County north through Tehama County. It is also known to occur in Arizona, New Mexico, Texas, and Oregon and extends beyond the western states into eastern North America, the Caribbean, Central America, and eastern Asia.
Within the Analysis Area	There is approximately 0.2 acre in the analysis area, with no occurrences in the proposed treatment units.
Trend	Unknown.
Fragility / Habitat Specificity	It is found in meadows and grassy clearings, including vernal creek beds and vernally moist sandy depressions.

Tall checker bloom (*Sidalcia gigantea* sp. *nova*)

Guild	Riparian forest.
Abundance	This taxon is thought to be a separate species from its current placement as S*idalcea celata* in the Jepson Manual of Higher Plants of California. Recent observations (Oswald 2002; Clifton 2005) have separated the robust Sierran populations into a new species: *Sidalcea* "gigantea," which has yet to be described. On the Plumas National Forest, it is known to occur on the Feather River Ranger District in several locations.

Range/ Distribution	Records of this taxon have been kept on the Plumas National Forest since 1999.
Within the Analysis Area	There is approximately 0.02 acre in the analysis area, with no plants in the proposed treatment units.
Trend	Unknown.
Fragility / Habitat Specificity	These plants are typically found in middle- to high-elevation conifer forests (2,100–5,400 feet). Although not in the wettest areas, individuals are found in moist areas or areas with nearby water.

3.3.10 Environmental Consequences: Effects of DFPZ Construction, Group Selection, and Individual Tree Selection Treatments on Riparian Forest and Interior Forest Guild Species

3.3.10.1 Alternative A (No Action)

Direct Effects. DFPZ construction, group selection, and individual tree selection would not occur under alternative A, so there would be no direct effects.

Indirect Effects. The no-action alternative would lead to denser, thicker forests that are more prone to high-intensity wildfires that would likely create conditions favorable to noxious weed invasion.

3.3.10.2 All Action Alternatives

There are no known occurrences of riparian or interior forest guild species in the proposed treatment units. However, there could be incidental effects on unknown populations, and these effects are described below.

Direct Effects. There would be no mechanical treatments in riparian areas except in plantations, which are highly disturbed and do not contain potential habitat for riparian species. Only hand treatments would be allowed in designated riparian areas; consequently, direct effects on the riparian forest guild associates would be minimal.

Heavy equipment used for mastication, thinning, and biomass removal could destroy above-ground parts of plants in interior forest areas. They could be crushed, broken, or uprooted by equipment. Although underburning could kill these rare species, they have all evolved with frequent low-intensity fires. The timing of prescribed burns is critical since annuals would not be affected by fall burns that take place after they have set seed, but they could be affected in the spring when they are growing and flowering. New research indicates that spring burns are often cooler and patchier than fall underburns. If prescribed burns are too hot, the impact on rare plant species could be greater because high-intensity fires could sterilize the soil, thereby killing the seedbank. Firelines and piles would be placed to avoid known occurrences of rare plants. Controlled areas for piles have been identified by unit (refer to the “Botany Protection Plan” in the project record, appendix B of the Botany BA/ BE) and would be designated in the field prior to pile construction.

Indirect Effects. Canopy removal would change relative humidity and sunlight interception on the forest floor, resulting in a modification of interior forest conditions on which these guild members depend. As a result, members would be negatively impacted. Also, mycorrhizal fungi play a pivotal role in the biology of some interior forest species. For example, several stages in the orchid's life cycle, especially early stages of seedling development, depend on associations with fungi. Given this essential dependence, the habitat needs of the fungi must also be met. Given the reproductive and establishment complexity of this species, microhabitat variables appear to be important; therefore, the microhabitat where these populations occur is considered fragile. Activities that disturb the soil could break up the mycelium, thereby negatively impacting these guild associates.

3.3.11 Environmental Consequences: Effects of Herbicide Use for DFPZ Maintenance and Noxious Weed Control on Riparian Forest and Interior Forest Guild Species

3.3.11.1 Alternative A (No Action)

Direct and Indirect Effects. There would be no direct or indirect effects.

3.3.11.2 Alternatives C and G (No Herbicide Use)

Direct Effects. There would be no direct effects from these alternatives because herbicide use is not proposed.

Indirect Effects. In the absence of herbicides, DFPZs would be maintained through mastication and underburning. These effects would be the same as those discussed above for gap-phase and general-openings guild species.

Noxious weeds would be controlled through integrated techniques, excluding the use of herbicides. There would likely be a greater cost per acre to control noxious weeds.

3.3.11.3 Alternatives B, D, E, and F (Herbicide Use)

Approximately 1,954 acres in DFPZs would be treated with imazapyr under alternatives B, D, E, and F. Triclopyr BEE could be used to treat up to 31 acres of broom seedlings per year for five years. The surfactant Syl-tac® (Hasten® and Syl-gard®) and the marker dye Hi-light® Blue would also be used. The proposed herbicide treatment units contain no interior forest or riparian forest guild associates.

Direct and Indirect Effects. The direct and indirect effects would be the same as those discussed above for gap-phase and general-openings guild species. The direct effects of herbicide contact could include death or decreased fitness and a subsequent susceptibility to pathogens, insects, or inability to compete for resources. There would be no direct effects on known rare plant populations because all known occurrences would be protected by a 50-foot no-spray buffer.

3.3.12 Existing Condition: Serpentine Guild Species

Serpentine species are limited to areas with serpentine soils. These soils frequently have high levels of heavy metals and low available plant nutrients, specifically low calcium and high magnesium.

The serpentine species that are known to occur in the analysis area are described below.

Layne's butterweed (*Senecio layneae*)

Guild	Serpentine.
Abundance	Layne's butterweed is known to occur on private and preserve land in the gabbro (dark course-grained igneous rock) habitat near Pine Hill in western El Dorado County. There are 3 known occurrences on the Eldorado National Forest (also in El Dorado County), 6 occurrences (2 on Bureau of Land Management [BLM] land and 4 on the Plumas National Forest) in Yuba County, and 10 known occurrences in Tuolumne County, all in the vicinity of the Red Hills (6 of these occurrences are found in the BLM Red Hills Area of Critical Environmental Concern), and 3 of the other Tuolumne County occurrences are on public land managed by the BLM.
Range/ Distribution	Most known sites are scattered within a 40,000-acre area in western El Dorado County that includes the Pine Hill formation (gabbro soils) and the adjacent serpentine soils. A few other colonies occur on serpentine soils in the Eldorado National Forest in El Dorado County, on serpentine soils in the Plumas National Forest and the BLM land in Yuba County, and on the serpentine soils of the Red Hills of Tuolumne County, mostly on land managed by the BLM.
Within the Analysis Area	There are approximately 13.7 acres in the analysis area and approximately 0.5 acre in a proposed underburn unit.
Trend	The populations on Forest Service land and state preserves in El Dorado County are relatively stable, but the trend is unstable to declining in areas where habitat has been lost to residential/commercial development. Documented populations on public lands in Tuolumne and Yuba Counties (Forest Service and BLM lands) are afforded some protection from management activities and development. Extensive surveys in El Dorado County (Pine Hill Preserve) are planned in the next two years (BLM, Al Franklin, personal communication).
Fragility / habitat specificity	Layne's butterweed grows in open rocky areas in chaparral plant communities, as well as woodland and forest communities, primarily on gabbro-derived soils, with the widely scattered populations found generally on serpentine-derived soils. It can be considered an early successional species that occupies temporary openings on gabbro and serpentine soils and is suppressed, and perhaps eliminated, as taller vegetation crowds out sunlight.

Sanborn's onion (*Allium sanbornii* v. *sanbornii*)

Guild	Serpentine.
Abundance	The species is found at elevations of 2,500–3,200 feet in the southwestern portions of the Plumas National Forest on serpentine substrate in Butte and Yuba Counties.
Range/ Distribution	The species occurs in widely scattered populations in northern California and adjacent Oregon.
Within the Analysis Area	There are approximately 1.3 acres in the analysis area and no occurrences in proposed treatment units.
Trend	Unknown.
Fragility / Habitat Specificity	Typically found on serpentine outcrops, the species is occasionally found on granitic or volcanic substrates as well.

McNab cypress (*Cupressus macnabiana*)

Guild	Serpentine.
Abundance	There are four occurrences on the Plumas National Forest.
Range/ Distribution	It is distributed from the Siskiyou Mountains southward to Sonoma County and also in the Sierra foothills from Shasta County south to Yuba County.
Within the Analysis Area	There are approximately 19 acres of McNab cypress in the analysis area and no occurrences in proposed treatment units.
Trend	Unknown.
Fragility / Habitat Specificity	The species is associated with serpentine/ultramafic soils. Recent work by Safford and Harrison (2004) suggests that California serpentine plant communities may be dependent on fire for recruitment. It is suspected that this species requires bare mineral soil for seedling regeneration. This rare species produces serotinous ("closed") cones that require fire for seed dispersal. In the absence of fire, environmental conditions are not present that support successful seedling establishment. This is also supported by work done on the closely related Sargent cypress (*Cupressus sargentii*), in which seedling recruitment was observed post fire (Ne'eman et al. 1999).

Northern Sierra rayless daisy (*Erigeron petrophilus* var. *sierrensis*)

Guild	Serpentine.
Abundance	It is known to occur on the Feather River and Mount Hough Ranger Districts of the Plumas National Forest.

Range/ Distribution	This species is known to occur along the western slope of the Sierra Nevada from Butte County to El Dorado County.
Within the Analysis Area	There are approximately 11 acres in the analysis area, with 0.13 acre in a proposed treatment unit.
Trend	Unknown.
Fragility / Habitat Specificity	It is found on gravelly or rocky slopes of serpentine in openings and in open mixed conifer and red fir forest.

Ahart's sulfur flower (*Erigogonum umbellatum* var. *ahartii*)

Guild	Serpentine.
Abundance	There are eight known occurrences: three in the area around Paradise and five in the area around Woodleaf. All of these occurrences are in serpentine substrates.
Range/ Distribution	This newly described variety is found on serpentine in the area around Paradise in Butte County and in the Woodleaf area of Yuba County.
Within the Analysis Area	There is 0.5 acre in the analysis area and no occurrences in proposed treatment units.
Trend	Unknown.
Fragility / Habitat Specificity	This species is found on serpentine in open chaparral and mixed conifer plant communities.

Bacigalupi's yampah (*Perideridia bacigalupii*)

Guild	Serpentine.
Abundance	It is known to occur in several locations on the Plumas National Forest in the Feather River Ranger District.
Range/ Distribution	This species is known to occur from Madera County to Butte County.
Within the Analysis Area	There is approximately 0.3 acre in the analysis area and 0.1 acre in proposed treatment units.
Trend	Unknown.
Fragility /Habitat Specificity	This yampah is found in openings in brush on low-elevation serpentine outcrops and serpentine derived soils.

3.3.13 Environmental Consequences: Effects of DFPZ Construction, Group Selection, and Individual Tree Selection Treatments on Serpentine Guild Species

3.3.13.1 Alternative A (No Action)

Direct Effects. There would be no direct effects.

Indirect Effects. There could be a gradual decline in these species in the absence of disturbance and fire, and there would be an increased risk from catastrophic fire in the absence of underburning to reduce fuel loads of brush and other dead material.

3.3.13.2 All Action Alternatives

Approximately 110 acres of serpentine soils (peridotite parent material) would be treated with mastication and harvest. The serpentine soil determinations were determined based on the Plumas National Forest soils GIS layer using peridotite as the parent material. Surveyors (Clifton and Buck 2005) reported that the GIS was a good predictor of serpentine soils in the field. No known occurrences of serpentine guild members are known to occur in proposed harvest or mastication units. There are approximately 185 acres of serpentine habitat that would be underburned with this proposal. There is approximately 0.5 acre of Layne's butterweed in a proposed underburn unit.

Direct Effects. Fire may kill individual plants, but it is known that most habitats in the northern Sierra Nevada coevolved with wildfire. However, the fire-return interval is not clearly understood for all areas, including serpentine habitats.

Indirect Effects. The soil chemistry and physical characteristics of serpentine habitats make them particularly vulnerable to increased rates of erosion from activities such as off-road vehicle use, rock collection and mining, and management activities. Depending on specific site characteristics, timber harvest could worsen erosion. Mastication activities would occur on approximately 63 acres of serpentine soil. Mastication could create a thick layer of duff that may potentially have negative effects on serpentine species. According to Hugh Safford, Forest Service Region 5 ecologist, a duff layer acts as a buffer to the serpentine soil, allowing non-serpentine plant species to colonize a site and potentially exclude the rare plants.

3.3.14 Environmental Consequences: Effects of Herbicide Use for DFPZ Maintenance and Noxious Weed Control on Serpentine Guild Species

3.3.14.1 Alternative A (No Action)

Direct and Indirect Effects. There would be no direct or indirect effects.

3.3.14.2 Alternatives C and G (No Herbicide Use)

Direct Effects. There will be no direct herbicide effects with these alternatives.

Indirect Effects. In the absence of herbicides, DFPZs would be maintained using mastication and underburning. These effects would be the same as those discussed above for gap-phase and general-openings guild species.

Noxious weeds would be controlled through integrated techniques, excluding the use of herbicides. There would likely be a greater cost per acre to control noxious weeds in the short term.

3.3.14.3 Alternatives B, D, E, and F (Herbicide Use)

Approximately 1,954 acres would be treated with imazapyr under these alternatives. Triclopyr BEE would be used to treat up to 31 acres of broom seedlings per year for five years. The surfactant Syl-tac® (Hasten® and Syl-gard®) and the marker dye Hi-light® Blue would also be used. Approximately 27 acres of serpentine habitat could be treated with imazapyr to control brush to maintain DFPZ effectiveness. There is approximately 0.13 acre of Northern Sierra rayless daisy in this treatment area, but it would be protected with a 50-foot no-spray buffer.

Direct and Indirect Effects. The direct and indirect effects would be the same as those discussed above for gap-phase and general-openings guild species. The direct effects of herbicide contact could include death or decreased fitness, with a subsequent susceptibility to pathogens, insects, or inability to compete for resources. There should be no direct effects on known rare plant populations because all known occurrences would be protected by a 50-foot no-spray buffer.

3.3.15 Affected Environment (Existing Conditions): Noxious Weeds

Tables 3-7 and 3-8 list the noxious weeds that are known to occur in the analysis area. No California Department of Food and Agriculture A- or B-rated noxious weeds were found in proposed treatment units. The California Department of Food and Agriculture's noxious weed list (http://www.cdfa.ca.gov/phpps/ipc/weedinfo/winfo_list-pestrating.htm) divides noxious weeds into categories A, B, and C. The A-listed weeds are those for which eradication or containment is required at the state or county level. With B-listed weeds, eradication or containment is at the discretion of the County Agricultural Commissioner. The C-listed weeds require eradication or containment only when found in a nursery or at the discretion of the County Agricultural Commissioner. All weeds in table 3-8 are C-rated except for English ivy, which is not rated.

Table 3-7. Acres of noxious weeds in the analysis area and proposed treatment units.

Common Name	Species	144,490-Acre Analysis Area (total acres of weeds)	Proposed Treatment Units (total acres)
Barbed goatgrass	*Aegilops triuncialis*	0.0	0.0
Bull thistle	*Cirsium vulgare*	Common	Common
English ivy	*Hedera helix*	0.1	0.01
French broom	*Genista monspessulana*	10.6	9.3
Klamathweed	*Hypericum perforatum*	Common	Common
Medusahead	*Taeniatherum caput-medusae*	Two plants	0.0
Scotch broom	*Cytisus scoparius*	94.9	0.3
Skeleton weed	*Chondrilla juncea*	0.1	0.0
Spanish broom	*Spartinum junceum*	0.5	0.5
Yellow starthistle	*Centaurea solstitialis*	0.5	0.001

Table 3-8. Acres of noxious weeds by treatment prescription.

Common Name	Species	Treatment Prescription	Acres of Noxious Weeds
English ivy	*Hedera helix*	Harvest	0.01
French broom	*Genista monspessulana*	Harvest	0.70
French broom	*Genista monspessulana*	Handcut / pile burn	0.06
French broom	*Genista monspessulana*	Masticate	0.65
French broom	*Genista monspessulana*	Underburn	7.90
Scotch broom	*Cytisus scoparius*	Harvest	0.12
Scotch broom	*Cytisus scoparius*	Masticate	0.001
Scotch broom	*Cytisus scoparius*	Underburn	0.20
Spanish broom	*Spartinum junceum*	Underburn	0.50
Yellow starthistle	*Centaurea solstitialis*	Underburn	0.001
Yellow starthistle	*Centaurea solstitialis*	Group selection	0.02

Klamathweed and bull thistle are two weeds that are common in the analysis area. Klamathweed can be found along most Forest Service roads on the Plumas National Forest that are not shaded by overstory canopy. Plants are usually scattered within the road prism, rarely forming dense stands or invading the adjacent forest. Plant distribution appears to be most heavily concentrated at the lower elevations (1,000–4,000 feet), with plants becoming less common at the higher elevations. The Klamathweed beetle (*Chrysolina quadrigemina*) is a very effective biocontrol agent, which keeps overall Klamathweed populations low (Borror 1992).

Bull thistle was probably introduced in North America during colonial times. It is naturalized and widespread throughout North America and is found on every other continent except Antarctica (Bossard 2000). It is most common in disturbed areas with little to no canopy and, like Klamathweed, is often found along roads with little shade cover. It is common along most Forest Service roads on the Plumas National Forest, although on the Feather River Ranger District, it normally does not form dense thickets. Although not native, bull thistle plants provide forage for many native insect species. Butterflies and bees are frequently observed on these plants. (Electronic images of insect activity on bull thistle inflorescences are available by contacting Chris Christofferson, assistant botanist, Feather River Ranger District, Plumas National Forest.) Furthermore, bull thistle does not spread by rhizomes or other creeping roots and does not produce allelopathic chemicals (substances released by one plant species that inhibit the germination or growth of competitor plants of the same or different species) like some other A- and B-rated noxious weeds (Bossard 2000). Two biocontrol insects (*Urophora stylata* and *Rhinocyllus conicus*) have been released and are helping reduce population levels.

The following data on broom biology and management is from the California Department of Food and Agriculture encycloweedia website. Scotch broom (*Cytisus scoparius*), French broom (*Genista monpessulana*), and Spanish broom (*Spartium junceum*) are also present in the analysis area and in proposed treatment units. There are approximately 106 acres in the analysis area, and much of this is on private property. There are approximately 10 acres in the proposed treatment units. Overall, this is a relatively small amount of broom. However, this project has the potential to create favorable conditions for broom proliferation.

The brooms are deciduous and grow in late summer to early spring. Seedlings can out-compete conifer seedlings and prevent reforestation. They were introduced from southern Europe and northern Africa. In California, Scotch broom is now found along the north coast, north coast ranges, Klamath ranges, Cascade range foothills, north and central Sierra Nevada foothills, Central Valley, San Francisco Bay region, and the south coast and in Canada and Montana. It also occurs in the eastern United States at elevations up to 3,950 feet.

Reproduction is by seed. Pods typically burst apart into spiral halves, ejecting seeds a short distance from the parent plant. Seeds are dispersed to greater distances by water, soil movement, vehicle tires, human activities, and animals. Seeds are hard-coated and long-lived under field conditions. Brooms can re-sprout from the crown when cut above. Seeds heated to temperatures above 150ºC (302ºF) for 2 minutes are killed, and seeds heated to 100ºC (212ºF) for 1 minute appear to be more susceptible to fungal pathogens. Yet, burning in the field often appears to stimulate germination. Seeds germinate after the first rains in fall through early summer in inland areas, and winter through mid-summer in coastal regions. Seedlings can emerge from soil depths up to about 3 inches, with optimal emergence from approximately 1 inch. Seedlings are subject to high summer mortality and browsing by wildlife during the first 2 years. Plants typically grow rapidly during years 3–4, often reaching a height of 6.5 feet. Seed production begins during years 2 or 3, usually when plants reach a height of about 3.5 feet, and shrubs are fully reproductive from years 3–5 through to about year 9. A mature shrub can produce approximately 2,000–3,500 pods, but seed production can decrease significantly during drought years. Individual shrubs live from 10 to 15 (20) years.

Management. Established infestations are difficult to eliminate because large, long-lived seedbanks typically accumulate. Minimizing soil disturbances, monitoring, and manually pulling young plants when discovered can help prevent new infestations. Machines and tools used to remove stands may inadvertently transport seeds to uninfested sites. Cutting Scotch broom shrubs to ground level at the end of the dry season can help reduce re-sprouting from the crown. Planting native shrubs and trees within and around broom stands can eventually help to minimize infestations by shading. Goats confined to a small area can help control stands of young shrubs or young re-growth from cut shrubs. Prescribed burns can eliminate above-ground growth but do not prevent re-sprouting from the crown and may stimulate a flush of seed germination.

Mechanical. The weed wrench is one of the most effective techniques for the complete removal of French broom, Scotch broom, and other brooms. The wrench locks on to the base of the stem and leverage is used to remove the entire plant. The wrench was specifically designed for complete broom removal to prevent any re-sprouting, and it is also effective on many trees and shrubs up to 2.5 inches in diameter. Some soil disturbance will occur with removal, which may favor new seedlings or deeply bury seeds in the soil. However, the disturbance is minimal and the technique can be employed even on steep slopes. Generally, a flush of broom seedlings may occur directly beneath the previously canopied area, which will need to be controlled. Mowing or cutting the shrubs may prevent seed production. However, re-sprouts will need to be managed.

Prescribed Fire. Brooms are highly flammable, and fire has been used to eliminate large impenetrable thickets and prepare areas for easier follow-up treatments. Fire stimulates seed germination, and large flushes of seedlings may be expected following burning. Fire appears more effective in controlling re-sprouts when there is adequate grasses to carry the fire.

Control measures have been designed into the project and are included in all alternatives, except the no-action alternative The following control measures have been identified:

1. Broom and other noxious weed infestations will be identified on the ground with orange noxious weed flagging prior to equipment entering infested units.
2. Broom infestations will be considered “controlled areas” that will exclude all equipment. These areas will be treated with hand equipment only to prevent the spread of seeds.
3. Mature broom plants will be killed by cutting them during summer and late fall when plants are water stressed.
4. Seedlings may be treated with a combination of techniques including herbicides, back-pack flamers, motorized brush cutters, weed wrenches, and hand pulling.
    a. Underburn areas will promote seed germination and will likely have large quantities of seedlings.
    b. The number of acres analyzed for treatment (31 acres) with this project exceeds the number of known infested acres (10 acres). The Forest Service has taken into account the possibility of a flush of seedlings following underburns and other treatments that remove understory vegetation.
5. Units with any amount of broom within or immediately adjacent to the unit are considered “infested.” Any equipment operating within an infested unit shall be cleaned prior to leaving that unit and entering an uninfested unit.
6. No mechanical firelines shall be constructed in an infested unit.
7. Other noxious species listed in table 3-7 above will be treated with other nonchemical tools, such as hand pulling and backpack torches.

3.3.16 Environmental Consequences: Effects of DFPZ Construction, Group Selection, and Individual Tree Selection Treatments on Noxious Weeds

3.3.16.1 Alternative A (No Action)

Direct Effects. There would be no direct effects.

Indirect Effects. Some weeds would become less abundant as the forest canopy continues to close in; however, long-lived seeds would remain in the soil until the next catastrophic fire, at which point conditions would likely be ideal for broom proliferation.

3.3.16.2 All Action Alternatives

Direct Effects. Mechanical treatments would remove overstory canopy and disturb the soil, creating conditions that favor noxious weed establishment. There would be approximately 221 acres of group selection harvest with one known infestation of yellow starthistle. Group selection units would leave little overstory canopy and result in a high level of ground disturbance. There would be approximately 1,110 acres of mastication units; within these units, there is approximately 0.7 acre of noxious weeds. This treatment would be less likely to create conditions that favor noxious weed establishment because there would be 40–50 percent canopy retention. Also, mastication treatments

would produce a layer of ground-up material that would act like a mulch to reduce germination of new seedlings. Mastication units with broom have been identified. Underburn units contain approximately 9 acres of noxious weeds. Mature broom plants would likely be killed with underburns. Firelines would create habitat for broom and other nonnative plant species. Dozers would not be used to construct firelines in those units with broom infestations. It is anticipated that this project will enable the Forest Service to decrease levels of broom infestation through the application of controlled burns and other associated treatments.

Indirect Effects. Environmental conditions could become more favorable to noxious weed establishment as a result of the canopy removal and ground disturbance associated with group selection treatments.

3.3.17 Environmental Consequences: Effects of Herbicide Use for DFPZ Maintenance and Noxious Weeds

3.3.17.1 Alternative A (No Action)

Direct Effects. There would be no direct effects.

Indirect Effects. There would be no indirect effects.

3.3.17.2 Alternatives C and G (No Herbicide Use)

Direct Effects. There would be no direct effects because herbicide use is not proposed under these alternatives.

Indirect Effects. In the absence of herbicides, noxious weeds would be killed through the use of other control tactics such as backpack torches, hand pulling, and brush cutters.

3.3.17.3 Alternatives B, D, E, and F (Herbicide Use)

These alternatives propose that approximately 1,954 acres would be treated with imazapyr. Triclopyr BEE would be used to treat up to 31 acres of broom seedlings per year for five years. The surfactant Syl-tac® (Hasten® and Syl-gard®) and the marker dye Hi-light® Blue are also be discussed here.

Direct and Indirect Effects. Herbicides would kill noxious weeds, but other nontarget species could also be killed as a result of herbicide application. A consequence of this would be the loss of native species that provide competition for noxious weeds. The death of nontarget species is expected to be minimal because all applications would be done by hand with backpack sprayers.

3.3.18 Past, Present, and Reasonably Foreseeable Future Actions

Future actions listed in the Schedule of Proposed Actions, and actions related to DFPZ maintenance activities, were considered in the analysis. Land management activities in the project area are summarized below, by decade, and are subdivided by watershed. Table 3-9 lists the activities that have taken place on federal and private land since the 1980s. Actions on private land prior to 1990 were not available for the analysis. The majority of past activities have been on private land and occurred in the 2000s. Figure 3-3 lists the past, present, and future timber management treatment acres in the Slapjack Project area.

Table 3-9. Activities on federal and private lands since the 1980s.

Decade	Type of Activity	Subwatershed						Grand Total
		Bullard's Bar Reservoir	Dobbins Creek	Frey Creek	Lower Dry Creek	McCabe Creek	Ponderosa Reservoir	
1980s	Clearcut			22.9	494.1		13.8	1,168.7
	Overstory removal							12.5
	Salvage			8.3			24.9	33.2
	Selection				86.6			86.6
	Thinning						44.6	44.6
1980s Total		**650.4**		**31.3**	**580.8**		**83.2**	**1,345.7**
1990s	Clearcut	329.6		36.6	87.9		120.2	574.3
	Rehabilitation				12.5		8.6	21.1
	Salvage	16.2						16.2
	Seed tree removal	1.3			2.1		87.4	90.8
	Selection	93.0			10.8		4.5	108.3
	Shelterwood removal	44.6	637.9					110.2
	Thinning	414.6	12.5		53.4		13.2	481.2
1990s Total		**899.3**		**36.6**	**166.8**		**233.8**	**1,402.1**
2000s	Clearcut	436.4		33.3	178.6		416.4	1,077.5
	Group selection	873.5	2.2		51.5		150.2	1,077.4
	Rehabilitation	37.3	9.3		237.3		226.1	510.0
	Salvage	288.8						288.8
	Seed tree removal	43.1		184.8			213.5	441.4
	Selection	95.3					306.4	401.7
	Shelterwood removal	797.2	637.3	78.2	564.6	291.1	1,693.7	4,062.0
	Thinning	34.1					38.7	72.8
2000s Total		**2,605.7**	**661.5**	**296.3**	**1,032.0**	**291.1**	**3,045.0**	**7,931.7**
Future	Clearcut	73.7		11.0	23.0		52.7	160.4
	Group selection	373.7		30.8			578.6	983.1
	Rehabilitation						15.9	15.9
	Sanitation salvage	67.9						67.9
	Selection	85.5					75.3	160.9
	Shelterwood removal	638.6			403.6		58.2	1,100.3
Future Total		**1,239.4**		**41.8**	**426.5**		**780.8**	**2,488.5**
	Grand Total	**5,394.8**	**727.2**	**405.9**	**2,206.1**	**291.1**	**4,142.8**	**13,167.9**

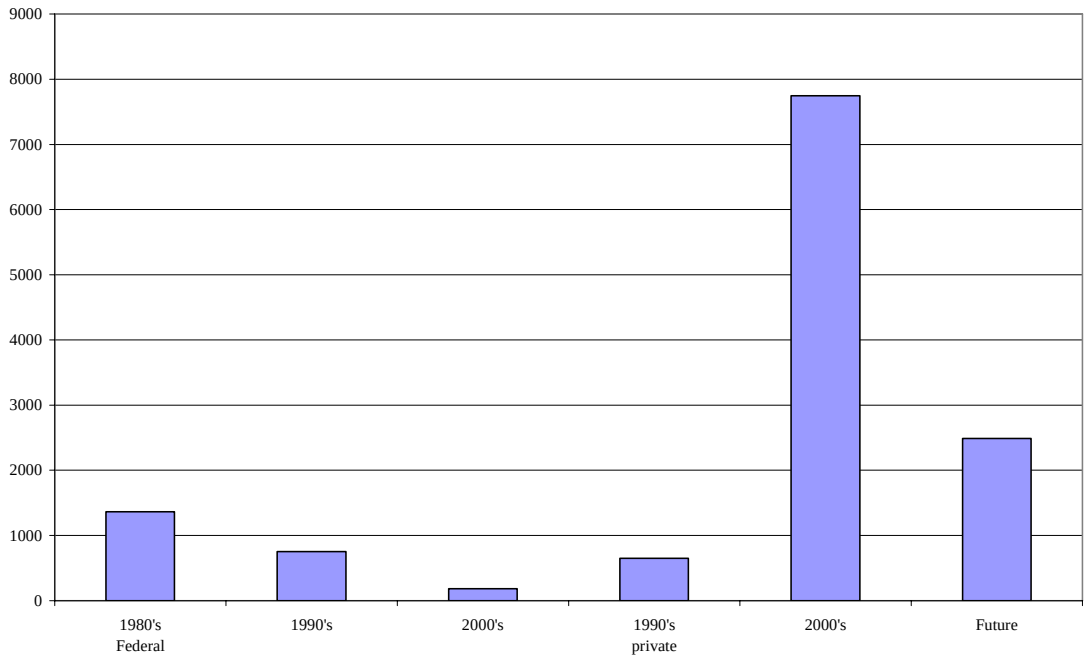

Figure 3-3. Past, present, and future timber management treatment acres in the Slapjack Project area.

Components of past actions that should be considered. There are four important components of past actions that should be considered when accessing the impact of past actions.

- What are habitat requirements of the species in question — does the species require disturbances or are they extremely sensitive to disturbances?
- What is the intensity of the disturbance — is it a clearcut or a light thinning?
- What is the size or scale of the disturbance — is it a 100-acre clearcut or 2-acre clearcut?
- How long does it take the landscape to recover those environmental components necessary to support the species in question?

The effects of past clearcutting and thinning on general-openings, gap-phase, and serpentine species. In general, past activities that exposed bare mineral soil and reduced the canopy are beneficial for general opening guild associates. These benefits would diminish through time as shrubs and trees return to the disturbed site. General openings species may have been negatively impacted from disturbances that completely removed the overstory. These species may be lost from the site until overstory trees return to the site and provide shade. However, activities such as thinning have likely been beneficial to these guild associates because competing vegetation is removed.

The effects of future projects on rare species. There are approximately 5,000 acres of future timber management projects in the analysis area—these are almost completely on private land. Only 30 acres of future noxious weed control projects are planned on federal land. The effects of these projects on rare species depend on the species in question and the level of project-specific mitigations. There would be a low risk that general openings and gap-phase species may be

negatively impacted, but there would be an elevated risk to interior forest and riparian guild associates.

3.3.19 Summary of Cumulative Effects

3.3.19.1 Alternative A (No Action)

Species in the gap-phase and general-openings guilds would likely decline with the implementation of the no-action alternative. These species require openings in the forest, and in the absence of fire and other disturbances, the forest canopy would become dense and exclude these species. As a result of tremendous fuel loading and high risk to local communities, fire suppression would likely continue in the analysis area. These species would be out-competed by brush and trees, but it is unlikely that alternative A would result in the extirpation of any rare plants in these guilds in the analysis area due to the level of disturbance associated with private land (approximately 80 percent of the analysis area is private property).

It is likely that rare plant species in the serpentine guild would be less impacted by this alternative because serpentine areas are not as heavily vegetated due to soil toxicity and low nutrient availability. However, these areas historically burned, and fire suppression has resulted in a build up of woody shrubs. A consequence of this is that the rare plants in the serpentine guild cannot compete with other plants for sunlight and other nutrients. Riparian and interior forest species would be the least impacted by the no-action alternative. These plants tolerate high levels of shade; however, encroachment of riparian areas by conifers and other nonriparian plants would likely continue with implementation of alternative A.

The no-action alternative would increase the risk of catastrophic wildfires in the analysis area. A frequent result of catastrophic wildfires, and the corresponding suppression activities, is the formation of conditions favorable to noxious weed invasion. Once these species are established, it can be costly to remove them.

3.3.19.2 All Action Alternatives

The extent of cumulative effects would depend on the management of potential direct and indirect effects, as well as the attributes of rare plant species located in the analysis area, their distribution in the analysis area, and the ability to design future projects with these rare plant attributes in mind. Overall, management of the direct and indirect effects through project design and mitigation measures would likely minimize the potential for adverse cumulative effects. There would be little difference in cumulative impacts between the action alternatives due to site-specific mitigations. The primary difference between these alternatives is the use of herbicides for DFPZ maintenance and noxious weed control. The use of herbicides would constitute a greater risk to rare plant species; however, due to site-specific mitigation measures, the risk would be minimal. Adverse cumulative effects are not expected from implementation of the Slapjack Project for the following reasons:

- The analysis area has been adequately surveyed for rare species.
- Projects over the past 20 years have incorporated protection measures for rare species, and as a result, the lingering effects of past actions on rare plant species are minimal (the primary lingering effect of past actions is that of fire suppression).

- This project has incorporated design criteria to ensure the protection of rare plant species; these include
  - controlled areas for herbicide treatments,
  - controlled areas for pile burning, and
  - Limited Operating Periods to protect sensitive developmental stages.
- The area has been adequately surveyed for noxious weeds, and treatments have been designed to eliminate equipment contact with infested areas and to use integrated management techniques to eliminate spread and contain the current infestation.
- Gap-phase and general-opening guild species would benefit from understory canopy thinning and the creation of openings.
- Serpentine guild associates would benefit from underburning.
- A minimal amount of riparian habitat would be affected by this project.
- Interior forest guild associates would be minimally impacted. There are no known occurrences in the proposed treatment units. Also, in the analysis area, the large tracts of land that have been set aside can act as reservoirs for these guild associates; these include approximately 5,500 acres of northern spotted owl Protected Activity Centers in the analysis area according to the Jo Anna Arroyo, assistant wildlife biologist on the Feather River Ranger District. There are 150 acres of *Off Base and Deferred Lands* (as defined by the HFQLG Act) and 13,000 acres of late-successional old-growth rank 4 stands. These areas contain stands of large-diameter trees and likely possess habitat for interior forest guild species. According to table 2 of the Forest Plan, the standards and guidelines applicable to the HFQLG Pilot Project area, timber harvest is not permissible in these areas. Also, direction is given to avoid late-successional old-growth rank 5 stands during DFPZ construction (rank 5 stands—a HFQLG land allocation—contain trees that are more than 24 inches diameter at breast height [dbh]). Downed wood debris would provide necessary habitat requirements for some of these guild associates.

3.3.20 Determination

The effects determination discussed below is based on professional experience and judgment, existing information, including existing condition of the analysis area, and the potential impacts of the alternatives. An effects determination is also the culmination of potential direct, indirect, and cumulative effects. Even if the potential direct effects would be low, there sometimes may be the potential for the indirect or cumulative effects to affect the viability of the species.

3.3.20.1 Determination for U.S. Fish and Wildlife Listed Threatened and Endangered Species

Alternative A (No Action). May affect and is likely to adversely affect *Senecio layneae*.

All Action Alternatives. May affect but not likely to adversely affect *Senecio layneae*.

3.3.20.2 Basis of Determination for Senecio Layneae

There are four known occurrences of *Senecio layneae* in the analysis area, totaling approximately 13.7 mapped acres. The acreage estimates are based on 2004 survey data (Buck and Clifton). Approximately 0.5 acre of *S. layneae* is within an underburn unit. No other areas containing this plant would be treated under the Slapjack Project or any other project within the scope of future foreseeable actions. The recovery plan (USFWS 2002) for *S. layneae* states that, "In most cases active management of the land is necessary to maintain and enhance habitat values for the species covered in this recovery plan." It goes on to explain, "The only practical approach is adaptive management, where management is applied, population responses are monitored, the outcome is evaluated, and management is readjusted accordingly."

The application of a fall underburn may kill mature *S. layneae*. However, other woody shrubs and small trees that currently occupy the site may be killed as well. Baad and Hanna (1987), as cited in the USFWS Recovery Plan, states that *S. layneae* is an early successional species that occupies temporary openings on gabbro or serpentine soils and is eliminated as vegetation grows up around it—this project would reduce such vegetation. Also, alteration of a natural fire regime is listed as one of the four major threats to this species (USFWS 2002). This project would initiate the first steps to return the area where *S. layneae* is found to a more historic fire regime.

3.3.20.3 Determination for U.S. Forest Service Sensitive Species

Alternatives A through G (All Alternatives). May impact individuals but not likely to cause a trend toward federal listing or loss of viability to *Allium jepsonii*, *Arabis constancei*, *Botrychium ascendens*, *Botrychium crenulatum*, *Botrychium lineare*, *Botrychium montanum*, *Bruchia bolanderi*, *Calycadenia oppositifolia*, *Calystegia atriplicifolia* ssp. *buttensis*, *Clarkia biloba* ssp. *brandegeae*, *Clarkia gracilis* ssp. *albicaulis*, *Clarkia mosquinii*, *Clarkia stellata*, *Cypripedium fasciculatum*, *Cypripedium montanum*, *Fritillaria eastwoodiae*, *Hydrothyria venosa*, *Lewisia cantelovii*, *Lupinus dalesia*, *Meesia triquetra*, *Meesia uliginosa*, *Monardella follettii*, *Monardella stebbinsii*, *Oreostemma elatum*, *Penstemon personatus*, *Sedum albomarginatum*, and *Senecio eurycephalus* var. *lewisrosei*.

The basis for the determination for Sensitive species includes the following:

1. Adequate surveys have been performed in the Slapjack Project area.
2. Protection measures and changes in prescriptions have been applied.
3. Gap-phase and general-openings guild associates respond positively to disturbances, which create openings and reduce competition from woody shrubs.
4. Serpentine guild species would benefit from the reintroduction of fire through underburns.
5. There are no interior forest or riparian associates located in the treatment units. There are over 13,000 acres of late-successional old-growth stands and 5,500 acres of California spotted owl Protected Activity Centers in the analysis area that likely contain habitat for these associates.

3.4 Economics

3.4.1 Introduction

The economic environment of the Plumas National Forest is described in the 1988 *Plumas National Forest Land and Resource Management Plan* (the "Forest Plan"), which was amended by the August 1999 Record of Decision for the final environmental impact statement (EIS) on the *Herger-Feinstein Quincy Library Group Forest Recovery Act* (HFQLG Act) and the 2004 Record of Decision for the Sierra Nevada Forest Plan Amendment (SNFPA) final supplemental EIS. Demographic and economic information for Butte and Yuba Counties has been compiled to provide a baseline for socioeconomic conditions of the Slapjack Project area. This information is on file at the Feather River Ranger District and available upon request.

3.4.2 Regulatory Framework

The HFQLG Act directs the Secretary of Agriculture to implement a Pilot Project on federal lands in the Plumas National Forest, Lassen National Forest, and the Sierraville Ranger District of the Tahoe National Forest in California. The Pilot Project is designed to maintain ecological integrity, community stability, and forest health. In addition, the Secretary shall use the most cost-effective means in conducting the Pilot Project.

3.4.3 Methodology for Assessing Impacts on Economics

3.4.3.1 Scope of the Analysis

This economic analysis focuses on those revenues and treatment costs associated with implementing group selection and fuel reduction treatments in the Slapjack Project area. The purpose of this economic analysis is to present the potential revenues and costs associated with each of the alternatives for comparison purposes.

This analysis does not include monetary values assigned to resource outputs such as wildlife, watersheds, soils, recreation, visual quality, and fisheries. It is intended only as a relative measure of differences between alternatives based on the direct costs and values used. Other values are discussed in the appropriate sections of this document.

3.4.3.2 Analysis Methods

Timber harvest values used in this economic analysis were based on the California State Board of Equalization Timber Harvest Values (January 1, 2005 – June 30, 2005). Harvest costs and road improvement costs were developed from the latest timber sale appraisal values. Mechanical (mastication, grapple pulling), manual (hand cutting, hand piling), and prescribed fire (underburning, pile burning) treatments are based on the latest service contract prices, Knutson-Vandenberg, and brush disposal sale area improvement plans.

3.4.4 Affected Environment (Existing Conditions)

The Plumas National Forest (the Forest) contributes to the regional economy in two primary ways: (1) through the generation of income and employment opportunities for residents of the immediate area, and (2) through direct and indirect contributions to local county revenues. The Forest also contributes in secondary ways, such as through production of goods and services in local and regional markets. Although some economic effects are dispersed over a broad area, the most substantial impacts are felt locally in Butte, Plumas, Lassen, Sierra, and Yuba Counties. The percentage of Plumas National Forest land in local counties is shown in table 3-10.

Table 3-10. Percentage of Plumas National Forest lands by county (based on GIS data).

County	County Acres	Beckworth Ranger District (acres)	Feather River Ranger District (acres)	Mt. Hough Ranger District (acres)	Total Plumas National Forest Lands in Each County (acres)	Plumas National Forest Lands within Each County (percent)
Butte	1,072,708	0	143,517	0	143,517	13.4
Lassen	3,022,136	39,686	0	1,635	41,320	1.4
Plumas	1,672,778	448,365	183,210	579,196	1,210,771	72.4
Sierra	615,514	14,794	33,522	0	48,316	7.8
Yuba	411,695	0	33,734	0	33,734	8.2
Totals	**6,794,830**	**502,844**	**393,984**	**580,831**	**1,477,659**	**21.7**

The two employment sectors most related to forest planning processes are the timber industry and tourism. They are very difficult to quantify, in terms of both total employment and their relative importance to local economies, because state and federal employers generally do not break down employment data into these categories.

Forest contributions to local county revenues come from three sources: (1) Payments in Lieu of Taxes, (2) timber yield taxes, and (3) *Receipt Act* payments or payments from the *Secure Rural Schools and Community Self-Determination Act of 2000*. Of these, the *Receipt Act* or *Secure Rural Schools and Community Self-Determination Act* payments are by far the most significant in terms of total contributions to each county and are therefore most likely to be affected by Forest land management decisions.

Payments in Lieu of Taxes. Payments in Lieu of Taxes are administered by the Bureau of Land Management and apply to many different types of federally owned land, including National Forest System lands. Payments in Lieu of Taxes compensate counties for the loss of property tax revenues due to nontaxable federal land in the county. Payments are made annually and are based on local population, federal acreage in the county, and other federal payments during the preceding fiscal year. The minimum payment is 75 cents per entitlement acre. The county may use these funds for any purpose. The Forest has no control over the disbursement of these funds, and the amount disbursed every year is unaffected by Forest land management decisions.

Timber Yield Taxes. The second source of revenues to local government is the timber yield tax, administered by the State Board of Equalization. This tax is not paid by the Forest; instead, it is paid

by private timber operators, based on the amount of timber harvested in a given year on both private and public lands. The tax is 2.9 percent of the value of the harvested timber. The taxes are collected by the state, and approximately 80 percent is returned to the counties from which the timber was harvested. Decisions about the amount of timber to be offered for sale each year on the Forest can affect the amount of revenues disbursed to the counties.

Receipt Act. *Receipt Act* payments are distributed pursuant to the *National Forest Management Act* (Public Law 94-588). Under this law, 25 percent of National Forest revenues are allocated to the state in which the Forest is situated. The amount returned is based on the National Forest acreage within each county. According to state law, *Receipt Act* funds must be divided evenly between public schools and public roads of the county or counties in which the National Forest is located and may not be spent on anything else.

Receipt Act payments are based on 25 percent of the total revenues collected from timber, grazing, land use, recreation, power, minerals, and user fees. Within the 11 western states, however, payments are based on 50 percent of revenue from grazing. Historically, at least 90 percent of total revenues have come from timber sale receipts. As a result, the amount of money available for distribution each year fluctuates widely, depending on the amount of timber harvested on National Forests.

Secure Rural Schools and Community Self-Determination Act. Congress passed the *Secure Rural Schools and Community Self-Determination Act* (SRSCSD Act) in 2000, offering counties an alternative to the *Receipt Act*. Under the SRSCSD Act, a state's three highest payment amounts between 1986 and 1999 are averaged to arrive at a "compensation allotment" or "full payment amount." A county may choose to continue to receive payments under the *Receipt Act* or to receive its share of the state's full payment amount under the SRSCSD Act. National Forests and other federal agencies that contribute to the 25 percent fund would have to generate approximately $56.4 million in total revenues in order to offset the $14 million that the counties receive under the SRSCSD Act.

The SRSCSD Act is currently funded through the end of 2006. Congress and the current presidential administration are examining the possibility of reauthorizing the SRSCSD Act. A controversial federal land sales proposal has been proposed by the Bush Administration as a means of funding the program for another five years. No other definitive funding proposals have been made to date. The Slapjack Project timber sales would not begin until 2007. If the SRSCSD Act is not reauthorized this year due to insufficient funding, then counties would have to rely exclusively on the *Receipt Act* for timber-related schools and roads funding.

Counties can receive variable, revenue-dependent payments under the *Receipt Act* or, if reauthorized, receive stable funding for local schools and roads under the SRSCSD Act. The legislation promotes local involvement, decisions, and choice by creating well-balanced resource advisory committees that recommend forest projects to the Secretary of Agriculture or advise counties on county project proposals. Counties that elect to receive the full payment amount under the SRSCSD Act, and receive more than $100,000, are required to allocate 15 to 20 percent of their funding to projects under Title II or Title III (see table 3-11). Like traditional 25 percent funds, Title I funds are expended for public schools and roads. Title II funds are allocated for projects on federal lands or projects that benefit federal lands. Resource Advisory Committees are established to

Table 3-11. *Secure Rural Schools and Community Self-Determination Act* full payment amounts to counties for fiscal year 2005.

County	Full Payment Amount	Title I Funds	Title I Percent of Full Payment	Title II Funds	Title II Percent of Full Payment	Title III Funds	Title III Percent of Full Payment
Butte	$895,320	$716,256	80%	$0	0%	$179,064	20%
Lassen	$3,876,372	$3,294,916	85%	$581,456	15%	$0	0%
Plumas	$7,258,972	$6,170,126	85%	$816,634	11%	$272,211	4%
Sierra	$1,848,005	$1,570,804	85%	$92,400	5%	$184,801	10%
Yuba	$238,982	$191,186	80%	$0	0%	$47,796	20%
Total	**$14,117,651**	**$11,943,288**		**$1,490,490**		**$683,872**	

determine Title II fund distribution. Title III funds are allocated for county projects that include search and rescue, community service work camps, easement purchases, forest-related education opportunities, fire prevention and county planning, or cost-share for urban community forestry projects. The SRSCSD Act full payment amounts (fiscal year 2005) for the five counties containing Plumas National Forest lands are shown in table 3-11.

Relative to the local economy, there is a potential to harvest 13–14 million board feet of timber and biomass (chips and fuelwood) over several years as part of the Slapjack Project. Plumas and Butte Counties can expect to receive 25 percent of the revenues generated from this timber sale through the *Receipt Act* or, if reauthorized, receive full payment from the SRSCSD Act. Approximately 82 percent of the Slapjack Project area is located in Yuba County, and the remaining 18 percent is in Butte County. Employment opportunities would be created from proposed thinning and biomass removal, fuels reduction, site preparation, and planting activities. Furthermore, indirect and induced economic employment and monies would be generated when income received by contractors and the timber industry is re-spent within the local economy.

3.4.5 Economic Consequences

Economic consequences are a measure of the overall value of the seven alternatives considered in this analysis. The level and mix of goods and services available to the public varies by alternative, resulting in a range of impacts on the social and economic environment. The impacts discussed in this section include estimated government expenditures and revenues, as well as monetary impacts on local communities.

Direct monetary impacts are discussed in terms of net cash value to the U.S. Treasury, including the costs associated with implementing the treatments and direct, indirect, and induced job opportunities.

In general, the monetary value of each alternative depends on the amount and method of timber harvest and the acreage planned for fuels reduction treatments. Areas with positive timber harvest values would pay for associated fuels reduction activities on those acres. Fuels reduction treatment

costs that exceed harvest revenues would become service contracts to be financed through appropriated funds when available.

The HFQLG final EIS and Record of Decision described the economic impacts of implementing the Pilot Project. This economic analysis for the Slapjack Project does not revisit the information presented in the final EIS and Record of Decision, but for comparison purposes, it focuses only on those revenues and treatment costs associated with each of the alternatives.

Employment. Employment opportunities can have direct, indirect, or induced effects on the local economy. Direct effects are associated with the primary producer. For example, the manufacturing of lumber from the Slapjack Project would have a direct effect on employment opportunities. Indirect effects account for employment in service industries that serve the lumber manufacturer. These industries may include logging, trucking, and fuel supplies. Induced effects are driven by wages. Wages paid to workers by the primary and service industries are circulated through the local economy for food, housing, transportation, and other living expenses. The sum of direct, indirect, and induced effects is the total economic impact in terms of jobs, which typically range from 10 to 15 jobs per million board feet of timber harvested.

Revenue. Net revenue is the difference between the revenues generated by an alternative and the costs required to implement the alternative. In this analysis, revenues come from harvest of timber and, when appropriate, chips or fuelwood. Revenues would either be used to pay for fuel treatment costs or go to the U.S. Treasury, with a possible 25 percent given to the counties under the *Receipt Act*. The latter may be more important depending on whether the SRSCSD Act is reauthorized (see section 3.4.4).

Alternative A (No Action)
- No treatments would be implemented.

Alternative B (Proposed Action)
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds with herbicides (up to 31 acres), mechanical and manual methods, and prescribed burning

Alternative C
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs without herbicides
- Control noxious weeds without herbicides

Alternative D
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs without herbicides
- Control noxious weeds with herbicides (up to 31 acres)

Alternative E
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds without herbicides

Alternative F
- Construct DFPZs
- Implement group selection (190 acres), except in watersheds over the Threshold of Concern
- Implement individual tree selection (148 acres); no proposed ITS units are located in watersheds over the Threshold of Concern
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds with herbicides (up to 31 acres)

Alternative G
- Construct DFPZs
- Implement group selection (190 acres), except in watersheds over the Threshold of Concern
- Implement individual tree selection (148 acres); no proposed ITS units are located in watersheds over the Threshold of Concern
- Maintain DFPZs without herbicides
- Control noxious weeds without herbicides

Payments to Counties. Local counties receiving payments through the *Receipt Act* rather than the SRSCSD Act would share part of the revenues generated from the timber harvest. The actual payment amount depends on estimated stumpage value, the amount of fuels work paid for by the timber sale, and the price bid by the purchaser awarded the timber sale contract.

Treatment Costs. Treatment or management costs include those costs associated with timber harvesting, biomass removal, road improvements, fuels treatments, and mitigation measure requirements, as well as costs of resource enhancement measures not associated with the sale of timber. Costs vary widely depending on the amount of mechanical, manual, or thermal treatments prescribed; the board feet of sawlogs or tons of biomass removed per acre; and the accessibility of the treatment units.

Nonpriced Costs and Benefits. It should be noted that all costs and values are not represented in the economic analysis. Calculations do not include costs and values for those items that cannot be estimated in dollar terms. The economic analysis does not take into account nonpriced benefits such as improved long-term wildlife habitat, improved watershed conditions, improved fish passage, control of noxious weeds, and reduced fire hazard. The various habitat improvement opportunities, which are not funded from the project's timber receipts, may be funded through other sources such as watershed improvement needs, Resource Advisory Committees, wildlife habitat improvements, Knutson-Vandenberg, or other appropriated funds. Examples of costs not estimated in dollar terms are the reduction in scenic value in the early years of fuels treatments, air pollution from wildfires, or reestablishing a forest following a stand-replacing wildfire.

For a detailed discussion of these nonpriced benefits and costs, refer to the appropriate resource section in this chapter. These nonpriced benefits and costs were considered along with the net economic value of each alternative in order to make a judgment as to which alternative would offer the best overall mix of costs and benefits to society.

3.4.5.1 Alternative A (No Action)

Direct and Indirect Effects. This alternative would not reduce critical fuel loadings or harvest any timber. No funds would be generated for the U.S. Treasury or returned to local counties. No additional employment opportunities or wages paid to primary and service industry employees would be circulated through the local economy. Tables 3-12 and 3-13 compare the economic impacts of alternatives A, B, C, D, E, F, and G on the local economy.

Table 3-12. Comparison of economic impacts of alternatives on local economies.

	Alternatives						
Employment	**A**	**B**	**C**	**D**	**E**	**F**	**G**
Potential Receipt Act payment (25% net revenues)	$0	$241,162	$241,162	$241,162	$241,162	$250,195	$250,195
Timber yield tax	$0	$100,712	$100,712	$100,712	$100,712	$99,415	$99,415
Direct jobs	0	130	130	130	130	129	129
Indirect jobs	0	137	137	137	137	136	136
Total direct and indirect jobs	0	267	267	267	267	265	265
Total employee-related income	0	$11,476,890	$11,476,890	$11,476,890	$11,476,890	$11,411,487	$11,411,487

Table 3-13. Comparison of revenues, costs, and project value for timber harvest, DFPZ construction, DFPZ preventive maintenance, noxious weed control, and DFPZ long-term maintenance treatments.

Revenues / Costs / Project Value	Alternatives						
	A	B	C	D	E	F	G
Direct and Indirect Effects							
Sawlog and biomass harvest revenues	$0	$3,472,813	$3,472,813	$3,472,813	$3,472,813	$3,428,103	$3,428,103
Harvest costs	$0	-$2,840,950	-$2,840,950	-$2,840,950	-$2,840,950	-$2,760,109	-$2,760,109
Net harvest revenues	$0	$631,862	$631,862	$631,862	$631,862	$667,994	$667,994
Nonharvest costs (DFPZ construction)	$0	-$1,091,500	-$1,091,500	-$1,091,500	-$1,091,500	-$1,091,500	-$1,091,500
Noxious weed control (33 acres x 5 years)	$0	-$33,020	-$43,140	-$33,020	-$43,140	-$33,020	-$43,140
DFPZ preventive maintenance (1,954 acres)	$0	-$488,500	$0	$0	-$488,500	-$488,500	$0
Total project value: short-term DFPZ maintenance	$0	-$981,158	-$502,778	-$492,658	-$991,278	-$945,026	-$466,646
Cumulative Effects							
DFPZ long-term maintenance (50 years) (4,419 acres)	$0	-$3,499,930	-$4,337,910	-$4,337,910	-$3,499,930	-$3,499,930	-$4,337,910
Total project value: long-term DFPZ maintenance	?	-$4,481,088	-$4,840,688	-$4,830,568	-$4,491,208	-$4,444,956	-$4,804,556

Cumulative Effects. The no-action alternative would result in a negative effect on local industries that depend on service contracts or a steady supply of timber, as well as counties that use timber yield taxes to fund county programs. These local industries currently lack opportunities related to fuels reduction, site preparation, and timber harvest activities—the action alternatives would provide those opportunities. The local economy would also not receive benefits from associated employment, such as in food, lodging, and transportation businesses. Throughout northern California, cumulative years of reduced timber harvesting activities (including those on federal lands) have resulted in the loss of infrastructure to complete such activities. The loss of such infrastructure, including local mill closures, could significantly reduce or eliminate future economic and environmental opportunities from National Forest lands. The continuation of current conditions under alternative A would preclude opportunities for long-term employment and rural community stability because the fuel reduction activities related to the creation and maintenance of Defensible Fuel Profile Zones (DFPZs) would not occur.

Under the no-action alternative, wildlife habitat, meadow, and streambank restoration and enhancement could not take place without appropriated money from Congress. In addition, dense standing trees and down woody material in the Slapjack Project area would continue to pose a very high fire hazard to the surrounding areas. If the no-action alternative were implemented, additional money would be needed to conduct any fuel reduction treatment, as well as possible elevated fire suppression costs should fire reoccur in the Slapjack Project vicinity. Should wildfire occur, costs incurred from potential fire fighter fatalities/injuries, loss of facilities, and post-fire tree regeneration and watershed rehabilitation costs would also likely be higher than under the action alternatives (Mason et al. 2006).

3.4.5.2 All Action Alternatives

Direct and Indirect Effects. Thinning, biomass removal, and fuel treatments for alternatives B through E would directly generate 130 full-time employment opportunities, compared to 129 under alternatives F and G (refer to table 3-12 above). The difference is small because only about 30 acres of group selection were dropped under the alternatives that eliminated non-DFPZ treatments in watersheds that are or would be over the Threshold of Concern. All action alternatives would create additional employment opportunities in service industries (such as logging supply companies, trucking companies, and fuel suppliers) that serve the timber industry. There would also be an induced effect driven by wages. Wages paid to workers by the primary and service industries would be circulated through the local economy for food, housing, transportation, and other living expenses.

The sum of direct, indirect, and induced effects is the total economic impact in terms of jobs. In addition to the direct employment that would result from the harvesting and fuel reduction treatments in alternatives B through G, and the indirect benefits of jobs in sawmills and energy generation plants, there would be some additional benefits to the local economy as wages earned by those employees are spent on living expenses. Alternatives B through E would generate an estimated 267 direct, indirect, and induced jobs, compared to 265 by alternatives F and G (refer to table 3-12 above).

Net harvest revenues for thinning and biomass removal would generate $631,862 under alternatives B through E. Net harvest revenue for alternatives F and G would be slightly higher at $667,994. The group selections dropped from alternatives F and G have smaller trees and less volume per acre than the average, thus the value of sawlogs per acre would be higher under alternatives F and G. This would reduce the impact of harvesting costs (refer to table 3-13 above). Implementation of mastication, underburning, and other fuel treatments for alternatives B through G would cost $1,091,500. All costs would be the same since no DFPZ treatments were dropped under alternatives F and G. The economic analysis does not take into account nonpriced benefits such as reduced fire hazard.

Cumulative Effects. Each of the action alternatives would result in the same cumulative effect—an increase in the overall economic activity in the HFQLG Pilot Project area. Though not a requirement, it is assumed in this analysis that most products from HFQLG Pilot Projects would be processed locally due to high hauling costs of products and equipment. Likewise, it is also assumed that most employment would largely be derived from Butte, Lassen, Plumas, Sierra, and Yuba Counties. The Slapjack Project timber sale revenues and service contract employment would complement all other HFQLG-funded projects across the Forest. The economic goals for the project, as a whole, across the Pilot Project area are discussed in the HFQLG Act final EIS.

Cumulative effects would also include the economic benefits of reducing potential of uncontrollable wildfire through thinning treatments. Although it is difficult to predict exact costs of future wildfires, not knowing future fire weather conditions, fire start locations, and so forth, the investment of doing fuels activities has been shown to be positive in time with the onset of future wildfire. Mason et al. (2006) estimate approximately 70 percent positive benefit to cost ratio for fuels reduction activities.

Table 3-13 above displays a summary of revenues and costs associated with timber harvest, DFPZ construction, DFPZ preventive maintenance, noxious weed control, and DFPZ long-term

maintenance treatments. The project values display the total net revenues or costs for implementing the DFPZ construction and noxious weed control activities. The long-term project values display the total net revenues or costs for implementing the DFPZ construction activities, including the present net value of the DFPZ long-term maintenance activities projected over a 50-year time period. For comparison purposes and to display the cost differences between alternatives, it was projected that alternatives B, E, and F would continue to use herbicides for DFPZ preventive maintenance. Appendix E contains the various spreadsheets used to calculate the revenues and costs for timber harvest, DFPZ construction, DFPZ preventive maintenance, noxious weed control, and DFPZ long-term maintenance treatments.

None of the action alternatives would determine how or even if DFPZs would be maintained long term. Decisions regarding the long-term maintenance of the DFPZs would be made at the time such maintenance is determined necessary. At that time, it would be determined whether or not herbicides would be used for DFPZ maintenance. If the woody vegetation and tanoak in the units exceed the height and density threshold set in the DFPZ maintenance guidelines, then some form of mechanical or thermal treatments would be necessary to remove the accumulated fuels. However, if herbicides could be applied without creating additional standing fuels, then herbicides may be used again as a preventive maintenance strategy. Appendix E of this EIS provides the complete economic analysis, by alternative.

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3.5 Fire and Fuels

3.5.1 Introduction

The Slapjack Project proposes to reduce fire hazards around the rural communities of Brownsville, Challenge, Clipper Mills, Dobbins, Feather Falls, Forbestown, and Strawberry Valley. These communities have been identified as being at risk from wildland fire in Yuba and Butte Counties' Community Wildfire Protection Plans, which were developed through a collaborative effort among state, local, and federal agencies with fire protection responsibilities, and with other interested stakeholders. Fire hazards would be reduced by constructing Defensible Fuel Profile Zones (DFPZs) using a variety of fuel manipulation techniques, such as tree harvest and biomass removal; mastication; manual hand cutting, piling, and burning; and prescribed underburning. Other activities proposed for the Slapjack Project are tree harvesting in the group selection and individual tree selection units in order to achieve an uneven-aged management strategy to regenerate fire-resilient species; associated road system improvement and closure work that would aid fire suppression resources in accessing future wildland fires; and aquatic habitat improvement activities and meadow enhancement near the communities.

3.5.2 Regulatory Framework

The Slapjack Project would contribute to fulfilling the long-term goals of the National Fire Plan of protecting communities at risk from wildfire and restoring ecological health on federal lands. The Slapjack Project would also meet the intent of the 2002 Healthy Forest Initiative by decreasing the wildfire risk to people, communities, and the environment through the construction of DFPZs, and increasing firefighter safety through improved road systems to access wildfires. DFPZs also provide safe areas to initiate fire suppression activities in the event a fire starts outside of the DFPZ.

The Slapjack Project is designed to fulfill management direction as specified in the 1988 *Plumas National Forest Land and Resource Management Plan* (the "Forest Plan"), as amended by the 1999 Record of Decision on the *Herger-Feinstein Quincy Library Group Forest Recovery Act* (HFQLG Act) final environmental impact statement (EIS) and the 2004 Record of Decision on the Sierra Nevada Forest Plan Amendment (SNFPA) final supplemental EIS. The standards and guidelines for fuels and vegetation management activities for the Slapjack Project area are shown in table 2 of the 2004 SNFPA Record of Decision. Table 2 includes direction for designing and implementing fuel and vegetation management activities in each of the various land allocations of the HFQLG Pilot Project.

The Feather River Ranger District has been working in conjunction with the Fire Safe Councils in Yuba and Butte Counties to design and implement fuel reduction projects on private lands, with the intent of improving connectivity of fuels treatments in the Slapjack Project area. There are currently two projects (funded under Proposition 40) on private lands in the Slapjack Project area. The Yuba and Butte Fire Safe Councils are currently working with private land owners to receive funds from Proposition 40 and other grant opportunities in fiscal year 2006 to complete more fuels reduction work in the Slapjack Project area.

3.5.3 Methodology for Assessing Impacts on Fire and Fuels

3.5.3.1 Scope of Analysis

The Slapjack Project area forms the analysis area for the pre- and post-treatment fire behavior predictions and for the fire regime condition class analysis. For analysis of both direct and indirect effects, a period of 5 to 20 years is estimated as the amount of time the treatments would remain effective following treatment, depending on vegetation type (see the "Vegetation" section (3.12) for more discussion of treatment effectiveness). The Slapjack Project area would comprise approximately 34,725 acres of public and private land and would generally be situated between Lake Oroville to Dobbins on the west, the North Yuba River to Wambo Bar on the east, and from Barton Hill to the town of Feather Falls to the north. The geographic area of analysis for cumulative effects extends to the adjacent areas within 1 mile of the Slapjack Project area. The timeframe for the cumulative effects analysis is from 1996 to approximately 2011. The analysis area for fire history includes the six 6th-level watersheds that encompass the Slapjack Project area. The six watersheds used in this analysis are Frey Creek, Ponderosa Reservoir, New Bullard's Bar, McCabe Creek, Lower Dry Creek, and Dobbins Creek. These six watersheds and the time period between 1917 and 2003 make up the analysis area for fire history. Fires in this analysis area could logically burn into or affect the project area. Past fires in the analysis area were inventoried and used to calculate fire size and fire causes. It is understood that this data does not contain all of the fires that actually occurred. The missing data can be due to a lack of reporting, differing priorities over the decades, and loss of records.

3.5.3.2 Indicators

Five environmental indicators were analyzed in this "Fire and Fuels" section: flame length, fire type, tree mortality, canopy base height, and fuel loading.

3.5.3.3 Analysis Method

Fire Behavior. The fire behavior measures used in evaluating the pre- and post-treatments are flame length, fire type, tree mortality, fuel loading, and canopy base height. Definitions for many terms used in this EIS can be found in the "Glossary" at the back of this document.

The predicted fire behavior in the proposed treatment units can be described by modeling both the current conditions in each of the units (based on stand and unit-level site-specific information) and the conditions that would result from implementation of the different alternatives. The fire behavior predictions are based on the Fire Program Solutions Fire Management Analyst (FMA 2002), a fire behavior program that uses algorithms to display rate of spread, flame lengths, crown fire initiation, crown fire type, and probability of tree mortality. The fuel models used in FMA 2002 simplify complex fuel profiles, which in turn simplify the predicted fire behavior; however, these fire behavior descriptors are useful in illustrating the relative differences among the alternatives.

Of the units analyzed, 10 percent of the proposed treatment units were selected to show pre- and post-treatment fire behavior for the analysis of effects. These units were selected based on proximity to communities at risk, elevation, and proposed treatment for each unit, fuel type, and sensitive habitat. The results of all data runs are contained in the Slapjack Project file, available for viewing at the Feather River District Office.

Site-specific vegetation characteristics were extracted from Forest Inventory Analysis data and entered into the FMA. The current National Forests Fire Laboratory (NFFL) fuel models were determined from on-the-ground evaluation of the areas proposed for treatment. The NFFL fuel models 8 and 9 were used for all post-treatment fire behavior analysis. This determination was made based on the experience of Brooks Henderson (District Fire Management Officer), who has 27 years of fire experience in the area. Mr. Henderson has observed that fire behavior after the type of treatments proposed are best represented by fuel models 8 and 9, depending on short- or long-needle type and canopy cover (B. Henderson, personal communication, 2005).

The 90th percentile weather conditions (see table 3-14) are standard weather parameters used for fire behavior prediction modeling on the Plumas National Forest. The data used in calculating the 90th percentile weather conditions were derived from the Pike County Remote Automated Weather Station (RAWS) located on the Feather River Ranger District. The use of 90th percentile weather conditions simplifies the modeling outputs of a complex environment and does not take into account the increase in wind speed that is often associated with large fires. The Pike County RAWS location is approximately the same in elevation and vegetation type as the proposed Slapjack Project.

Table 3-14. 90th percentile weather conditions and observations.

Weather Parameter	Observations
Dry bulb	92ºF
Duff	60 percent
Relative humidity	14 percent
1-hour fuel moisture	4 percent
10-hour fuel moisture	5 percent
100-hour fuel moisture	7 percent
1,000-hour fuel moisture	8 percent
20-foot wind speed	7 mph
Herbaceous fuel moisture	33 percent
Live woody fuel moisture	48 percent
Live fuel moisture	120 percent

Historical Fire Regime and Condition Class. The historical fire regime determination was made by analyzing fire history for the watersheds described above in the “Scope of Analysis” section and reviewing fire history research that is relevant to this project. Individuals trained in evaluating fire regime and condition class determined the current condition class through observations of the vegetation and fuel composition characteristics in the project area and comparing their observations to a course-scale condition class map that was developed jointly by Forest Service Region 5 and the California Department of Forestry. The following discussion describes the fire regime and condition class concept.

A natural fire regime is a general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention, but it also includes the influence of aboriginal burning (Agee 1993; Brown 1995). Coarse-scale definitions for natural (historic) fire regimes have

been developed by Hardy et al. (2001) and Schmidt et al. (2002) and interpreted for fire and fuels management by Hann and Bunnell (2001). The five historical fire regimes are classified based on the average number of years between fires (fire frequency), combined with the severity (amount of replacement) of the fire on the dominant overstory vegetation. Table 3-15 shows that historical fire regimes are described by a five-tiered system, which ranks fire regimes by frequency and severity.

Table 3-15. Historical fire regimes.

Rank	Frequency	Severity
Fire Regime 1	0–35 years	Low
Fire Regime 2	0–35 years	Stand replacement
Fire Regime 3	35–100+ years	Mixed
Fire Regime 4	35–100+ years	Stand replacement
Fire Regime 5	200+ years	Stand replacement

A fire regime condition class (FRCC) is a classification of the amount of departure from the natural fire regime (Hann and Bunnell 2001). Coarse-scale FRCC classes have been defined and mapped by Hardy et al. (2001) and Schmidt et al. (2002) and include three condition classes for each fire regime. The classification is based on a relative measure describing the degree of departure from the historical natural fire regime. This departure results in a change to one or more of the following ecological components: vegetation characteristics; fuel composition; fire frequency, severity, and pattern; and other associated disturbances. Condition classes can be altered by disturbances such as timber harvest, livestock grazing, introduction of noxious weeds (nonnative plant species), introduction of insects, and other types of natural phenomena such as wind or water. The condition classes are described below.

- **Condition Class 1:** Fire regime is within the historical range, and the risk of losing key ecosystem components is low. Vegetation attributes (species composition and structure) are intact and functioning within the historical range.

- **Condition Class 2:** Fire regime has been moderately altered from the historical range. The risk of losing key ecosystem components is moderate. Fire frequencies have departed from historical ranges by one or more return intervals (either increased or decreased). This would result in moderate changes to one of the following: fire size, intensity, severity, and landscape patterns. Vegetation has been moderately altered from the historical range.

- **Condition Class 3:** Fire regime has been significantly altered from the historical range. The risk of losing key ecosystem components is high. Fire frequencies have departed from historical frequencies by multiple return intervals, resulting in dramatic changes to one or more of the following: fire size, intensity, severity, and landscape patterns. Vegetation attributes have been significantly altered from their historical range.

Fire regime and condition class are interlinked. For example, a recently burned area classified as Fire Regime 1 would most likely be in Condition Class 1, meaning the area is within its historical range of variability. Another example would be a Fire Regime 1 area that has not burned within

100 years, meaning that it has missed at least two natural fire disturbances. In this example, the area would most likely be classified as Condition Class 2 or 3.

3.5.4 Affected Environment (Existing Conditions): Fire and Fuels

3.5.4.1 Fire Regime Condition Class

Fire History. The Feather River Ranger District has detailed information on fire ignitions since 1965, but only limited information is available for fires before that time. The history of large fires was derived from the Plumas National Forest Geographic Information System (GIS) database that tracks both Forest Service and California Department of Forestry large fires from 1917 to 2003. It is understood that this data does not contain all of the fires that actually occurred due to lack of reporting, differing priorities over the decades, or loss of records. However, there are enough data to demonstrate the continuing influence of wildland fire in and surrounding the approximate 34,725-acre Slapjack Project area. Watersheds were used for this analysis based on the different types of fuels that are found in the watersheds and where large fires have the ability to burn entire watersheds.

The Forest Service did not begin taking organized and consistent fire suppression action until the 1920s. Before that time, fires on National Forest System lands burned unconstrained regardless of cause, unless they were a threat to private property. Fires burned with varying intensity (usually low) and often burned large swaths of land before they were extinguished by weather or lack of fuel. Random fire occurrences maintained dead fuels and stand structures in conditions that were more resistant to stand-replacing fires. These stand conditions have been documented by pioneer accounts, early photo point records, and fire history records from tree ring analysis.

An analysis of the project area and immediate surroundings indicates that fire continues to influence the landscape. Records of large fires between 1917 and 2003 show a total of 58 fires that affected or could have affected the Slapjack Project area. Large fires ranged from 100 acres to over 33,000 acres in size, the largest being the “49er” fire that burned over 33,000 acres and destroyed 148 dwellings and 356 other structures. See table 3-16 for a U.S. Forest Service detailed fire history of class A, B, C, and D fires listed by watershed and fire cause.

Table 3-16. Fires greater than 100 acres that occurred between 1917 and 2003.

Year	Cause	Total Fire Size (acres)	Year	Cause	Total Fire Size (acres)
1917	Unknown	700	1931	Unknown	230
1917	Unknown	8,000	1932	Unknown	573
1918	Unknown	705	1932	Unknown	168
1920	Unknown	378	1934	Unknown	268
1920	Unknown	246	1934	Unknown	212
1920	Unknown	574	1934	Unknown	168
1920	Unknown	236	1936	Unknown	159
1920	Unknown	340	1936	Unknown	544
1921	Unknown	682	1937	Unknown	195

Table 3-16. Fires greater than 100 acres that occurred between 1917 and 2003 (continued).

Year	Cause	Total Fire Size (acres)	Year	Cause	Total Fire Size (acres)
1921	Unknown	1,000	1942	Unknown	1,002
1926	Unknown	793	1944	Unknown	632
1926	Unknown	548	1948	Miscellaneous	335
1927	Unknown	164	1949	Lightning	256
1927	Unknown	206	1949	Miscellaneous	239
1927	Unknown	27,829	1949	Lightning	772
1928	Unknown	142	1959	Miscellaneous	18,514
1928	Unknown	503	1960	Miscellaneous	5839
1929	Unknown	114	1960	Unknown	4,364
1929	Unknown	524	1961	Unknown	578
1929	Miscellaneous	135	1961	Unknown	1,471
1929	Unknown	746	1977	Miscellaneous	163
1929	Unknown	4,063	1988	Human	33,000
1930	Unknown	157	1994	Unknown	301
1931	Unknown	238	1997	Miscellaneous	5,835
1931	Unknown	2,698	1999	Miscellaneous	12,289
1931	Unknown	1,901	1999	Lightning	1,784
1931	Unknown	121	2002	Human	187

Table 3-17 shows that fires ignited in the project area are more likely to be ignited by human causes rather than natural causes.

Table 3-17. Number of fires by watershed and fire cause (1965–2003).

Cause	Watershed						Total
	Frey Creek	Ponderosa Reservoir	New Bullard's Bar	McCabe Creek	Lower Dry Creek	Dobbins Creek	
Campfire	3	1	2	1	3	0	10
Lightning	2	6	19	2	7	1	37
Equipment use	2	3	7	2	7	0	21
Smoking	3	7	9	0	3	0	22
Children	1	6	2	0	9	0	18
Debris burning	2	7	12	1	8	1	31
Railroad	0	0	0	0	0	0	0
Incendiary	2	5	11	2	10	0	30
Miscellaneous	2	17	26	1	27	0	73
Total	**17**	**52**	**88**	**9**	**74**	**2**	**242**

In the Sierra Nevada, fire regimes varied historically across the landscape with elevation, precipitation, aspect, topographic position, soil conditions or site productivity, and vegetation (Skinner and Chang 1996; Fites-Kaufman 1997).

Fire patterns can vary by individual watershed or landscape, even if they have similar vegetation. For example, the role of fire can vary with how the landscape is oriented relative to prevailing wind patterns. Drainages that are aligned with prevailing wind patterns will have more frequent, or larger, or more intense fires than those that are sheltered from prevailing winds. However, rarely is there fire history data for each landscape, so generalizations on fire regimes are often made based on similarities in the landscape topography and vegetation. For the northern Sierra Nevada, fire history research has been compiled from all parts of the Sierra Nevada and southern Cascade Mountains by vegetation type and landscape conditions to allow the Forest Service to describe general historic fire regime patterns for the northern Sierra Nevada.

According to Fites-Kaufman, in the northern Sierra Nevada, elevation is the most important and visible factor underlying changes in fire regimes and vegetation. The Slapjack Project would lie within what Fites-Kaufman described as the lower montane zone, which ranges from approximately 2,000 feet in elevation to approximately 4,500 to 5,000 feet in elevation. This zone is characterized by ponderosa pine, black oak, and live oak forest, with interspersed chaparral in the lower elevations of the zone. In lower elevations (less than 3,000 feet), Douglas-fir has been seen in riparian areas and on wetter north aspects. Historically, fire return intervals in this zone ranged from 5 to 15 years, with low fire intensity and severity, resulting from small accumulations of fuels on the ground due to the frequent fire return interval.

Chang and Skinner (1996) describe a mixed conifer zone, which lies within the middle elevation zone of the Sierran forest and is dominated by ponderosa pine, with large amounts of white fir and sugar pine. Variation in species is usually associated with elevation. Generally, this mixed conifer zone, like Fites-Kaufman's lower montane zone, is described as having frequent fires of low to moderate severity. However, it was found that the fire regime could vary in both interval and severity depending on vegetation, topographic position, site quality, and other local factors.

The Slapjack Project area is characterized as a mixed conifer forest type, with a heavy component of tanoak. The area receives high annual precipitation that ranges from 60 to 80 inches per year. The median fire return interval in a study conducted by Wills and Stuart (1994) in mixed evergreen forest near the Forks of the Salmon was 15 years, with a range of 3 to 50 years. In another study conducted by Agee (1993), the mean fire return interval was 18 years in mixed conifer-tanoak near Oregon Caves National Monument.

3.5.4.2 Summary of Fire Regime and Condition Class Affected Environment

Fire Regime. Historically, the Slapjack Project area fell within Fire Regime 1, meaning it has a frequent fire return interval of 0 to 35 years, with a low to moderate fire intensity and severity.

Condition Class. The majority of the project area is made up of Fire Regime 1, Condition Classes 2 and 3, meaning that the fire return interval for the area is approximately 0 to 35 years, and stand-replacing fires can be expected. Condition classes 2 and 3 indicate that the Slapjack Project area ecosystem is at a moderate to high risk of losing key ecosystem components as described above. The

percentage of acres of Slapjack Project area by condition class is as follows: Condition Class 1, 4 percent; Condition Class 2, 24 percent; and Condition Class 3, 70 percent. The remaining 2 to 3 percent of the area is unburnable, meaning it is made up of water, rock out cropping, or other natural or man-made barriers that will not sustain combustion.

3.5.4.3 Fuels and Fire Behavior

A mixed conifer-pine forest dominates the Slapjack Project area. The mixed conifer forest type consists of the following tree species: ponderosa pine (*Pinus ponderosa*), white fir (*Abies concolor*), sugar pine (*Pinus lambertiana*), incense-cedar (*Calocedrus decurrens*), Douglas-fir (*Psuedotsuga menziesii*), California black oak (*Quercus Keloggii*), California live oak (*Quercus agrifolia*), and tanoak (*Lithocarpus densiflora*). Assorted shrub species of *Ceanothus* (*Ceanothus* sp.), manzanita (*Arctostaphylos* sp.), bear clover (*Chamaebatia foliolosa*), California blackberry (*Rubus ursinus*), and Himalayan blackberry (*Rubus discolor*) contribute to the dense understory of the project area. Three noxious weeds (invasive plant species) that contribute to wildfire threat in the project area are Scotch broom (*Cytisus socpaarius*), Spanish broom (*Spartinum junceum*) and French broom (*Genista monspessulana*).

Many of today's forests have been altered from their historic conditions, especially in the mixed conifer vegetation type. Timber harvest, including clear cutting and high grading (taking only the largest and most valuable trees); grazing; fire suppression; and intense large fires have changed the forest structure and species composition of mixed conifer forest. This is the case for the Slapjack Project area. Current conditions in the majority of the project area include a reduction of large trees and structural diversity and an overstocked understory made up of shade-tolerant species such as incense-cedar, white fir, tanoak, and brush. There has been a shift towards increased proportions of shade-tolerant, less fire-adapted species (firs and incense-cedar) and decreased proportions of shade-intolerant, fire-adapted species such as large pines. Many areas are overstocked and, as a result, susceptible to disease and insect attack.

ArcView 3.3 was used to calculate fuel conditions in the Slapjack Project area. The data used in the calculations are stored in the Plumas National Forest GIS library and were also ground-truthed with personal observation. Fuel conditions are variable throughout the Slapjack Project area and can be described by six Northern Forests Fire Laboratory fuel models (FM): FM 10, mixed conifer with heavy timber litter and a dense shade-tolerant understory, comprises approximately 44 percent of the area; FM 9, described as closed canopy stands of long-needle conifers or hardwoods, comprises approximately another 23 percent of the area; FMs 4, 5, and 6, comprised of brush/shrubs, make up 27 percent of the project area; and FM 8, closed canopy stands of short-needle conifers, comprises 3 percent of the area. The remaining 3 percent is made up of water or other natural or man-made noncombustible materials. Fuel Models 8 and 9 represent desired fuel conditions.

Fuel Model 4 describes stands of mature shrubs, 6 or more feet in height, that have a higher percentage of dead fine woody material in the crowns of the shrubs than other brush fuel models. Fires can burn with high intensity and rapid rates of spread due to the higher percentage of dead woody material associated with this fuel model. A deeper litter layer may also hamper suppression efforts in this fuel model.

Fuel Model 5 represents shrub and sapling fuel types, which are indicative of some type of disturbance. Fires generally are not intense due to the low surface fuel loadings. Only under late summer conditions and/or extreme weather condition do live fuels in FM 5 pose a threat of becoming large fires.

Fuel Model 6 contains a wide range of shrub conditions. Shrubs may be older in FM 6 than FM 4 but may not be tall and/or have the dead woody component seen in FM 4. Fires may carry better through FM 6 than FM 5; however, a moderate wind (greater than 8 mph) is required. Fires will drop to the ground in lesser wind speeds or at openings in the stand.

Fuel Models 8 and 9 are single-story, early-to-mid successional stands with little dead and down material or ladder fuels. Fires burn with low intensity with little spread or tree mortality. Initial attack in these fuel types is highly successful. Only under extreme fire conditions (such as high wind speeds) do these fuel types pose a resistance to control.

Fuel Model 10 represents decadent late-stage succession, characterized by multistoried stands with ladder fuels and a significant component of dead and down materials. Due to the heavy down fuel component and presence of ladder fuels, fires in FM 10 burn with a high intensity. This can lead to spotting, torching, and crowning in overstory trees. Fires occurring in this fuel type are difficult to control under initial attack conditions.

3.5.4.4 Topography

The slopes in the Slapjack Project area vary considerably, ranging between 0 and 65 percent. The majority of the group selection units would be located on slopes between 0 and 35 percent. Elevation in the project area ranges from approximately 2,500 feet to 4,000 feet in elevation.

3.5.4.5 Desired Fire and Fuels Conditions

Desired fuels conditions are described in the 1988 Forest Plan, as amended by the 1999 Record of Decision on the HFQLG Act final EIS and the 2004 Record of Decision on the SNFPA final supplemental EIS. Consistent with the following desired conditions, the proposed action would reduce existing surface and ladder fuels in the DFPZs, group selection units, and individual tree selection units. Residual fuels (less than 3 inches in diameter) in these treatment areas would not exceed 5 tons per acre post treatment. However, where down logs exist, 10 to 15 tons per acre of the largest down logs, having diameter greater than 12 inches, would be retained. Ladder fuels would be removed in the treatment units to increase canopy base heights, which would prevent convective heat from igniting tree crowns. In general, canopy cover would be reduced to approximately 40 percent to reduce the potential for crown fire spread and allow for more effective application of water and fire retardant by aerial suppression resources in the event of a wildfire. Other desired conditions are flame lengths less than 4 feet and a decrease in resistance to control during initial attack. This change would help to moderate fire behavior within the DFPZs, group selection units, and individual tree selection units.

The proposed treatments would also be implemented in the riparian areas within DFPZs in order to enhance and protect the riparian areas from effects of large wildland fires. To create desired conditions, some hand cutting, piling, and burning of piles could be considered. This type of treatment would be used if the post-thinning review of the area determines that it would be beneficial

to the health of the riparian areas to do so. The types of treatments designed to improve the health and fire resiliency of riparian areas include aquatic and riparian ecosystem restoration such as fish bank improvements, streambank stabilization, and meadow improvements). These treatments would enhance the overall ecosystem of the area but would not improve the fuels and fire behavior on a scale that would be noticeable if a fire were to occur in the area. Other activities would include road decommissioning, closures, and reconstruction.

3.5.5 Environmental Consequences

3.5.5.1 Alternative A (No Action): Fire Behavior

Flame Length. The upper limit for direct action taken by hand crews is generally considered to be 4 feet, and 6 feet is considered the upper limit for direct action taken by mechanized equipment (dozers). Flame lengths in excess of these limits usually result in indirect action taken to contain the fire. The no-action alternative would reduce the effectiveness of hand crews used for fire suppression. Flame length predictions for both the current condition and the post-treatment conditions are described in table 3-18.

Fire Type. Fire type is described in four ways. The first type is a surface fire, which burns only the fuels at or near the surface without torching the trees above—this is the desired condition. The second type is the passive crown fire, which torches out individual or small groups of trees as the surface fuels burning under them provide the convective heat to ignite the above-ground fuels. The third is the active crown fire in which fire is spread from tree to tree in conjunction with the convective heat of the surface fuels burning under them. The fourth is the running crown fire—this is a very rare occurrence in which the fire is spread from tree to tree independent of the burning surface fuels. This type of crown fire requires extreme weather conditions and contiguous heavy tree canopy and is not modeled for. The no-action alternative would allow wildland fires to develop into either passive or active crown fires. The fire type predictions for current conditions and post-treatment conditions are described in table 3-19.

Alternative A (No Action)
- No treatments would be implemented.

Alternative B (Proposed Action)
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds with herbicides (up to 31 acres), mechanical and manual methods, and prescribed burning

Alternative C
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs without herbicides
- Control noxious weeds without herbicides

Alternative D
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs without herbicides
- Control noxious weeds with herbicides (up to 31 acres)

Alternative E
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds without herbicides

Alternative F
- Construct DFPZs
- Implement group selection (190 acres), except in watersheds over the Threshold of Concern
- Implement individual tree selection (148 acres); no proposed ITS units are located in watersheds over the Threshold of Concern
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds with herbicides (up to 31 acres)

Alternative G
- Construct DFPZs
- Implement group selection (190 acres), except in watersheds over the Threshold of Concern
- Implement individual tree selection (148 acres); no proposed ITS units are located in watersheds over the Threshold of Concern
- Maintain DFPZs without herbicides
- Control noxious weeds without herbicides

Table 3-18. Flame length predictions for current conditions and post-treatment conditions.

Treatment Unit	Alternative A: No Action (Current Conditions)			Action Alternatives (B, C, D, E, F, and G)		
	Fuel Model[a]	20% Slope	40% Slope	Fuel Model[b]	20% Slope	40% Slope
20	5	6 feet	7 feet	9	2 feet	3 feet
40	10	3 feet	4 feet	9	3 feet	3 feet
51	10	6 feet	7 feet	8	1 foot	1 foot
59	10	5 feet	6 feet	8	1 foot	1 foot
61	10	6 feet	7 feet	9	2 feet	3 feet
62	9	3 feet	3 feet	9	3 feet	3 feet
75	9	3 feet	3 feet	9	3 feet	3 feet
80	5	6 feet	7 feet	9	2 feet	3 feet
97	5	6 feet	7 feet	8	1 foot	1 foot
184	10	3 feet	4 feet	8	3 feet	4 feet
991	11	2 feet	3 feet	8	1 foot	1 foot

Notes:

a. Fuel model used for existing condition analysis.

b. Fuel model used for post-treatment analysis.

Table 3-19. Fire type predictions.

Treatment Unit	Alternative A: No Action (Current Conditions)		All Action Alternatives (B, C, D, E, F, and G)	
	20% Slope	40% Slope	20% Slope	40% Slope
20	Active	Active	Surface	Surface
40	Active	Active	Surface	Surface
51	Passive	Passive	Surface	Surface
59	Passive	Passive	Surface	Surface
61	Active	Active	Surface	Surface
62	Passive	Passive	Surface	Surface
75	Surface	Surface	Surface	Surface
80	Passive	Active	Surface	Surface
97	Passive	Passive	Surface	Surface
184	Passive	Active	Surface	Surface
991	Active	Active	Surface	Surface

Tree Mortality. The *probability of mortality* is the chance that a tree will be killed by a fire. The probability of mortality is based on bark thickness and percent crown scorched, which is derived from scorch height, crown ratio, tree height, species, and tree diameter (FMA 2002). The probability of mortality was averaged for the treatment units analyzed.

Tree mortality predictions for both current conditions and post-treatment conditions are described in table 3-20.

Table 3-20. Percent probability of pre- and post-fire tree mortality.

Treatment Unit	Alternative A: No Action (Current Conditions)		All Action Alternatives (B, C, D, E, F, G)	
	20% Slope	40% Slope	20% Slope	40% Slope
20	82%	86%	7%	8%
40	69%	75%	9%	10%
51	67%	78%	6%	6%
59	68%	69%	5%	5%
61	65%	69%	4%	4%
62	52%	54%	6%	7%
75	68%	70%	68%	70%
80	87%	87%	18%	10%
97	40 %	47%	6%	6%
184	57%	70%	48%	48%
991	55%	56%	2%	2%

The probability of mortality was calculated for a subset of trees with diameters between 10 and 29 inches diameter breast height (dbh). It was predicted that in the event of a wildland fire (under 90th percentile weather conditions) under the no-action alternative, there would be approximately 24 percent mortality of mixed conifer trees between 10 and 29 inches dbh on 40 percent slopes, and 19 percent mortality on 20 percent slopes.

The probability of mortality by tree species, diameter at breast height, tree height, and crown ratio for inventoried stand data is available for viewing in the Slapjack Project file at the Feather River District Office.

Fuel Loading. Fuel load and depth are significant fuel properties for predicting whether a fire will be ignited, its rate of spread, and its intensity. Fuel loading can slow the suppression efforts of firefighters if there are large accumulations of dead and down fuel. Fuel loading predictions for both the current conditions and post-treatment conditions are described in table 3-21. Table 3-22 reflects initial attack production rates, by fuel type.

Table 3-21. Fuel loading predictions at less than 3 inches.

Treatment Unit	Alternative A: No Action Current Conditions	All Action Alternatives (B, C, D, E, F, and G)
	Tons per Acre	
20	3.50	3.48
40	8.41	4.53
51	15.62	3.50
59	12.02	5.00
61	15.62	3.48
62	4.53	4.53
75	4.53	4.53
80	3.50	3.48
97	3.50	3.50
184	8.41	6.51
991	6.50	5.00

Table 3-22. Estimated initial attack production rates.

Crew Type	Fuel Model 5	Fuel Model 10	Fuel Model 11	Fuel Model 9	Fuel Model 8
	Chains per Hour[a]				
Type 1 Crew 20 person	6	20	15	40	40
Type 3 Engine 5 person	20	20	20	22	24

Source: Fireline Handbook NWCG Handbook 3, 1998.

Note:

a. Chain is a measurement of distance; one chain = 66 feet.

Canopy Base Height. For the purpose of this analysis, canopy base height is the height above the ground of the first canopy layer where the density of the crown mass within the layer is high enough to support vertical movement of a fire. Ladder fuels would be removed in the treatment units to increase canopy base. Conditions under the no-action alternative would allow surface fires to move into the crowns. Canopy base height predictions for both the current condition and the post-treatment conditions are described in table 3-23.

3.5.5.2 Alternative A: Condition Class

The Slapjack Project area would remain mostly in Condition Classes 2 and 3 and have a moderate to high risk of losing key ecosystem components because the vegetation characteristics and fuel composition would not change under alternative A.

Table 3-23. Canopy base height.

Treatment Unit	Alternative A: No Action Current Conditions (in feet)		All Action Alternatives (B, C, D, E, F, and G) (in feet)	
	20% Slope	40% Slope	20% Slope	40% Slope
20	2	2	51	51
40	2	2	N/C[a]	N/C
51	3	3	52	52
59	2	2	N/C	N/C
61	2	2	N/C	N/C
62	2	2	N/C	N/C
75	25	25	34	34
80	2	2	42	42
97	2	2	N/C	N/C
184	2	2	19	19
991	1	1	98	98

Note:

a. N/C = Noncomputable – minimal canopy bulk density does not allow the FMA program to compute this calculation.

3.5.5.3 Alternative A: Effects of No Action

Direct Effects – Fire Behavior. Surface fuels, ladder fuels, and canopy fuels would not be modified over the short term; therefore, potential fire behavior would not change from the current condition. Fires would be expected to be more intense, resulting in a greater percentage of tree mortality.

Direct Effects – Fire Suppression. Road closures, reconstruction, and decommissioning would not occur; therefore, access for fire suppression resources would not be modified from current levels into the near future, which may slow the suppression efforts of firefighters.

Indirect Effects – Fire Suppression. An increased intensity of wildfire (as described above in the "Fire Behavior" section) and longer initial attack response time for fire suppression resources would increase the likelihood that fires could escape initial attack and become large. Larger fires would increase the risk of injuries to both firefighters and the public, as well as increase the potential for residences to be lost or damaged. As reported by van Wagtendonk (2004), there are landscapes today where accumulations of dead woody debris and dense stands of shade-tolerant understory trees and shrubs have made the fuel and vegetation complex nearly homogeneous (same kind of vegetation structure or species), and that the inevitable fire that cannot be suppressed becomes larger and burns more intensely. The potential for high-intensity fire exists in the Slapjack Project area in those stands where there is little heterogeneity (diversity) in the fuel and vegetation complexes.

Riparian/Forest Cover – High-intensity wildfires could cause substantial loss of forest cover and degrade watersheds and riparian areas. Areas that experience high-intensity wildfires may take longer to regenerate because of high local seed mortality and the great distance seed sources are from burned areas (Graham, McCaffrey, and Jain 2004).

Forest Health – Additional tree mortality may be caused by increased insect attacks following a wildfire. The no-action alternative would produce indirect effects in that hazardous fuels would continue to build up. Dead fuels and shaded forest floors would inhibit natural regeneration of fire-tolerant tree and plant species.

Cumulative Effects. See section 3.5.6 below for a discussion of past, present, and reasonably foreseeable future actions considered in the cumulative effects analysis. Taking no action would not provide connectivity with the Lower Slate and South Fork DFPZs on adjacent National Forest System lands and privately owned lands (see "Figure A-5b: Slapjack Project Connectivity with Private Lands" in appendix A). Future Forest Service fuel reduction projects, as well as those currently being designed by the Fire Safe Councils in Butte and Yuba Counties, would lack connectivity without the larger landscape-scale design proposed for the Slapjack Project. Even though DFPZ effectiveness is not conclusive, and has not been established at the landscape scale (Agee et al. 2000), the Slapjack Project is part of the HGQLG Act Pilot Project that is intended to evaluate the effectiveness of DFPZs.

Summary of Effects. The no-action alternative would not meet the intent of the 1988 Forest Plan, as amended by the 1999 Record of Decision on the HFQLG Act final EIS and the 2004 Record of Decision on the SNFPA final supplemental EIS, the National Fire Plan, or the Healthy Forest

Initiative. Rural communities would continue to be at risk from wildfire, and public and firefighter safety would continue to be jeopardized from the existing conditions in the event of a wildfire.

3.5.5.4 All Action Alternatives: Effects of DFPZs, Group Selection, and Individual Tree Selection Harvests

Direct Effects – Fire Behavior. The potential fire behavior would be decreased in the treatment units by all action alternatives when compared to the no-action alternative. The most effective strategies for reducing crown fire occurrence and severity are to (1) reduce surface fuels, (2) increase height to live crown, (3) reduce canopy bulk density, and (4) reduce continuity or density of the forest canopy (Graham, McCaffrey, and Jain 2004; Peterson et al. 2005). Flame lengths could be reduced from 2–7 feet to 1–4 feet by reducing surface fuels through underburning, piling and burning, or mastication. Fuel loading would be reduced by more than 57 percent across all units. These results indicate that acres inside the treatment units would meet the standards and guidelines of the 1999 Record of Decision on the HFQLG Act final EIS. Unit 184 is the only unit that would not meet the post-treatment 5 tons/acre standard required by the 1999 Record of Decision. Unit 184 is an underburn-only unit because it contains the Sensitive plant species, Layne's butterweed (*Senecio layneae*). It is important to note that units with underburn may not reach the desired condition with only one treatment and would require a follow-up underburn within two to five years of the first, if the desired condition is not reached. The proposed hand and mechanical thinning, biomass removal, and mastication treatments would increase canopy base height in most of the units from 1 to 3 feet to over 19 feet. The reduction in fuel loading and increase in canopy base height, combined, would decrease the likelihood that surface fires would develop into crown fires. In the event of a wildland fire under the 90th percentile weather conditions, there would be approximately 9 percent mortality of mixed conifer trees between 10 and 29 inches dbh on slopes between 20 percent and 40 percent.

For the most part, these potential fire behavior characteristics would be expected immediately after final treatment has been completed and would last anywhere from 5 to 20 years. The "Vegetation" section (3.12) in this chapter contains a discussion on how long the effects of the proposed treatments are expected to last on the different vegetation components.

The other activities are included under "Treatment 6 – Wildlife, Aquatic, and Riparian Ecosystem Restoration" (see chapter 2 for a complete discussion). These treatments are designed to improve the health and fire resiliency of the riparian areas and include aquatic and riparian ecosystem restoration such as fish bank improvements, streambank stabilization, and meadow enhancement. These treatments would enhance the overall ecosystem of the area but would not improve the fuels and fire behavior on a scale that would be noticeable if a fire occurred in the area. The last activities, road decommissioning or closures, would not hinder the fire suppression capabilities under all action alternatives because the main roads for suppression access would not be closed. Some of these main roads would be enhanced by reconstruction and, this in turn, would possibly help in the reduced response time for suppression crews to a potential fire in the area.

Direct Effects – Fire Behavior and Microclimate. The following is a discussion of the potential increase in fire behavior that could result from changes in microclimate and increases in fine fuels (Demming et al. 1977; Weatherspoon 1996; Agee et al. 2000) in the treatment units. Because of the increased tree spacing and decreased shade from tree canopies, the action alternatives would create slightly hotter and drier conditions and slightly increased wind speeds in the DFPZs and group

selection units. The open canopy would also encourage more fine fuels and herbaceous plants. However, when all the effects (reductions in surface fuels, flame lengths, and ladder fuels and an increase in fire suppression production rates) of the treatments are considered together, the fuel treatment activities would mitigate the effects caused by the decreased relative humidity and increased temperature (Martin and Brackebusch 1974; Rothermel 1983; Agee 1996; van Wagtendonk 1996; Agee et al. 2000). The residual canopy cover within DFPZ units would effectively keep fuel in a sheltered or partially sheltered forest. In the group selection units, the existing canopy of trees surrounding the group selections would mitigate any increase in wind speed. The proposed groups would average 1.5 acres in size, and in an opening that small, an increase in wind speed would hardly be noticeable to a person standing in the unit.

Direct Effects – Fire Behavior and Shrubs. Research on group selection patches in the Challenge Experimental Forest (located in the project area) indicates that, in 10 years, there will be significant cover of grasses, herbs, and shrubs, but that the vegetation will have achieved little growth in height (McDonald and Abbott 1994; McDonald and Reynolds 1999). That research shows that small openings, characteristic of group selection, suppressed growth of shrubs due to shading from trees adjacent to the openings (McDonald and Abbott 1994; McDonald and Reynolds 1999). The live fuel moisture of the grasses, herbs, and shrubs will play the biggest role in reducing fire behavior (Agee 1996) in addition to the ratio of live:dead vegetation available to burn. The proportion of dead and live material in the units may affect the way regenerated shrub species may burn. With a relatively low amount of dead surface fuels (5 tons or less per acre) remaining post treatment, the live fuels in the group selection units may act more as a heat sink rather than a heat source in the event of a wildland fire. It has been observed on the Plumas National Forest, that brush species do not exhibit severe or extreme fire behavior, especially when the brush is young, succulent, and growing. On the Plumas National Forest, one example of a high-intensity wildfire burning into an older plantation with a heavy brush component occurred when the Pigeon fire in August 1999 (Mount Hough Ranger District) burned to the edge of a plantation where the spread was limited by the fuel characteristics in the plantation. Spot fires in the plantation also had limited spread because of the fuel characteristics (Phil Shafer, personal communication). Another example was the Mosquito fire in August 1999 (Feather River Ranger District) that started from a lightning strike adjacent to a nine-year-old plantation comprised mainly of ponderosa pine and a high component of *Ceanothus* shrubs—much like many of the plantations in the Slapjack Project area. A fireline was quickly constructed through the middle of the plantation, and the fire was controlled at about 30 acres by one engine crew and a dozer. If the *Ceanothus* shrubs were older and contained more dead branches, the fire may not have been contained so easily or extinguished at 30 acres (Estes, personal communication, 2005).

Direct Effects – Underburning. As part of the Slapjack Project, approximately 4,200 acres could be burned during project implementation; this would include follow-up underburning to other treatments. Analysis indicates that prescribed burning would result in 60 to 80 percent mortality in residual conifers, hardwoods (8 inches dbh and less), and most shrubs. This means that there would be a short-term increase in fire hazard in those units only treated by underburning; however, the reduction of surface fuels by underburning would mitigate this short-term hazard over the majority of the area, in both the underburn-only units, as well as those that are planned for harvest or mastication.

Direct Effects – Firelines. A combination of dozer and hand lines would be used to construct the firelines around the perimeter of the underburn units. It is estimated that approximately 2,463 chains of hand line and 2,389 chains of dozer line may be constructed. Existing roads would be used as

fireline when possible. Interior lines could be constructed on some of the larger units to enable Forest Service burning crews to cut off the firing in safe and effective areas if smoke or fire behavior concerns make continued burning problematic. The construction of firelines would reduce the potential for a prescribed fire to escape.

Direct Effects – Short-term Hazard. For treatment units that would require some type of prescribed fire (either piles or underburning) to meet the desired condition, a short-term fire hazard would exist for up to five years (based on past local experience) until the prescribed fire treatment could be accomplished.

Indirect Effects – Fire Suppression. Each action alternative would increase the likelihood that wildland fires occurring in the treatment units would be successfully suppressed by initial-attack hand crews and engines when compared to the no-action alternative. This would occur as a result of the (1) repair of forest roads, which would promote shorter response times for fire suppression resources to initial attack wildland fires; (2) reduction in fire behavior characteristics as described in the "Direct Effects" section above; and (3) increase in fireline production rates that, at the very least, would double for hand line construction.

Wildland fires that may escape initial attack, either inside or outside the treatment units, would have a higher likelihood of being suppressed at a smaller size with any of the action alternatives compared to the no-action alternative. One reason for this is that slopes outside the Slapjack Project DFPZs range from 0 to 50 percent. All of the action alternatives are designed to reduce the likelihood that a crown fire entering a DFPZ would continue to spread as a crown fire through the DFPZ. Standing and dead fuels would be treated such that crown fire would not be supported, causing crown fires that enter the DFPZ to be reduced to surface fires. This would be accomplished by increasing canopy separation (crown spacing) to approximately 40 percent and raising crown base heights by reducing ladder and surface fuels.

Also, as previously described, the reduction of surface and ladder fuel loading would enhance the capabilities of firefighting suppression resources by decreasing resistance to control. By reducing the canopy cover, the effectiveness of firefighting aircraft would improve retardant and water penetration through the canopy to the surface fuels, thereby slowing the fire progression so ground units would be more effective. One example of improved effectiveness was observed during the 2003 Peterson fire on the Feather River Ranger District, when the District Fuels Officer and District Suppression Battalion Officer observed effective penetration of aerial retardant in timber harvested areas where canopy cover had been reduced versus areas without any prior treatment (R. Case and B. Henderson, personal communication, 2005).

The action alternatives would increase firefighter and public safety should a wildland fire occur in the project area due to fuels treatments on approximately 4,420 acres in the Wildland Urban Interface area. These fuels treatments would reduce the likelihood of structures being destroyed or damaged by wildland fires in the communities of Challenge, Brownsville, Forbestown, Clipper Mills, Strawberry Valley, and Feather Falls. Implementing fuel treatments in units that are within 300 feet of residential homes (which is the case in some instances) could prevent intense flaming fronts from reaching structures in the event of a wildland fire. According to the Structure Ignition Assessment Model (Cohen 1997), intense flame fronts (for example, crown fires) will not ignite wooden walls at distances greater than approximately 130 feet.

Implementing treatments in units that are not immediately adjacent to structures could have an indirect effect on structure protection by enabling the fire to be controlled at a smaller size, as described above. This would also require fewer resources to work on fire perimeter control because of the increased fire suppression effectiveness in the treatment areas, which in turn could allow more resources to be committed to structure protection. The action alternatives would also create safer locations from which suppression resources could establish control points and safety zones for initial or extended attacks because of the reduced number of trees per acre in the treatment units (see "Table 3-58. Basal area and trees per acre in proposed DFPZs" in the "Vegetation" section). The proposed fuel reduction treatments along roads, as well as the road improvements themselves, would promote safer travel for both the public and firefighters.

Indirect Effects – Forest Health. There could be additional indirect effects of the action alternatives from the removal of fuel accumulations and opening the canopy, which would encourage the natural regeneration of fire-tolerant tree and plant species. Individual tree selection harvests would remove the shade-tolerant ladder fuels, which in turn would improve the vigor and amount of the fire-resilient trees and plants in the project area.

Indirect Effects – Riparian Areas. The proposed treatments in the Riparian Habitat Conservation Areas (RHCAs) would contribute to improved riparian health, create a more fire-resilient riparian zone, and reduce fire behavior potential within the RHCAs.

3.5.5.5 Alternatives B, E, and F: Effects of Herbicide Use to Maintain DFPZs

Alternatives B, E, and F propose the use of herbicides on approximately 1,954 acres for the maintenance of DFPZs to help stop the regeneration of tanoaks (where tanoak comprises more than 10 percent of the DFPZ). The effect of using herbicides to maintain DFPZs would be a reduction in the amount of burning or mechanical treatments that would be required to maintain surface fuel treatments in the DFPZs. Alternatives B, E, and F would produce less particulate emissions (smoke from burning and dust from machines and support vehicles) when compared to alternatives C, D, and G. The "Vegetation" section (3.12) in this chapter contains additional information on the effects and effectiveness of herbicide treatment.

The overall effect on fire behavior would be no different with or without the use of herbicides for DFPZ maintenance.

3.5.5.6 Alternatives C, D, and G: Effects of No Herbicide Use to Maintain DFPZs

DFPZs would be maintained with either underburning or mechanical treatments. In these cases, underburning would not be required for approximately three years after the initial treatments. Because ground fuels would be limited after only three years, a low-intensity underburn may be difficult to accomplish. Burning would have to take place under dryer conditions in order to meet objectives of killing regrowth. The increased fire behavior would increase the risk of harming residual trees and increase the risk of escape. Alternatives C, D, and G would produce more particulate emissions (smoke from burning and dust from machines and support vehicles) than would alternatives B, E, and F.

The overall effect on fire behavior would be no different with or without the use of herbicides for DFPZ maintenance.

3.5.5.7 Alternatives B, D and F: Effects of Herbicide Use to Control Noxious Weeds

Direct Effects. See section 3.5.5.5 above.

Indirect Effects. Alternatives B, D, and F propose herbicide use on approximately 31 acres of noxious weeds; about 10 of these acres are populated by the Scotch and French broom species, which are highly flammable when mature. The use of herbicides to reduce the potential for noxious weed spread would also reduce the potential fire behavior in the project area.

3.5.5.8 Alternatives C, E, and G: Effects of No Herbicide Use to Control Noxious Weeds

Direct Effects. See section 3.5.5.5 above.

Indirect Effects. In the absence of herbicide use on the approximate 31 acres, noxious weeds would be killed using other control methods such as manual cutting, hand pulling, backpack torches, and brush cutters. Manual cutting of mature broom species would occur during the summer and late fall when the plants are water stressed; they would then be piled on site and burned. Burning piles when there is little soil moisture could potentially scorch the soil, which would actually be favorable for early seral native plant growth, but likewise for nonnative plant growth. There is the likelihood, however, that pile burning would kill broom seeds located beneath the piles. Another method would be to cover the hand and machine piles with plastic until conditions are moister. This method would still meet the objective of pile consumption and reduction of particulate emissions from smoke.

3.5.5.9 Alternative F

Direct Effects. The effects of alternative F would be similar to alternative B, except 19 group selections would not be implemented in watersheds that are over the Threshold of Concern.

Indirect Effects. This alternative would reduce group selections by approximately 30 acres out of 219 acres; this reduction would not cause a measurable impact on the desired condition.

3.5.5.10 Alternative G

Direct Effects. The effects of alternative G would be similar to alternative C, except that 19 group selections would not occur in watersheds that are over the Threshold of Concern.

Indirect Effects. This alternative would reduce group selections by approximately 30 acres out of 219 acres; this reduction would not cause a measurable impact on the desired condition.

Cumulative Effects of All Action Alternatives. The cumulative effects of the action alternatives (as discussed in context of the past, present, and reasonably foreseeable future actions) are described below. The action alternatives all propose construction of the same network of DFPZs, so they would all have the same effect of providing connectivity to the Lower Slate and South Fork DFPZs, to the fuel treatment areas on private lands, and to the fuel treatment units proposed for the Slapjack Project (see figure A-5b in appendix A). The degree of cumulative effects of these treatments would depend on several factors. One factor is how the treatments would be located on the landscape in relationship to one another. The other factor has to do with the timing of implementation and maintenance of the

treatment areas, since effectiveness of the treatments would decrease over time if not maintained. This cumulative connectivity has the potential to limit the size of wildland fires, and by doing so, reduce the risk of residences being destroyed or damaged by wildland fire.

All of the action alternatives propose to alter vegetation structure and composition to similar degrees at the landscape scale, hence the condition class in all action alternatives would begin to move the landscape towards its historical range (Condition Class 1).

3.5.6 Past, Present, and Reasonably Foreseeable Future Actions

The geographical analysis area for past, present, and reasonably foreseeable future actions is the project area and the adjacent areas within 1 mile of the Slapjack Project. This 1-mile area was used because it is reasonable to assume that the DFPZ could be directly affected by fire behavior from the fuels and the project area's topography. It is expected that fire burning outside the 1-mile area would not have a influence on the proposed DFPZ because the fire would burn away from the DFPZ due to slope and topography

Past Actions. In recent years, there have been a number of timber sales and other projects (see table 3-24 and figure A-5b in appendix A) in the Slapjack Project area that have occurred on Forest Service or private lands. These sales and other projects were analyzed from a fuels and fire management perspective and were found to be either somewhat beneficial in reducing fuels or nondetrimental to the creation of DFPZs.

Table 3-24. Past, present, and reasonably foreseeable future projects.

Year	Project	Acres	Impacts on Fuels and Fire Behavior
1996	Peterson Ridge	15.3	Reduced hazardous fuels
	Beanville	12.9	Reduced hazardous fuels
1997	Mount Hope	16	Reduced hazardous fuels
	PC Snow Damage	296	Reduced hazardous fuels
1999	Woodleaf machine pile thin	392	Reduced hazardous fuels
2000	Peterson Ridge	22.3	Reduced hazardous fuels
2001	West Pendola fire salvage	77.3	Reduced hazardous fuels
	West Pendola fire salvage	50.8	Reduced hazardous fuels
2001	Lower Slate DFPZ	4,852	Reduced hazardous fuels
2005	Pike County site clearance	54.9	Reduced hazardous fuels
Future	FERC licensing	NA	License renewal for Energy Regulatory Commission – no impacts on fuels
Future	Recreation activities	NA	No known recreation activities planned at this time – no impacts on fuels
Future	Roadside Noxious Weeds EIS	Unknown	Reduction of hazardous fuels along the roadways

The year 1996 until present was the timeframe used to analyze the fuels treatments in past projects. It was determined that projects prior to 1996 would not have any impact (beneficial or detrimental) on the Slapjack Project because the fuel bed would have gone to a static state. Conditions and projects prior to 1996 are described as an existing condition.

Present Actions. The Slapjack Project is part of a forestwide plan to place DFPZs in strategic locations. Two of the current projects that establish connectivity with the Slapjack Project are the Lower Slate and South Fork DFPZs to the northeast. The Feather River Ranger District has been working with the Fire Safe Councils in Yuba and Butte Counties to design and implement fuels reduction projects on private lands in order to improve connectivity of fuels treatments in the Slapjack Project area. There are currently two projects (funded under Proposition 40) on private lands in the Slapjack Project area.

Private industrial landowners have worked with the Feather River Ranger District to design current projects around the Slapjack Project in order to achieve a reduction in fire behavior similar to those described above for the action alternatives. When the Slapjack Project was in its initial planning stages, a series of meetings were held with numerous stakeholders, including Fire Safe Councils in Butte and Yuba Counties, the California Division of Forestry and Fire Protection, University of California Cooperative Extension, Quincy Library Group, Chy Company, Soper Wheeler Company, Sierra Pacific Industries, Siller Brother Industries, Yuba County Roads Department, and Mooretown Rancheria. These stakeholders believe that fuels treatments on private and National Forest System lands in the project area would improve the chance that communities at risk would be protected from a wildfire.

Reasonably Foreseeable Future Actions. The Fire Safe Councils in Yuba and Butte Counties are currently working with private land owners to receive funds (for fiscal year 2006) from Proposition 40 and other grant opportunities in order to complete more fuels reduction work on private lands in the Slapjack Project area. The Feather River Ranger District is also in the planning stage for the proposed Sugarberry Project, which would provide additional DFPZ connectivity to the northeast of the Lower Slate DFPZ and protection to the communities of Strawberry Valley and LaPorte. It is anticipated that the stakeholders who collaborated to improve the connectivity of the Slapjack Project would continue to do so into the foreseeable future.

3.5.7 Summary of Effects

The no-action alternative would result in a continuing buildup of hazardous fuels, with wildfire severity increasing proportionate to the fuel hazard accumulations. The continued fuels buildup could require suppression actions that are increasingly complex and dangerous to firefighters and the public. The environmental effects from wildfires would include the loss of ground cover and, typically, a high percentage of uneven-aged (all-sized) trees. The implementation of any of the action alternatives would result in a trend from Condition Class 2 or 3 toward Condition Class 1. Such a shift would move the project area towards the historical range of variability (Condition Class 1). The action alternatives would (1) reduce the potential of high-intensity wildfires in the project area, (2) reduce the likelihood of a fire threatening one of the communities at risk, and (3) create safer areas for suppression resources to fight oncoming wildfire.

3.6 Heritage Resources

3.6.1 Introduction

Archaeological sites, historic buildings and structures, landscapes, and objects are the fabric of our national heritage. Collectively known as heritage or cultural resources, they are our tangible links with the past. The Plumas National Forest is responsible for, and committed to, protecting and managing these important resources in a spirit of stewardship for future generations to understand and enjoy.

3.6.2 Regulatory Framework

Section 101 of the *National Environmental Policy Act* (NEPA) requires the federal government to preserve important historic, cultural, and natural aspects of our national heritage. To accomplish this, federal agencies use the Section 106 process associated with the *National Historic Preservation Act* (NHPA). Passed by Congress three years before NEPA, the NHPA sets forth a framework for identifying and evaluating historic properties and assessing effects on these properties. This process has been codified in 36 Code of Federal Regulations (CFR) 800 Subpart B. The coordination or linkage between the Section 106 process of the NHPA and the mandate to preserve our national heritage under NEPA is well understood and is formally established in 36 CFR 800.3b and 800.8.

NEPA includes reference to ". . . important historic, cultural, and natural aspects of our national heritage." This terminology includes those resources defined as "historic properties" under the NHPA (36 CFR 800.16(l)(1)). Therefore, agencies use the NHPA Section 106 process to consider, manage, and protect historic properties during the planning and implementation stages of federal projects. Locally, the Plumas National Forest uses a programmatic agreement between Region 5 of the U.S. Forest Service, the California State Historic Preservation Office, and the Advisory Council on Historic Preservation to implement the Section 106 process.

3.6.3 Methodology for Assessing Impacts on Heritage Resources

3.6.3.1 Scope of the Analysis

Three levels of analyses were completed to understand the significant themes and extent of heritage resources associated with the Slapjack Project. First, research into the greater history of the project area was conducted to understand historic themes or events that have transpired in time and space. Second, a heritage resource survey was conducted for the project area to identify cultural properties associated with these themes. Lastly, cultural properties were assessed to determine potential effects associated with implementation of the project. The results and relevant rationale for each of these analyses are presented below.

The project boundary for the heritage resources survey and site protection is the Slapjack Project Area of Potential Effect (APE). This is the area within the project area that has the potential to affect heritage resources. The protection of heritage resources, therefore, must encompass the entire APE. Resources beyond the Slapjack Project boundary would not be affected because no ground-disturbing activities would occur on archaeological sites outside the APE.

3.6.3.2 Analysis Methods

Heritage resource data for the Slapjack Project is based on information available in the heritage resource files at the Feather River Ranger District. The heritage resource files include literature pertaining to prehistory and history, site records, and atlases that show recorded site locations, previously surveyed areas, and other heritage resource data. The approximate 5,000-acre analysis area has been surveyed for cultural resources.

3.6.3.3 History of the Project Area

The following is a broad historical overview of the human or cultural mechanisms that have influenced the project area. Ecosystem models based solely on biological and physical elements often disregard the complex interaction between humans and their environment. More than any other phenomenon, cultural landscapes provide a unique opportunity to interpret the history of the effects humans have had on the environment. Together, natural and cultural influences have shaped the overall character of the project vicinity.

Prehistory Period. Archaeological studies on the Feather River Ranger District have primarily been limited to cultural resource inventories for proposed Forest Service activities. Because intensive archaeological research in the Slapjack Project area sufficient to define prehistoric complexes and establish a reliable cultural chronology is not available, cultural assessments and interpretations for the project area rely upon extrapolations from several studies that were completed for lands adjacent to the study area.

Prehistoric cultural complexes that have been documented for this area of the Sierra Nevada are the Mesilla (1000+ BC – AD 1), Bidwell (AD 1 – AD 800), Sweetwater (AD 800 – AD 1500), Oroville (AD 1500 – AD 1850), and Historic (after 1850) (Markley 1978:24; Kowta 1988).

The Mesilla Complex has been described as being the Butte County foothill variant of the Martis Tradition and is believed to have been borne by Hokan speakers from the eastern Sierra and the Great Basin. Diagnostic features of this complex are the milling stone and mano combination, and large shale and basalt leaf-shaped, stemmed, and side-notched projectile points (Kowta 1988:148). At present, little is known about the Mesilla life way. It has been postulated that the settlement system consisted of semipermanent winter villages, seasonal campsites, and special-use locations. Subsistence was probably based on deer hunting and small seed gathering, as evidenced by remaining artifacts (Kowta 1988:97).

The Bidwell Complex appears to be a continuation of the Mesilla Complex with a marked increase and diversification of subsistence activities. Salient features include a mano-milling stone combination (although mortar and pestles were utilized as well), steatite vessels, and small and large basalt projectile points, indicating the introduction of the bow and arrow. Shellfish, salmon, rabbit, and deer bones are evident in middens dating from this period (Kowta 1988:149).

It is suggested that during the Sweetwater Complex, a Maiduan-speaking population from the west or south moved into the area inhabited by the Martis/Mesilla (ancestral Washo) and pushed them to the east. Characteristic traits of this period include a large variety of bone artifacts, as well as the use of shell artifacts such as Olivella shell beads. There appears to be an increase in acorn

consumption as evidenced by the increase in acorn-grinding equipment such as cobble and slab mortars and flat-ended pestles. The use of bedrock mortars also began at this time. Point forms from the period include a small corner-notched type and a large leaf-shaped form with incipient side notches (Kowta 1988:150). Although it appears that the Sweetwater Complex coincides with the arrival of a different group of people into the area, substantive evidence must come from a larger inventory of artifacts, in addition to a definitive assemblage of ancestral Maidu, before any firm conclusions can be drawn.

The Oroville Complex was a continuation of the preceding Sweetwater Complex, with an intensification of characteristic trends and traits. For example, there was an increase in reliance on bedrock milling stations and portable mortars. An increase in trade beads, such as the Olivella disks, oblong disc beads, and Haliotis ornaments suggests an increasingly complex economic exchange and trade system. Housepits from this period have also been discovered; both conical bark superstructure and the semi-subterranean forms have been found. Point types include the Small Desert Side-Notch, the Cottonwood Triangular, small Gunther Stemmed points, and larger corner-notched and leaf-shaped points reminiscent of the Sweetwater period. The traits of the Oroville Complex continued into the Historic period, which is synonymous with the ethnographic Konkow culture.

Ethnographic Period. The Slapjack Project area is in the ethnographic territory of the Northwest or Konkow Maidu. Boundary lines drawn by Dixon (1905:125) and Riddell (1978) through this remote area of the Sierra Nevada differ slightly and are best considered approximate locations. However, due to local topography and hydrology patterns, it seems likely that the Slapjack Project area was more accessible to the Northwestern, or Konkow Maidu, rather than the Nisenan Maidu who lived just to the south of the project area.

The Konkow Maidu are believed to have inhabited this region for at least the last 800 years, but could have arrived as early as 1,200 years before the present. The Konkow inhabited the lower portions of the Feather River region near Oroville and Chico. Their territory ranged from the valley floor and foothills to approximately 4,500 feet above sea level (Riddell 1978:372). Linguistically, the Konkow are related to the Northeastern or Mountain Maidu, both of which are classified as being in the California Penutian language family. Technologically, the Konkow culture is quite similar to other California foothill groups all along the west side of the Sierra Nevada.

Hunting, fishing, and plant gathering were the primary means of subsistence and required seasonal shifts from snow-free low elevations in winter to higher elevations in the summer months (Riddell 1978; Kroeber 1925). Trading was also an important supply avenue (Davis 1961). The bow and arrow were generally used for hunting, with deer being the principal game. Deer were often killed during large drives where the animals were driven over cliffs or ambushed along migration trails. Elk, ground squirrel, rabbit, and game birds were also hunted. Nets and gigs were used for salmon and eel fishing in the Feather River and its tributaries (Riddell 1978).

The principal plant food collected was the acorn, which was gathered in the early fall and stored in granaries. Pine nuts were another basic food item. Other nut meats collected included hazel, buckeye, and nutmeg. Acorns and some other nuts required extensive processing before eating due to high levels of tannin or prussic acids. Wild mint, manzanita berries, and various roots, seeds, bulbs, and greens were also harvested (Riddell 1978).

Abundant resources in the watershed provided many of the food and material requirements necessary for Konkow's survival. The Konkow also enhanced the quantity and quality of desirable species, primarily through the use of fire. Fire was used to keep areas free of brush, manage game, stimulate production of food crops, decrease insects and diseases, and facilitate food gathering.

Extensive trading took place between the Konkow and neighboring cultural groups. During trades they received bows and arrows, obsidian, skins, sugar pine nuts, deer hides, miscellaneous foods, and clam disc and other shell beads. They supplied salmon, salt, obsidian, log rafts, digger pine nuts, and beads of clam and other shell to other groups (Davis 1961:34; Kroeber 1925:399).

Settlements in the foothill and mountain regions of the Konkow were located on ridge tops or terraces due to the steep and often rugged side slopes of the Feather River and its tributaries. However, the Konkow took advantage of the opportunity to settle along rivers when topographic conditions allowed. Village sites consisted of an average of five to eight houses and a population of 35 to 40 people. The number of villages that comprised a "village community" varied, but generally did not exceed 200 people (Riddell 1978; Kroeber 1925).

Historic Period. The extensive gold deposits of the project area were discovered relatively late in the Gold Rush. It was more than two years after John Marshall's discovery at Coloma before this remote, mountainous region yielded its first nugget to the gold seekers of 1849 (Baker and Shoup 1985).

The Gold Rush miners who came during the early years were transient adventurer's intent on getting rich quickly. For the first few years of mining (1849–1852), activity focused on working the natural watercourses by pan, rocker, and sluice box. By 1853 areas away from these streambank diggings, as they were initially called, had become important, and a rush for water claims then set in. The hydraulic mining technique also arrived at this time and small-scale drifting ("drifts" or "tunnels" as they were often called) into the gravel banks of the ancient river channel was also underway (Sinnott 1977:11, 314). An important first step towards the successful mining of the gravel deposits was the transport of water to mining sites. The years 1853 and 1854 saw a rush for water claims since water was needed to wash the drift dirt and undertake hydraulic operations (Baker and Shoup 1985: 25). The rush for water in 1853 to 1854 resulted in the creation of a number of major ditch and flume systems in the area (Baker and Shoup 1985: 26).

Hydraulic mining was carried out by applying a stream of water under high pressure onto a gravel bank. The water blasted the bank down, and the gravels containing the gold were then directed into a sluice box, which caught the heavier gold. The water and mud went into a stream or river. Using this system, a few men could process hundreds of tons of earth a day, making it economical to mine gravel worth only a small amount per square yard (Baker and Shoup 1985: 26).

Drift mining was used when lava or other hard rock made hydraulic mining impractical, or when the gold in the gravel was mostly on bedrock. Thus, adits or "tunnels," as they were usually called, were more frequently used to penetrate the bank, using rails and ore cars to bring the pay gravel out of the mine. The first real boom in drift mining came in the late 1850s (Baker and Shoup 1985: 26).

The founding and early development of drift mines marked another stage in a transition, which was underway during the mid and late 1850s. This transition had a number of aspects, which

collectively marked the demise of the Gold Rush and the rise of a much different type of political economy and society. The most important of these aspects included more capital-intensive mining, the rise of reasonably stable small towns, occupational diversification in these towns, improved transportation and communication in these towns, an alteration of the dominant cultural forms, the arrival of women and children, better mining technology, and the development of sawmills and logging (Baker and Shoup 1985: 27).

The key thread in this transition was the rise of small towns, something that was a constant process at least from the mid 1850s on. It was in the small towns of the project area – Challenge, Clipper Mills, Feather Falls, and Forbestown – that the capital needed for more modern mining was accumulated, that occupational diversification took place, where women and children usually lived, and where the relative stability associated with the post-Gold Rush period was focused. Thus, the demise of the "Gold Rush" in the project area was associated with the growth of towns and increase in townspeople (Ibid.). The economies associated with most mining communities were constant boom and bust.

The Town of Challenge – In the early 1850s, gold was discovered in the creeks in the Challenge area including Little Oregon Creek, Dry Creek, and Costa Creek. By the 1860s much of the gold had been depleted in the area. The town of Challenge did not exist until 1862, when a small sawmill located at Strawberry Valley was moved to the Challenge area. This mill was bought by Andrew Leach in 1874. Mr. Leach owned mills at Woodleaf and Clipper Mills. The center of this company became Challenge, which included more than 20 buildings (warehouse, blacksmith shop, machine shop, store, Mr. Leach's home. etc.). A system of flumes was constructed to expedite the transport of lumber from the mills to the California Northern Pacific Railroad at Honcut. In 1884 Mr. Leach bought a locomotive and built a narrow-gauge railroad line from the Challenge mill to Beanville, and by 1889, it extended up to Indian Creek near Woodville (Woodleaf) (Mossinger 1995: 79-82; cited in: Dwyer and Nilsson 2004). In 1887 the Challenge and Woodville sawmills burned to the ground and heavy snow collapsed the flumes (Ibid. 95). All of Mr. Leach's properties were sold to pay his creditors. (Dwyer and Nilsson 2004: 17).

By the 1880s, the main roads traversed through Challenge, which included a toll road that ran between Marysville and Woodville (Woodleaf), with a gate and tollhouse at Challenge. J.W. Ribble built the Challenge Hotel in 1886, which was located near the LaPorte Ranger District office (now closed) (McDonald and Lahore 1976: 85; cited in: Dwyer and Nilsson 2004).

Challenge was home to a large number of Chinese immigrants in the 1880s and 1890s. As with most Chinese immigrants at the time, they lived at the outskirts of town, and had a store and several cabins (McDonald and Lahore 1976: 86; cited in: Dwyer and Nilsson 2004).

The Town of Clipper Mills – The first sawmill in the Clipper Mills area was built in 1852, north of the present town on Grizzly Creek. The "Clipper Mill" was constructed between 1855 and 1856. A store and hotel were built near the mill. The first post office was established in 1861, and a school was built in 1868 (Pater 1976:92; cited in: Dwyer and Nilsson 2004).

The Town of Feather Falls – The town of Feather Falls was originally a logging camp (name unknown) of the Hutchinson Lumber Company. In 1938 (approximate date), the post office in Mooretown moved to the town of Feather Falls (Stephens 1989: personal communication).

Mooretown was a mining town and trading center with a population large enough to warrant a post office (Gudde 1975:224). Mooretown was located approximately 0.5 mile west of the present town site of Feather Falls. It is not known what caused the demise of Mooretown, but it is presumed that the decline in gold mining was a major contributor (Tibbetts 1989).

Camp One and Camp Eighteen were logging camps set up to accommodate the Hutchinson Lumber Company. Camp One is located approximately 1.6 miles northeast of the town of Feather Falls. Camp Eighteen is located about 4 miles northeast of Feather Falls. While most logging camps were portable, Camp One and Camp Eighteen remained stationary because they were machine maintenance locations. Camp One was in existence between 1921 and 1922. Camp Eighteen lasted longer than Camp One, but no date of operation was noted (Stephens 1989: personal communication; cited in: Tibbetts 1989).

Rogersville was a small settlement approximately 2 miles northeast of Feather Falls, just northeast of Camp One. It predates Camp One and was founded around the same time lumber operations began in the Feather Falls area. This settlement ended sometime in the 1920s (Stephens 1989: personal communication; cited in: Tibbetts 1989).

The Hutchinson Lumber Company operated a sawmill in Oroville and shipped logs via the Feather River railway that they built in 1923. The Feather River Railway was originally a 21-mile logging line that connected with the Western Pacific Railway at Bidwell Bar and then ran up the South Fork of the Feather River. “Logs were carried over the private line to the Western Pacific connection and hence to the mill south of Oroville” (Stephens 1963:3). The Feather River Railway was built by the Hutchinson Lumber Company at a cost of $1 million dollars (Stephens 1989: personal communication). This railway was a private logging railroad until 1940 when it became a common carrier.

The Hutchinson Lumber Company’s Oroville Mill was a three-band mill consisting of one 8-foot and two 9-foot saws. The mill measured 305 feet by 209 feet. The mill ran two shifts per day. In 1926 the mill cut 100 million board feet of lumber, with 20 million board feet of this going into lumber for fruit boxes. Pine accounted for 55 percent of the trees cut in 1926. This saw mill burned to the ground in 1927 (Stephens 1989: personal communication).

Because of high production costs and high mortgage rates, timber could not be cut fast enough to meet the Hutchinson Lumber Company’s annual monetary demands. This, and the loss of the Oroville mill, caused the Hutchinson Lumber Company to claim bankruptcy in 1927. It was purchased by two men from West Virginia—A.H. Land, a banker, and Dr. O.O. Cooper, a doctor and surgeon–and was renamed the Feather River Pine Mill, Inc. (Stephens 1989: personal communication).

Extensive legal complications with the insurance company over the fire damage claim, and the economic depression of 1929, prohibited the building of the new mill until 1938; it was called the Feather River Pine Mill. This new mill was a two-band mill, built at a logging camp of the bankrupt Hutchinson Lumber Company and became the town of Feather Falls (Ibid.).

Because of the high production demands placed on the Hutchinson Lumber Company to meet their extensive mortgage overhead, they were not known for their quality lumber. Because the Feather River Pine Mill did not have the extensive mortgage overhead that the Hutchinson Lumber Company

had, they became known for their quality lumber. The Feather River Pine Mill operated one shift per day and cut about one-half the lumber Hutchinson Lumber Company cut (Ibid.).

The Georgia Pacific Railway Company bought the Feather River Railway and the Feather River Pine Mill holdings in 1957. Because of the extensive holdings of this railway company, it was considered a monopoly, and the U.S. Government forced Georgia Pacific to sell 20 percent of their holdings. This portion of the Feather Falls Railway was purchased by Louisiana Pacific, which is the current owner of the town of Feather Falls (Ibid.).

The Town of Forbestown – In 1849 Ben Forbes, a native of Philadelphia, Pennsylvania, began mining the South Fork Feather River. Forbes eventually settled in the Forbestown area and opened a trading store. The town of Forbestown was established in 1852, with a post office opening in 1854 (Carmosino 1998: 41; cited in: Dwyer and Nilsson 2004). It was located at the head of Forbestown Ravine approximately 0.75 mile from the present day town of Forbestown. The Forbestown mining district was one of the most significant lode deposits in Butte County (Clark 1970: 15). The district encompasses the Feather Falls area, the Brownsville area to the south, and the town of Hurleton, Springtown, and Bidwell Bar areas to the west.

Forbestown went through two major mining booms. The first occurred between 1850 until around 1865, with the population expanding to approximately 3,000. This made Forbestown the second largest town in Butte County (Carmosino 1998: 41; cited in: Dwyer & Nilsson 2004). By 1859, Forbestown had 5 hotels, 10 saloons, 2 dance halls, 2 drug stores, 1 bank, 3 general stores, barber shops, an Odd Fellows Hall, and a Masonic Hall (Ibid. cited in: Dwyer and Nilsson 2004). The first library and church in Butte County were in Forbestown.

By the 1860s, most of the placer miners were leaving the area due to the depletion of easy-to-obtain gold. Between the 1870s and 1888, hardrock mining became the second boom for Forbestown. In 1873 the Forbestown Consolidated Quartz Mining Company had a 5- and 10-stamp mill. By 1877 there were five mills in the area. The 1884 Sawyer Decision, which called for debris dams to be built to control silt into the rivers and streams, brought an end to many mills due to the exorbitant costs of running a hydraulic operation (Ibid. 50; cited in: Dwyer and Nilsson 2004). Major mines were the Golden Queen, Gold Bank, Shakespeare, and Golden Fleece.

The 1880s mining boom was a rebirth for Forbestown, with the building of a new saloon, doctor's office, boarding house, and shoe shop. In 1903 the Gold Bank Mine closed and was purchased in 1909 by Michael Cooney, a native of Ireland. Cooney and B.F. Forbes consolidated the Gold Bank, Golden Queen, Miller, and Shakespeare claims. These consolidated mines were closed in 1924, and a lien was filed by unpaid miners in 1925. The Forbestown post office was closed in 1925 but opened again in 1938 with a small mining boom during the depression (Ibid. 58-60; cited in: Dwyer and Nilsson 2004).

3.6.4 Affected Environment (Existing Conditions)

Consultation with the tribes and local Native American communities and/or interested parties was initiated in accordance with the Region 5 Programmatic Agreement, *National Historic Preservation Act*, and other laws and regulations.

The Forest Service acknowledges that contemporary Native American interests include traditional cultural properties (sites associated with cultural practices or beliefs that are rooted in history and important in maintaining cultural identity), and plant gathering sites for basket materials, medicines, and food resources. To date, the tribes have not identified any traditional cultural properties within the Slapjack Project boundaries.

Cultural properties identified during literature reviews, inventories, or surveys were assessed to determine potential effects associated with implementation of the project. Results of the analysis are discussed below.

Surveys or inventories resulted in the identification of 73 cultural resource properties within the proposed Slapjack Project area; 26 sites are related to prehistoric use. These sites consist of campsites, food processing stations, and tool production stations. There are 46 sites related to historic uses, primarily mining, that took place between 1850 and the 1930s. The sites consist of historic encampments, dams, ditches, mine adits, cabins, turpentine trees, a lookout, and cabin flats. Associated artifacts and features represent all aspects of historic mining, from industrial equipment to daily living. There are also seven multi-component sites that consist of both prehistoric and historic features and artifacts.

Alternative A (No Action)
- No treatments would be implemented.

Alternative B (Proposed Action)
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds with herbicides (up to 31 acres), mechanical and manual methods, and prescribed burning

Alternative C
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs without herbicides
- Control noxious weeds without herbicides

Alternative D
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs without herbicides
- Control noxious weeds with herbicides (up to 31 acres)

Alternative E
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds without herbicides

Alternative F
- Construct DFPZs
- Implement group selection (190 acres), except in watersheds over the Threshold of Concern
- Implement individual tree selection (148 acres); no proposed ITS units are located in watersheds over the Threshold of Concern
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds with herbicides (up to 31 acres)

Alternative G
- Construct DFPZs
- Implement group selection (190 acres), except in watersheds over the Threshold of Concern
- Implement individual tree selection (148 acres); no proposed ITS units are located in watersheds over the Threshold of Concern
- Maintain DFPZs without herbicides
- Control noxious weeds without herbicides

3.6.5 Environmental Consequences

Heritage resources have been considered in all aspects of the Slapjack Project, including the seven alternatives analyzed in this document.

3.6.5.1 Alternative A (No Action)

No ground-disturbing activities would occur under the no-action alternative; hence, there would be no effects on heritage resources.

3.6.5.2 All Action Alternatives

The treatments proposed under the action alternatives would have no direct or indirect effects on heritage resources because all archaeological sites would be protected using Standard Resource Protection Measures.

3.6.5.3 NHPA Section 106 Assessment

The effects of the project on heritage resource sites were analyzed in compliance with Section 106 of the *National Historic Preservation Act.*

Although the project activities have the potential to affect heritage resources, no effects are anticipated due to the following protection measures that would be implemented, as appropriate, for all heritage resources that could be affected by project implementation. Application of the following Standard Resource Protection Measures would result in the project having "no effect" on heritage resources:

- All proposed activities, facilities, improvements, and disturbances shall avoid heritage resource sites. Avoidance means that no activities associated with the project that may affect heritage resource sites shall occur within a site's boundaries, including any defined buffer zones. Portions of the project may need to be modified, redesigned, or eliminated to properly avoid heritage resource sites.

- All heritage resource sites within the area of potential effect shall be clearly delineated prior to implementing any associated activities that have the potential to affect heritage resource sites.

- Buffer zones may be established to ensure added protection where the Forest or District Archaeologist determines that they are necessary. The use of buffer zones in conjunction with other avoidance measures are particularly applicable where setting contributes to the property's eligibility under 36 CFR 60.4, or where it may be an important attribute of some types of heritage resource sites (e.g., historic buildings or structures; historic or cultural properties important to Native Americans). The size of buffer zones needs to be determined by the Forest or District Archaeologist on a case-by-case basis.

- When any changes in proposed activities are necessary to avoid heritage resource sites (e.g., project modifications), these changes shall be completed prior to initiating any activities.

- Monitoring during project implementation, in conjunction with other measures, may be used to enhance the effectiveness of protection measures.

3.6.6 Past, Present, and Reasonably Foreseeable Future Actions

3.6.6.1 Past Conditions

As indicated in the above general history of the Slapjack Project area, there are numerous archaeological sites and features. Prehistoric sites date from 150 to 7,500+ years before present. There are remains of prehistoric housepits, village sites, lithic scatters, and bedrock milling features and artifacts.

Since the landscape is never static, it is difficult to predict the impact Native Americans had on the land. Current studies on fire ecology suggest that Native Americans used fire as a tool to control vegetation. Based on ethnographic data, these studies are suggesting that vegetation control occurred

primarily within close proximity to larger villages and was used to reduce brush, control insects, and enhance certain desirable species of plants. A local example of this is the burning of beargrass to enhance the plant's qualities for basket weaving. Based only on ethnographic data, it is impossible to know the true extent of vegetative control measures used.

Historic land uses did have major impacts on the landscape during the gold rush, the settlement and industry of post gold rush, and the impact of logging and ranching. Evidence of the magnitude of European settlement is found in numerous mining features such as ditches, reservoirs, and hydraulic pits. Early photographs of historic townsites provide a glimpse of landscapes almost completely barren of trees. All trees were removed for building house, townsites, heat sources, and the shoring of mining adits.

Logging mills were built in the project area during the 1850s, and by the 1890s, the denuding of timbered land on the East Coast brought lumber companies West. These companies bought up millions of acres of timbered lands. As the easily accessed trees were cut, logging railroads were built to acquire more timber. Archaeological sites and features associated with lumbering include logging camps, lumber mills, railroad grades, and artifacts.

Prior to the mid 1970s, there were no archaeologists working for the Forest Service. At that time, there were few protection measures for archaeological resources. In fact, digging and collecting on archaeological sites was a common practice. By the early 1980s, cultural resource surveys and site protection measures were in place. Today, all archaeological sites are protected from any project activities.

3.6.6.2 Present Conditions

As indicated previously, treatment areas in the Slapjack Project area have been surveyed for archaeological sites. All archaeological sites located during surveys would be protected from project activity.

3.6.6.3 Future Conditions

The Forest Service will continue to protect archaeological sites from project activities in the future. But, as more and more people are drawn to National Forests to recreate, and with the ever increasing use of motorized vehicles, it becomes a difficult challenge to protect archaeological resources.

Future impacts on archaeological sites may increase due to increased access to the Forest, although the likelihood and intensity of the impacts are unknown. The Slapjack Project itself would not impact archaeologist sites because the sites would be protected from project activities.

The protection of archaeological sites is more than just flagging and avoiding as is the practice before project activities. Educating the public about the fragile, finite nature of archaeological sites is paramount to site protection. Public education can be accomplished by developing interpretative signs, lectures, and brochures that provide information on the history of the sites, as well as archaeological site protection measures.

3.6.7 Summary of Cumulative Effects

Archaeological sites would be protected using Standard Resource Protection Measures; therefore, no cumulative effects on heritage resources are expected.

3.7 Human Health and Safety

3.7.1 Introduction

The Forest Service proposes to construct 4,419 acres of Defensible Fuel Profile Zones (DFPZs) using a variety of manual, mechanical, and thermal treatment methods. Chemical treatment methods would be used as a preventive maintenance strategy on 1,954 acres of DFPZs. Noxious weed control would entail a combination of manual, mechanical, thermal, and up to 31 acres of chemical treatment methods.

3.7.2 Regulatory Framework

3.7.2.1 Federal Requirements

The U.S. Environmental Protection Agency (EPA) regulates the use of pesticides under the authority of two federal statutes: the *Federal Insecticide, Fungicide, and Rodenticide Act* and the *Federal Food, Drug, and Cosmetic Act.*

Federal Insecticide, Fungicide, and Rodenticide Act (as amended on January 23, 2004). This Act provides the basis for regulation, sale, distribution, and use of pesticides in the United States. It authorizes the EPA to review and register pesticides for specified uses. The EPA also has the authority to suspend or cancel the registration of a pesticide if subsequent information shows that continued use would pose unreasonable risks.

Federal Food, Drug, and Cosmetic Act. This Act authorizes the EPA to set maximum residue levels, or tolerances, for pesticides used in or on foods or animal feed.

Food Quality Protection Act of 1996. This Act amended the *Federal Insecticide, Fungicide, and Rodenticide Act* and *Federal Food, Drug, and Cosmetic Act*, setting tougher safety standards for new and old pesticides and making uniform requirements regarding processed and unprocessed foods.

Endangered Species Act of 1973. This Act prohibits any action that can adversely affect an Endangered or Threatened species or its habitat. In compliance with this law, the EPA must ensure that use of the pesticides it registers will not harm these species.

Currently, the Center for Biological Diversity has filed a lawsuit against the EPA for alleging that EPA violated the *Endangered Species Act* by failing to consult the U.S. Fish and Wildlife Service on pesticide risks to the California red-legged frog, an Endangered species whose habitats are, in some cases, hundreds of miles from the farms where the 66 pesticides at issue are applied. As a result, a federal court ordered the EPA to start assessing pesticide risks to the California red-legged frog.

Pending the outcome of the lawsuit, the Plumas National Forest will follow all label directions for the application of pesticides. The Plumas National Forest will make appropriate changes to projects on the Forest if there are changes to the label or restrictions on the use of certain pesticides resulting from the EPA's consultation process on these pesticides and the red-legged frog. In compliance with the Council on Environmental Quality regulations for implementing the *National Environmental Policy Act*, this environmental impact statement (EIS) contains an analysis of project effects on

Threatened and Endangered species, as appropriate, including consultation with the U.S. Fish and Wildlife Service, when required.

3.7.2.2 Pesticide Labels and Material Safety Data Sheets

Federal laws require that specific information or precautions be printed on pesticide labels to protect human and environmental health. Precautionary statements provide important information on hazards that applicators must be aware of before using a specific pesticide. Each chemical label specifies the suggested or maximum application rate (concentrate) of the chemical to be applied for the various application methods (such as by hand or aerial spray), and may also contain information on first aid and decontamination procedures.

A Material Safety Data Sheet is designed to provide both workers and emergency personnel with the proper procedures for handling or working with a particular substance. The data sheets include such information as physical data (melting point, boiling point, and flash point), toxicity, health effects, first aid, reactivity, storage, disposal, protective equipment, and spill/leak procedures. These are of particular use if a spill or other accident occurs.

3.7.2.3 State Requirements

States can register pesticides under specific state pesticide registration laws after a pesticide is registered by the EPA. Ultimately, states have primary responsibility for pesticides used within state borders and may have more stringent requirements for registering pesticides for use in that state.

California has the nation’s strictest pesticide laws and regulations. The California Department of Pesticide Regulation (DRP) protects human health and the environment by regulating pesticide sales and use in the state. The DPR evaluates a pesticide thoroughly (under guidelines of the Food and Agriculture Code) before it is marketed and used in California. Strict oversight begins with product evaluation and registration; continues through the licensing of commercial applicators, dealers, and consultants; and concludes with environmental monitoring and testing.

The DPR also evaluates pesticides under California’s unique climatic and cultural conditions. Pesticide residues decay differently under hot dry conditions than under warm humid conditions. Because of the varied climatic conditions in the state, combined with local use enforcement, some pesticides are restricted to certain areas of California, rather than a statewide ban.

The DPR reviews labels for consistency with EPA requirements, accuracy of human health hazards based on toxicology data, regulatory enforcement of label requirements, and adequacy of worker and environmental protection. The DPR sometimes denies registration to products that were approved by the EPA. The DPR works with registrants and the EPA to recommend revisions to the label, since label language is under the sole jurisdiction of the EPA. Any changes to the label must be approved by the EPA before the product can be sold in the United States. The DPR may also impose use restrictions beyond those listed on the product label.

3.7.2.4 Forest Requirements

The 1988 *Plumas National Forest Land and Resource Management Plan* (commonly referred to as the "Forest Plan") was the first such forestwide plan adopted by the Plumas National Forest. The Forest Plan remains in effect and is subject to two major amendments. The Forest Plan and the documents amending it are described in chapter 1, section 1.5.4 (Forest Plan Direction).

3.7.3 Methodology for Assessing Impacts on Human Health and Safety

3.7.3.1 Scope of Analysis

The geographic boundary for the human health and safety analysis is limited to the Slapjack Project area for direct and indirect effects. The area encompassed by the six Hydrologic Unit Code (HUC) 6 watersheds that intersect the Slapjack Project area was queried for pesticide use, and the following HUC6 watersheds (the geographic boundary for the cumulative effects analysis) were analyzed for the potential cumulative effects of proposed herbicide application: Dobbins Creek, Frey Creek, Lower Dry Creek, McCabe Creek, New Bullard's Bar Reservoir, and Ponderosa Reservoir watersheds.

The existing condition analysis is based on pesticide use data compiled by the California DPR and was tabulated by HUC6 watersheds for the herbicide risk assessment.

The timeframe for the cumulative effects analysis generally extends back two to three years, depending on the residual effects (the length of time a chemical is active in the soil) of the herbicide being used. Various herbicides have different residual soil activity. Foliar (leaf) herbicides, such as glyphosate, bind with soil particles and is not readily absorbed from the soil by plants. Foliar and soil active herbicides, such as imazapyr, can remain active in the soil for six months to two years, and hexazinone may remain in the soil at low concentrations for up to three years after application. However, to establish trends or patterns of herbicide use, cumulative effects analysis may extend back five years.

3.7.3.2 Analysis Methods

This analysis is based on portions of "Appendix G: Human Health Risk Assessment" of the *Herger-Feinstein Quincy Library Group Forest Recovery Act Final Supplemental Environmental Impact Statement* (HFQLG Act final supplemental EIS) that pertain to the proposed use of imazapyr and triclopyr formulations in the Slapjack Project area. It is also based on site-specific information for the Slapjack Project used to calculate the risks of herbicide exposure to workers and the public. The Slapjack Project proposes to use the same application rates of imazapyr and triclopyr (see tables C-1 and C-2 in appendix C of this EIS) as analyzed in the HFQLG Act final supplemental EIS; therefore, a separate human health risk assessment is not required. The risk assessment uses standard methodology widely accepted by the scientific community, regulatory agencies, and the United States Department of Agriculture, Forest Service, *Vegetation Management for Reforestation Final Environmental Impact Statement*, 1988, pages 4-62 to 4-122 and appendix F; National Research Council 1983; EPA 1986).

The risk assessment uses the analytical elements described by the National Research Council (1983): hazard analysis, exposure analysis, and risk analysis. The *hazard analysis* focuses on

determination of the toxic properties of each herbicide. Human hazard levels are derived primarily from results of laboratory experiments on animal models, supplemented where appropriate with information on human poisoning incidents, epidemiology studies, and data on chemical structure. The *exposure analysis* estimates people's potential exposure to herbicides, determines the doses likely to result from those estimated exposures, and determines the number and characteristics of people in the exposed populations. The *risk analysis* combines the hazard information with the dose estimates, and the probability that they could occur, in order to predict health effects on individuals under the given conditions of exposure.

The risk assessment for the HFQLG final supplemental EIS is based largely on the risk assessments conducted by Syracuse Environmental Research Associates, Inc. (SERA). Details regarding the specific methods used to prepare the SERA human health risk assessments referenced in this document are provided in SERA (2001), while detailed explanations of specific methods used in estimating occupational exposure are provided in SERA (1998).

The analyses of past use of pesticides in the Slapjack Project area were derived from pesticide use reports queried from the California DPR website: http://www.cdpr.ca.gov/docs/pur/purmain.htm.

3.7.4 Affected Environment (Existing Conditions)

This section describes the types of risks to workers and the public from activities proposed for the Slapjack Project. The risk assessment in appendix G of the HFQLG Act final supplemental EIS examines the potential health effects on people who might be exposed to imazapyr and triclopyr, the herbicides proposed for maintaining DFPZs and controlling noxious weeds under the Slapjack Project. The people potentially at risk fall into two groups: workers and members of the public. Workers include applicators, supervisors, and other personnel directly involved in treatment activities. The public includes forest visitors or nearby residents who could be exposed through drift, direct contact with sprayed vegetation, by eating food items such as berries growing in or near treated areas, eating game or fish containing herbicide residues, or by drinking water that contains such residues. This exposure model also takes into account possible exposure for Native American gatherers. The individuals most likely to be exposed to herbicides are the backpack applicators, contract inspectors, residents who live near the treatment areas, and forest visitors such as hikers and backpackers, hunters, anglers, and firewood and other gatherers.

3.7.4.1 Hand Methods

Worker Safety. Working with hand tools on steep slopes and under unfavorable site conditions can be inherently hazardous. Workers can be cut by tools, hit by falling brush, or injured by falling onto sharp stumps or ends of cut brush. Potential injuries range from minor cuts, sprains, abrasions, and bruises to severe injuries such as arterial bleeding, fractures, or concussions. A severe injury may even kill a worker. Other types of health risks include fatigue, heat exhaustion, heat stroke, tendon or ligament damage, aggravation of joint diseases, heart attack, or stroke. The likelihood of injury increases as slope, brush density, brush height, and size of crew increase and when a crew works in a relatively concentrated area. Hand clearing of vegetation is relatively slow work—this exposes workers to the hazards for longer periods in relation to other, more efficient methods of clearing vegetation. Typical crew sizes are 5 to 10 chainsaw, brush cutter, or hand tool operators and one foreman.

Public Safety. Members of the public would be at low risk since they would likely not be sufficiently close to hand treatment operations.

3.7.4.2 Mechanical Methods

Worker Safety. Equipment operators can be injured in several ways. Accidents can occur when operators lose control of machines on steep slopes or slippery terrain and under conditions of poor visibility. Falling trees or limbs, rolling rocks, and flying debris can injure other employees working in the area. Excessive noise can damage the operator and adjacent worker's hearing. The typical crew size for a mastication machine or dozer would be the heavy equipment operator and a swamper (ground personnel assigned to equipment who work with the operator or can warn other individuals of hazards).

Public Safety. Risks to the public from use of mechanical equipment would be low. Large masticating equipment can throw debris out 200 feet, but the use of signing and swampers would reduce the chance the public would be in an area that is being treated. Masticating equipment can cause fires, which if not immediately controlled, could endanger people and property. Injuries are possible from accidents when heavy equipment is transported along roads or when the public does not see or ignores safety warning signs and enters the treatment unit.

3.7.4.3 Thermal (Prescribed Burning) Methods

Worker Safety. Prescribed burning projects create risk of smoke and heat injury to both workers and the public. Effects on workers range from eye irritation, coughing, and shortness of breath to severe burns, scars, or death. In addition, chronic exposure to smoke can lead to long-term adverse health effects, such as emphysema or lung cancer. Wood smoke presents a cancer risk due to the presence of at least five polyaromatic hydrocarbons. Prescribed burning operations require specialized equipment and specialized training. A typical operation may have several fire engines (3 to 5 person) and several 10- to 20-person hand crews.

Public Safety. Smoke may have local, transitory effects on air quality. Sensitive members of the public may experience irritations of the eye, throat, or lung from even low-level exposures. Risks of adverse chronic health effects on the public from smoke exposure should be lower than the risks to workers because the public exposures would be much less than worker exposures. In addition, public notices are placed in local newspapers, and signs are installed on roads accessing prescribed burn areas to inform the public of the prescribed burn. This method of treatment is expected to result in minimal adverse effects on public safety.

3.7.4.4 Chemical Methods

Worker Safety. Injuries to workers from herbicide use would be same as manual methods, except for working with cutting equipment, but with the addition of overexposure to herbicides. Backpack herbicide applications typically can treat more vegetation that just manual grubbing or chainsaw cutting on a per-acre basis. Ground applications of herbicides are conducted by workers carrying backpack sprayers. The majority of the backpack applicators are not from the local area. Crews work for contractors who have successfully bid on Forest Service reforestation projects and can travel over

wide geographic areas as they complete work for the Forest Service and private landowners. The typical crew size for hand application contracts is 12 sprayers, a “rinser” to wash off nontarget plants inadvertently sprayed, a foreman, and a mixer.

Forest Service contract inspectors are also exposed during project implementation but to a much lesser degree than contract sprayers. Besides wearing personal protective equipment, inspectors routinely reduce their exposures by staying upwind of applicators and choosing their routes for inspection within the treatment unit.

Public Safety. Public exposure, and hence risks from herbicide use, would be reduced by establishing streamside buffer zones, following management requirements for reducing herbicide drift, and posting signs around treated areas during and after herbicide applications.

Alternative A (No Action)
- No treatments would be implemented.

Alternative B (Proposed Action)
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds with herbicides (up to 31 acres), mechanical and manual methods, and prescribed burning

Alternative C
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs without herbicides
- Control noxious weeds without herbicides

Alternative D
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs without herbicides
- Control noxious weeds with herbicides (up to 31 acres)

Alternative E
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds without herbicides

Alternative F
- Construct DFPZs
- Implement group selection (190 acres), except in watersheds over the Threshold of Concern
- Implement individual tree selection (148 acres); no proposed ITS units are located in watersheds over the Threshold of Concern
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds with herbicides (up to 31 acres)

Alternative G
- Construct DFPZs
- Implement group selection (190 acres), except in watersheds over the Threshold of Concern
- Implement individual tree selection (148 acres); no proposed ITS units are located in watersheds over the Threshold of Concern
- Maintain DFPZs without herbicides
- Control noxious weeds without herbicides

3.7.5 Environmental Consequences

A comprehensive analysis of potential adverse health effects on workers and the public is included in appendix F of the Forest Service Region 5 final EIS on vegetation management (USDA Forest Service 1988), the SERA risk assessments for imazapyr and triclopyr (SERA 2003, 2004b), the HFQLG final supplemental EIS (USDA Forest Service 2003a), and the Surfactant Risk Assessment (USDA Forest Service 2002a).

Table 3-25 displays the number of acres of DFPZ construction and acres of preventive and long-term maintenance and noxious weed control treatments by alternative for direct, indirect, and cumulative effects. The effects of herbicide use are described in appendix C.

3.7.5.1 Alternative A (No Action)

Direct and Indirect Effects. Alternative A would have no effects on worker or public health because no DFPZ construction, DFPZ maintenance, or noxious weed control activities would occur.

Cumulative Effects. There would be a high risk to firefighters and other fire personnel (pilots, support personnel) under this alternative. Wildland fire suppression under the existing and future conditions of this area would be far more difficult to implement due to the resistance to control and the flame lengths associated with large brush fires in the type of terrain present in the project area.

Table 3-25. Comparison of treatment acres for DFPZ maintenance and noxious weed control by alternative.

	Alternatives						
Direct and Indirect Effects	**A**	**B**	**C**	**D**	**E**	**F**	**G**
DFPZ Construction (in acres)							
1. Manual	0	87	87	87	87	87	87
2. Mechanical	0	3,671	3,671	3,671	3,671	3,671	3,671
3. Thermal	0	661	661	661	661	661	661
4. Chemical	0	0	0	0	0	0	0
Totals	**0**	**4,419**	**4,419**	**4,419**	**4,419**	**4,419**	**4,419**
DFPZ Preventive Maintenance (in acres)							
1. Chemical	0	1,954	0	0	1,954	1,954	0
Noxious Weed Control (in acres)							
1. Manual and Thermal	0	0	33	0	33	0	33
2. Manual, Thermal, and Chemical	0	31 (33)[b]	0	31 (33)[b]	0	31 (33)[b]	0
Cumulative Effects	**A**	**B**	**C**	**D**	**E**	**F**	**G**
DFPZ Long-term Maintenance[a] (Estimated Acres) (10-year Intervals)							
1. Manual	0	87	87	87	87	87	87
2. Mechanical	0	1,717	3,671	3,671	1,717	1,717	3,671
3. Thermal	0	661	661	661	661	661	661
4. Chemical	0	1,954	0	0	1,954	1,954	0
Totals	**0**	**4,419**	**4,419**	**4,419**	**4,419**	**4,419**	**4,419**

Notes:

a. The treatment acres in this table are estimated based on slope and other stand conditions and are presented for purposes of comparison only. Decisions regarding the long-term maintenance of the DFPZs—including the specific treatment to be used—would be made at the time such maintenance is determined necessary. Selection of one of the action alternatives would not determine what methods would be used for the long-term maintenance of DFPZs.

b. The additional 2 acres of noxious weed control would be conducted by nonchemical methods

There would be some cumulative effects on public health and safety because existing fuel loads would remain untreated, and subsequent growth of vegetation would add to these loads. In the future, there would be an undetermined risk of further wildland fires to private property and homes.

3.7.5.2 Alternative B (Proposed Action)

Direct and Indirect Effects. See the HFQLG final supplemental EIS (chapter 3 and appendixes E, F, and G) and the SERA risk assessments for imazapyr and triclopyr for human health effects on workers and the general public (SERA 2003, 2004). These documents are hereby incorporated by reference in their entirety and are summarized in appendix C of this EIS.

The potential hazards to workers and the public associated with herbicide, manual, mechanical, and thermal treatments are discussed above in the “Affected Environment” section. The SERA risk assessments provide information about the risks to human health associated with imazapyr and triclopyr. Comparable risk assessments for manual, mechanical, and thermal treatments are not

available, making it difficult to compare the risks of chemical treatments with those of nonchemical treatments. Potential risks of injury from the various treatment methods would depend upon the skill and training of the personnel and the complexity and types of equipment used. For instance, prescribed burning requires expensive specialized equipment, training, and experience in accomplishing projects. On the other hand, herbicide application does not require intensive training, years of experience, or specialized equipment. Therefore, in order to make some quantitative comparisons between alternatives, an estimation of production rates by treatment methods was used to calculate the total number of days required to complete an activity with the assumption that probability of injury or exposure increases the longer a person must work to complete a given task (see table 3-26). The crew size for different treatment methods would vary for several reasons, including availability of equipment, Limited Operating Periods, and contract requirements.

Table 3-26. Estimation of production rates and person days by treatment method.

DFPZ Construction (acres)	Acres	Crew Size	Production Acres/day/Person	Total Acres per Day	Total Days	Total Person Days
1. Manual (chainsaw, brush cutters, etc.)	87	15	0.25	3.75	23.2	348
2. Mechanical (5 masticators with 5 swampers)	3,671	10	1	10	367.1	3,671
3. Thermal (specialized fire equipment)	661	15	5	75	8.8	132
4. Chemical (batch truck, backpack sprayers)	0	30	2	60	0.0	0
Totals	**4,419**					**4,151**
DFPZ Preventative Maintenance (acres)						
1. Chemical (two 15-person crews)	1,954	30	2	60	32.6	977
Noxious Weed Control (acres)						
1. Manual and Thermal	33	2	0.25	0.5	62.0	124
2. Manual, Thermal, and Chemical	33	2	1	2	15.5	31

DFPZ Construction—DFPZ construction would be limited to nonchemical treatment methods. Manual and thermal treatments could be completed within 30 days, limiting exposure to workers and the public. However, mechanical treatments would require over a year to complete all of the treatments (refer to table 3-26 above). Limited Operating Periods and weather would cause further delays. Table 3-26 also shows that it would take about 4,151 person days to construct 4,419 acres of DFPZs.

DFPZ Preventive Maintenance—DFPZ preventive maintenance would be limited to herbicide treatments where the objective would be to prevent or reduce the potential for fuel build up. Alternative B proposes to use herbicides on 1,954 acres to control tanoak and other woody vegetation. Under normal operating procedures, if would take two 15-person crews approximately two months to complete the project. It is estimated that the potential risk to workers would be around 977 person days (refer to table 3-26). Appendix C discusses the potential risks of using herbicides.

Noxious Weed Control—The number of days to control noxious weeds would range from 16 to 62, depending upon the use of herbicides. If herbicides were used, then potential risk would be limited to 31 person days instead of 124 person days. Appendix C discusses the potential risks of using herbicides. For alternative B, herbicides would be used to control noxious weeds, so potential risks to workers and the public would be limited to the 16 days of herbicide application (see table 3-27).

Table 3-27. Comparison of person days, by alternative, for direct and indirect effects.

Total Person Days	Alternatives			
	B and F	C and G	D	E
DFPZ Construction	4,151	4,151	4,151	4,151
DFPZ Preventive Maintenance	977	0	0	977
Noxious Weed Control	31	124	31	124
Total	**5,159**	**4,275**	**4,182**	**5,252**

Cumulative Effects. Alternatives B, E, and F propose herbicide use for preventive maintenance of DFPZs to treat tanoak and brush regrowth within 2 to 3 years of DFPZ construction. None of the action alternatives would determine how, or even if, DFPZs would be maintained over the long term. Decisions regarding the long-term maintenance of the DFPZs would be made at the time such maintenance is determined necessary. At that time, it would be determined whether or not herbicides would be used for DFPZ maintenance. If the woody vegetation and tanoak in the units exceed the height and density threshold set in the DFPZ maintenance guidelines, then some form of mechanical or thermal treatments would be necessary to remove the accumulated fuels. However, if herbicides could be applied without creating additional standing fuels, then herbicides may be used again as a preventive maintenance strategy. Consequently, if herbicides could be used again as preventive maintenance in the long term, then the total person days for maintaining the DFPZs would be around 3,174 for the 4,419 acres of the DFPZs (see table 3-28).

Table 3-28. Comparison of person days, by alternative, for cumulative effects of DFPZ maintenance.

Treatment Methods	Chemical Methods (acres)	Nonchemical Methods (acres)	Alternatives B, E, and F (person days)[a]	Alternatives C, D, and G (person days)[a]
DFPZ Maintenance (manual)	87	87	348	348
DFPZ Maintenance (mechanical)	1,717	3,671	1,717	3,671
DFPZ Maintenance (thermal)	661	661	132	132
DFPZ Maintenance (chemical)	1,954	0	977	0
Total Acres	**4,419**	**4,419**	**3,174**	**4,151**

Note:

a. Total person days for DFPZ maintenance are estimated based on possible maintenance methods appropriate for slope and other stand characteristics and are presented for comparison purposes only. Decisions regarding specific treatments to be used for the long-term maintenance of the DFPZs would be made at the time such maintenance is determined necessary. Selection of one of the action alternatives would not determine what methods would be used to maintain DFPZs in the long term.

3.7.5.3 Alternative C

Direct and Indirect Effects. For DFPZ construction, alternative C would be the same as alternative B. There would be no DFPZ preventive maintenance with herbicides. Herbicides would not be used for noxious weed control. Noxious weeds would be controlled by hand pulling, cutting, and burning, and it would take about 62 days and around 124 person days to complete the noxious weed control project (refer to table 3-26 above).

Cumulative Effects. The cumulative effects of this alternative would be similar to alternative B. With reduced fuel loading, ladder fuels, and canopy fuels, there would be a lower risk potential of a stand-replacing wildlife occurring in the project area. Firefighter safety would be enhanced due to lower flame lengths and resistance to control than alternative A. Public safety would also be enhanced for similar reasons. See the “Fire and Fuels” section in this EIS for a detailed discussion.

Alternative C would not make a decision on the future maintenance of the DFPZs. Decisions regarding long-term DFPZ maintenance—including the specific treatments to be used—would be made when the time for maintenance of the natural stands is reached (approximately 10–20 years after initial treatment). However, because herbicides have been shown to be most efficient and effective in delaying or preventing the buildup of understory fuels when used within approximately two years of the initial treatment (HFQLG final supplemental EIS, page 22), herbicide use for preventive maintenance of the DFPZs is essentially precluded under this alternative unless accumulated woody vegetation are first removed by burning or mechanical treatments. A new analysis and decision document would be conducted at that time.

Without using herbicides for long-term DFPZ maintenance, there would be an increased risk of injury to workers due to manual, mechanical, and thermal methods for DFPZ maintenance and noxious weed control. There would be an increased risk to the public from mechanical (fugitive dust) and prescribed burning (smoke particulates) methods for DFPZ maintenance and noxious weed control. It would take about 4,151 person days to complete the 4,419 acres for DFPZ maintenance (refer to table 3-28 above).

The amount of proposed burning treatments would increase in the project area, but implementation would only occur under prescribed fire conditions to manage smoke and with enough personnel present to ensure public safety. Dust would also be generated with project implementation. Tractor and grapple piling would produce the most dust but would be of short duration. Mechanical shredding is not expected to produce large quantities of dust because the shredded material would be left on site as mulch between the equipment and the soil. Some dust could occur when the shredding head occasionally comes in contact with the soil. Most operators try to avoid this because soil and potential rock contact is hard on equipment and increases the need for maintenance and repairs. Noxious weed control would include hand pulling, cutting, and burning.

3.7.5.4 Alternative D

Direct and Indirect Effects. Direct and indirect effects would be the same as those described for DFPZ construction under alternative C, and the same as alternative B for noxious weed control. Alternative D would have the lowest number of person days (4,182) to complete all of the treatments (refer to table 3-27 above).

Cumulative Effects. The cumulative effects would be same as those described for alternative C for DFPZ long-term maintenance and the same as alternative B for noxious weed control. The total number of person days (4,151) to complete all of the treatments would be the same as alternative C (refer to table 3-28 above).

3.7.5.5 Alternative E

Direct and Indirect Effects. The effects would be the same as alternative B for DFPZ construction and preventive maintenance and the same as alternative C for noxious weed control. However, the total number of person days to complete all treatments would be slightly higher by 93 person days than alternative B (refer to table 3-27).

Cumulative Effects. Cumulative effects would be the same as those described under alternative B for DFPZ long-term maintenance and the same as alternative C for noxious weed control. The total number of person days (3,174) to complete all of the treatments would be the same as alternative B (refer to table 3-28).

3.7.5.6 Alternative F

Direct and Indirect Effects. The direct and indirect effects would be the same as those described under alternative B for DFPZ construction, DFPZ preventive maintenance, and noxious weed control. The total number of person days (5,159) to complete all of the treatments would be the same as alternative B (refer to table 3-27).

Cumulative Effects. The cumulative effects would be the same as those described under alternative B for DFPZ long-term maintenance and noxious weed control. The total number of person days (3,174) to complete the treatments would be the same as alternative B (refer to table 3-28).

3.7.5.7 Alternative G

Direct and Indirect Effects. The direct and indirect effects would be the same as those described under alternative C for DFPZ construction and noxious weed control. The total number of person days (4,275) to complete all of the treatments would be the same as alternative C (refer to table 3-27).

Cumulative Effects. The cumulative effects would be the same as those described under alternative C for DFPZ long-term maintenance and noxious weed control. The total number of person days (4,151) to complete all of the treatments would be the same as alternative C (refer to table 3-28).

3.7.6 Summary of Cumulative Effects

The proposed use of herbicides could result in cumulative doses of herbicides to workers or the general public. Cumulative doses from the same herbicide would occur from (1) additive doses resulting from various routes of exposure from this project, and (2) additive doses if an individual is exposed to other herbicide treatments. Additional sources of exposure could include use of herbicides on adjacent private land or home use by a worker or member of the general public.

Other agricultural applications (grapes, rangeland, pastureland, landscaping, and right-of-way) were considered during this analysis but were not considered relevant because (1) none of the chemicals used in those applications are known to interact with the herbicides proposed for use in this project, and (2) their occurrence was remote in relation to the project area. The only recent use of herbicides on the Plumas National Forest is associated with a Fuel Reduction Study on the Challenge Experimental Forest. As part of this study, four 0.5-acre plots were treated with Velpar L (hexazinone) in 2004, followed several months later with Accord Concentrate (glyphosate) and Arsenal (imazapyr). Soil solution samples are being analyzed at the University of California, Davis. In 1991 and 1997, herbicides (Garlon 4 and Roundup) were used to control tanoak on several 0.5-acre plots as part of a long-term soil productivity study. These treatments were not considered in the cumulative effects analysis because (1) triclopyr (Garlon™ 4) degrades rapidly and has an average half-life in soils of 30 days (SERA Risk Assessment, Triclopyr BEE, 2003); (2) the primary breakdown product of triclopyr acid is TCP (3,5,6-trichloro-2-pyridinol), which appears to be relatively short lived in soil, with a half-life of 69.3 days (SERA 2003); and (3) glyphosate (active ingredient in Roundup) can remain active in the soil for six months to two years. Consequently, residual effects from the 1991 and 1997 applications are not expected.

Tables 3-29 and 3-30 list the past use of herbicides (by pound) in the Slapjack Project area. It is assumed that there would not be any extensive changes in these herbicide use patterns into the near future. Herbicides are used primarily for road and utility right-of-way maintenance; rangeland improvement; noxious weed treatments; maintenance of orchards and flowerbeds, parks, and golf courses; and by individual rural home / land owners. Other projects that could potentially involve herbicide use in Yuba and Butte Counties would be expected to be small and scattered, following past trends. Table 3-31 displays the total pounds of active ingredients that were applied in Butte and Yuba Counties between 2000 and 2003. See appendix D of the Slapjack Project "Human Health Risk Assessment Report" for cumulative effects of pesticides applied by watershed, by year.

Table 3-29. Past use of herbicides, in pounds of active ingredient, by watershed in the Slapjack Project area.

Watershed (HUC6)	Slapjack Project Area	Public, Private, and Corporate Lands				
		2004	2003	2002	2001	2000
		Pounds of Herbicides Applied				
Dobbins Creek	7.50	251.4	2,715.6	1,871.2	8,137.8	9,239.0
Frey Creek	3.50	131.2	25.9	32.7	43.5	16.6
Lower Dry Creek	244.25	808.1	476.7	623.6	129.5	1,288.7
McCabe Creek	0.00	19.2	86.9	2,818.5	764.7	527.9
New Bullard's Bar Reservoir	345.75	364.4	1,560.4	3,410.1	1,800.5	1,858.3
Ponderosa Reservoir	120.00	0.0	1,440.6	1,423.3	362.5	829.9
Totals	**721.00[a]**	**1,574.3**	**6,306.0**	**10,179.3**	**11,238.6**	**13,760.3**

Note:

a. The 721 pounds of herbicide (active ingredient) applied equals 31 acres of noxious weed control times 5 years times 1.5 pounds per acre for triclopyr, plus 0.25 pound per acre of imazapyr times 1,954 DFPZ acres.

Table 3-30. Past use of herbicides, in acres treated, by watershed in the Slapjack Project area.

Watershed (HUC6)	Slapjack Project Area	Public, Private, and Corporate Lands				
		2004	2003	2002	2001	2000
		Acres Treated				
Dobbins Creek	5	181.8	660.0	1,739.0	4,468.0	4,305.0
Frey Creek	14	224.0	3.0	61.0	77.0	640.0
Lower Dry Creek	652	1,548.3	403.0	685.0	242.6	1,590.0
McCabe Creek	0	27.0	334.0	1,617.0	231.0	462.0
New Bullard's Bar Reservoir	1,283	590.0	2,597.0	3,564.0	1,176.0	2,543.5
Ponderosa Reservoir	155	0.0	1,764.0	853.0	137.0	775.4
Totals	**2,109[a]**	**2,571.1**	**5,761.0**	**8,519.0**	**6,331.6**	**10,315.9**

Note:

a. The 2,019 acres = 31 acres of noxious weed control times 5 years plus 1,954 acres of DFPZ treatments.

Table 3-31. Total pounds of herbicide (active ingredient) use for Butte and Yuba Counties.

County	2004	2003	2002	2001	2000
	Total Pounds of Herbicide Applied				
Butte County	2,962,209.7	3,062,291.7	2,896,424.7	2,764,335.5	3,480,682.2
Yuba County	1,398,577.2	1,427,355.1	1,432,139.0	972,242.9	1,426,512.1
Totals	**4,360,786.9**	**4,491,649.8**	**4,330,565.7**	**3,738,579.4**	**4,909,194.4**

It is conceivable that workers or members of the public could be exposed to herbicides as a result of treatments on surrounding private lands, as well as from the treatments proposed in for this project. Each of the hazard quotients summarized in appendix C of this document involves a single exposure scenario. Where individuals could be exposed by more than one route, the risk of such cases can be quantitatively characterized by simply adding the hazard quotients for each exposure scenario.

This risk assessment specifically considers the effect of repeated exposure in that the chronic RfD (reference dose) is used as an index of acceptable exposure. Consequently, repeated exposure to levels below the toxic threshold should not be associated with cumulative toxic effects.

The Forest Service does not anticipate any additive doses from treatments in subsequent years because these herbicides persist in the environment for a relatively short time (generally less than one year), do not bioaccumulate, and are rapidly eliminated from the body. It is highly unlikely that any residues from a previous herbicide application would still be in place during any subsequent treatments a year later. According to recent work completed by the California Department of Pesticide Regulation, some plant material contained triclopyr residue up to 80 weeks after treatment and glyphosate residue up to 66 weeks after treatment; however, these levels were less than 1 part per million. Since the proposed treatments in this project would be a minimum of two to three years in the future, it is highly unlikely that any residues from the first application year would still be in place during the second or third year.

Cumulative effects can also be caused by the interaction of different chemicals with a common metabolite or a common toxic action. With the exception of triclopyr and chlorpyrifos, none of the

other herbicides have been demonstrated to share a common metabolite with other pesticides. Although concern has been expressed about a possible link between the toxic effects of other triazine herbicides, such as atrazine, and the herbicide hexazinone, no studies on hexazinone have supported such a link. These two herbicides, while having some commonality in chemical structure, are dissimilar enough chemically that common toxic action is not expected.

As discussed in appendix C of this EIS, the primary metabolite of triclopyr is 3,5,6-trichloro-2-pyridinol or TCP. TCP is also the primary metabolite of an insecticide called chlorpyrifos. Cumulative doses of TCP could result from additive doses resulting from triclopyr and chlorpyrifos use. However, only 1 acre of chlorpyrifos (Lorsban) was applied to orange trees within the Slapjack Project area (see table 3-32). In the seven-county HFQLG Act area, chlorpyrifos was primarily used in walnut, almond, and plum orchards in the Sacramento Valley.

Table 3-32. Number of acres of Garlon 3A (Triclopyr TEA), Garlon 4 (Triclopyr BEE), and Lorsban 4E-HF (Chlorpyrifos) pesticides that were applied in the past, and that would be applied under the Slapjack Project, and the potential breakdown to metabolite 3,5,6-trichloro-2-pyridinol (TCP).

Watershed (HUC6)	Slapjack Project Maximum Yearly Acres	Public, Private, and Corporate Lands					
		Five-year Average	2004	2003	2002	2001	2000
		Acres Treated					
Dobbins Creek	1	6.60	0	0.00	19.00	0.00	14.00
Frey Creek		1.20	1[a]	1.00[a]	4.00[a]	0.00	0.00
Lower Dry Creek	13	82.116	77	0.00	75.00	21.60	237.00
McCabe Creek		91.40	0	180.00	237.00	0.00	40.00
New Bullard's Bar Reservoir	4	89.00	5	20.00	65.00	14.00	340.00
Ponderosa Reservoir	13	40.20	0	74.00	122.00	5.00	0.00
Totals	**31**	**310.316**	**83**	**275.00**	**522.00**	**40.58**	**631.00**

Note:

a. Within the Slapjack Project, only 1 acre of Lorsban was applied to orange trees in the Frey Creek Watershed in 2002, 2003, and 2004.

Although chlorpyrifos is not generally used in forestry, recent studies have shown drift of chlorpyrifos, and other insecticides, from agricultural lands in the Sacramento / San Joaquin Valley to the Sierra Nevada range (McConnell et al. 1998). Levels of chlorpyrifos have been measured in watercourses in the Sierra Nevada as high as 0.000013 mg/L (milligrams per liter). These upper levels have been measured in the southern Sierra. As a comparison, the use of chlorpyrifos in Fresno County was over six times higher than the seven HFQLG Act Pilot Project counties combined. This would indicate that it is unlikely that such high aquatic levels of chlorpyrifos would be found in the HFQLG Act Pilot Project area as a result of atmospheric movement. However, assuming that 10 percent of the applied triclopyr under the typical rate of application could degrade to TCP (EPA 1998), and using the pond spill scenario (central estimate of 3.6 mg/L of triclopyr; SERA 2003, page 3-20), the amount of TCP from triclopyr would be 0.36 mg/L. Assuming that 100 percent of the chlorpyrifos would degrade to TCP (an over-exaggeration of the rate of degradation), this would add an additional 0.000013 mg/L of TCP, resulting in no appreciable increase in risk.

3.8 Hydrology

3.8.1 Regulatory Framework

3.8.1.1 Sierra Nevada Forest Plan Amendment Final Supplemental Environmental Impact Statement and Record of Decision

Table 2 of the 2004 *Record of Decision on the Sierra Nevada Forest Plan Amendment Final Supplemental Environmental Impact Statement* (SNFPA final supplemental EIS) describes standards and guidelines applicable to the Herger-Feinstein Quincy Library Group (HFQLG) Pilot Project area for the life of the Pilot Project (USDA Forest Service 2004). No standards and guidelines specific to riparian areas, hydrology, or water resources are mentioned in table 2. The Record of Decision directs that vegetation management projects in the Pilot Project area follow the direction of the *Herger-Feinstein Quincy Library Group Forest Recovery Act* (HFQLG Act) in the application of Scientific Analysis Team guidelines.

3.8.1.2 Herger-Feinstein Quincy Library Group Forest Recovery Act

The HFQLG Act direction is to apply the Scientific Analysis Team guidelines for riparian system protection for all resource management activities conducted and all timber harvesting activities that occur in the Pilot Project area during the term of the Pilot Project. The prescribed minimum widths of "interim boundaries" in Riparian Habitat Conservation Areas (RHCAs) are as follows:

- 300 feet (perennial fish-bearing streams and lakes);
- 150 feet (perennial nonfish-bearing streams, ponds, wetlands greater than 1 acre, and lakes); and
- 100 feet (intermittent and ephemeral streams, wetlands less than 1 acre, and landslides).

The features to use in RHCA width determination (whichever is greatest) are (1) top of inner gorge, (2) 100-year floodplain, (3) outer edge of riparian vegetation, and (4) a distance equal to one or two tree heights (average height of 150 feet on the Feather River Ranger District. This means a 150-foot RHCA buffer width is applied to seasonally flowing streams (intermittent or ephemeral) that have a definable channel and evidence of annual scour and deposition, instead of a 100-foot RHCA buffer. These guidelines would supersede other direction, unless that direction (for example, mitigation measures or project design features) would provide greater protection to riparian and fish habitat or would better achieve Riparian Management Objectives (RMOs). For more detailed information, refer to appendices A and B of the "Hydrology Report" in the project record and appendix F of this EIS.

The HFQLG Act directs the Plumas National Forest to include provisions for accommodating at least a 100-year flow, including associated bedload and debris, at new stream crossings and existing crossings where resources are degraded. The Forest is required to meet RMOs during the development and implementation of a road management plan.

The Plumas National Forest is required to provide specific direction for management of fire and fuel treatment to meet RMOs and minimize disturbance of riparian ground cover and vegetation. The Forest is required to design prescribed burn projects to include the identification of objectives and risks in the RHCAs. To meet these requirements, an RMO report has been included and is part of the project file and labeled as appendix A to the Hydrology Report.

3.8.1.3 Plumas National Forest Land and Resource Management Plan

The 1988 *Plumas National Forest Land and Resource Management Plan* (commonly referred to as the "Forest Plan") has been amended by more recent programmatic documents, including the 2004 SNFPA Record of Decision and the HFQLG Act Record of Decision. The Forest Plan still provides management direction where not amended. As described below, some goals, polices, and guidelines still apply to streamside management (USDA Forest Service 1988).

Forest Plan guidelines are applied to ephemeral channels with no evidence of annual scour and deposition where Scientific Analysis Team guidelines from the HFQLG Act are not applicable The west side of the Forest contains ephemeral channels with no evidence of scour and deposition. The Glossary for the HFQLG Act final EIS defines these channels as ephemeral swales. These channels may only flow during large magnitude flow events (such as the 2-year or 10-year events), or were once wet areas altered during past logging and stand-establishing activities that have resulted in inadvertent alteration of the natural channel network. Ephemeral swales are not protected under HFQLG Act guidelines; however, ground-based equipment restrictions are needed to ensure further alteration does not occur. For these types of streams, Streamside Management Zone (SMZ) widths are defined in the Forest Plan are applied. The SMZ width ranges from 0 to 50 feet and width depends upon hill slope and channel stability. Within these protections zones, proposed DFPZ treatment still occurs; however, ground-based equipment is excluded.

The Forest Plan requires the implementation of a SMZ plan for any activity within a SMZ. While the Slapjack Project is designed to restrict activities in SMZs and RHCAs, there are exceptions when proposed treatments have been determined to occur in these protection areas. In accordance with the Forest Plan requirement, a "Streamside Management Zone Plan" has been prepared and is included as appendix B of the "Hydrology Report." It describes in more detail the application of Management Mitigation Measures (MMMs), Best Management Practices (BMPs), and standards and guidelines applicable to the Slapjack Project.

3.8.1.4 California State Water Resources Control Board, Federal Clean Water Act, and Porter-Cologne Water Quality Control Act

The *Porter-Cologne Water Quality Control Act*, which is contained in Division 7 of the California Water Code, establishes the responsibilities and authorities of the State Water Resources Control Board (SWRCB). The SWRCB is mandated to balance, to the extent possible, all uses of California's water resources for domestic, agricultural, or environmental uses. Each Regional Water Quality Control Board has the authority and responsibility for regional water quality control and planning (USDA Forest Service Plumas National Forest 2002b).

The *Clean Water Act of 1972*, as amended in 1977 and 1980, establishes goals, policies, and procedures for the maintenance and improvement of the nation's waters. It addresses both point and nonpoint sources of pollution and establishes or requires programs for the control of both sources of pollution. Land management activities have been recognized as potential sources of nonpoint sources of water pollution. By definition, nonpoint source pollution is not controllable through conventional treatment plant means. Nonpoint source pollution is controlled by containing the pollutant at its source, thereby preventing delivery of pollutants to surface water. Sections 208 and 319 of the *Clean Water Act* (Public Law 92-500), as amended, acknowledge land treatment measures as being effective means of controlling nonpoint sources of water pollution and emphasize their development. Working

cooperatively with the SWRCB, the Forest Service has developed and documented nonpoint source pollution control measures applicable to National Forest System lands. These measures have been certified by the state and approved by the EPA as the most effective means the Forest Service could use to control nonpoint source pollution. These measures were termed "Best Management Practices" (BMPs). BMPs include, but are not limited to, structural and nonstructural controls, operations, and maintenance procedures. BMPs can be applied before, during, and after nonpoint source pollution-producing activities to reduce or eliminate the introduction of pollutants into receiving waters. BMPs are usually applied as a system of practices rather than as a single practice. BMPs are selected on the basis of site-specific conditions that reflect natural background conditions and political, social, economic, and technical feasibility. BMPs are basically a preventive rather than an enforcement system. BMPs relating to water quality are included in the handbook "Water Quality Management for National Forest System Lands in California – Best Management Practices" (USDA Forest Service 2000). The BMPs that apply to the Slapjack Project are included in appendix F of this EIS.

3.8.1.5 Section 303(d) of the Clean Water Act

Section 303(d) of the *Clean Water Act* requires the identification of water bodies that do not meet, or are not expected to meet, water quality standards or are considered impaired. The affected water body, and associated pollutant or stressor, is provided by the EPA. The most current list available is the 2002 303(d) list. Englebright Reservoir is listed as impaired for mercury, and the source of mercury is listed as resource extraction related to abandoned mines, with a medium Total Maximum Daily Load (TMDL) priority. The Feather River downstream of Oroville Dam is listed as impaired by Diazinon™, an agricultural pesticide, with a high TMDL priority. There are no sources of Diazinon™ located upstream of the dam, and no restrictions or TMDLs apply within the project area or cumulative off-site watershed effects analysis area.

3.8.1.6 Regional Water Quality Control Board – Central Valley Region – Beneficial Uses and State Water Quality Objectives

Beneficial uses are defined under California State law in order to protect against degradation of water resources and to meet state water quality objectives. The Forest Service is required to protect and enhance existing and potential beneficial uses during water quality planning (California Regional Water Quality Control Board [CRWQCB] 1998). The Slapjack Cumulative Off-site Watershed Effects analysis of the Slapjack Project is designed to include all effects on beneficial uses of water that occur away from locations of actual land use and are transmitted through the fluvial system (USDA Forest Service 1990). Beneficial uses of surface water bodies that may be affected by activities on the Plumas National Forest are listed in chapter 2 of the *Central Valley Region's Water Quality Control Plan* (hereinafter referred to as the "Basin Plan") for the Sacramento and San Joaquin River basins (CRWQCB 1998). Existing and potential beneficial uses are defined for the Middle Fork Feather River and its tributaries, for Lake Oroville, for the watershed areas that are sources to Englebright Reservoir on the Yuba River, and for the Yuba River downstream of Englebright Reservoir. Beneficial uses are not defined for the South Fork Feather River but are assumed to include all the same beneficial uses as the others listed. Beneficial uses include municipal and domestic water supplies, agricultural supply, hydropower generation, water contact recreation, noncontact water recreation, commercial and sport fishing, warm freshwater habitat, cold freshwater habitat, wildlife habitat, and spawning, reproduction, and/or early development.

3.8.2 Methodology for Assessing Impacts on Hydrology

3.8.2.1 Indicators

Indicator 1: Watershed Condition

Measure 1 — Cumulative Off-Site Watershed Effects Analysis. The following definitions apply when assessing the direct, indirect, and cumulative watershed effects (CWE) condition:

Direct effects on watershed conditions result when activities occur in and deposit sediment or pollutants directly into the watercourses. Increased erosion and sedimentation directly into stream courses are caused by road maintenance and/or construction, fireline construction and reconstruction for prescribed burning, wildland fires, and timber management activities, such as construction of skid trails, temporary roads, and log landings.

Indirect effects can occur when subwatershed areas are disturbed by roads and timber harvest or associated activities. Disturbances include soil compaction, removal of vegetation canopy, and removal of effective soil cover. These disturbances can cause hillslope destabilization and/or detachment and mobilization of sediment that will eventually reach the stream (defined as a nonpoint source of pollution). Increased erosion and sedimentation causes increased peak channel flows, alteration of annual flow distribution, stream channel geometry alteration, and degradation or aggradation of channel beds. Indirect effects of project activities could occur to the channel network that is in or adjacent to the proposed treatment units. When not properly mitigated, indirect effects can result in an adverse effect on water quality and quality of stream and riparian habitat.

Cumulative off-site watershed effects include any changes that involve watershed processes and are influenced by multiple land use activities (Reid 1993). They do not represent a new type of impact. Changes that accumulate in time or space are considered CWEs. The definition of a CWE from the Council on Environmental Quality Regulations (40 CFR 1508.7) states:

> Cumulative impact" is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Land use activities alter environmental parameters—they modify topography; change the character of soil and vegetation; import or remove water, chemicals, and fauna; and they introduce pathogens and heat. Changes in these parameters can cause changes in watershed processes. As the watershed changes in response to the altered environmental parameters, changes in production and transport of water, sediment, organic matter, chemicals, and heat occur (Reid 1993). Land use can cause on-site CWEs that result directly from on-site changes in environmental parameters or off-site CWEs that are the result of changes in watershed transport processes.

The CWE analysis includes all effects on beneficial uses of water that occur away from the locations of actual land use and that are transmitted through the fluvial system. Effects are either beneficial or adverse and are a result of additive effects of multiple management activities within a watershed. The CWE analysis is based on the guidance from Forest Service Handbook FSH 2509.22-

Soil and Water Conservation (USDA Forest Service 1990). The method of analysis uses the model "Equivalent Roaded Areas" (ERAs) measured in acres. The ERA model serves as an index to measure the impact of past, present, and future land management activities on downstream water quality. More specifically, the ERA describes these off-site impacts in terms of the area roaded within a watershed. It assumes that the more densely a watershed is roaded, the greater the impacts will be to water quality downstream. The following land-disturbing effects are considered in the ERA model: roads, landings, timber harvesting activities on public and private lands, wildland fire, and grazing. These land-disturbing effects were assessed for the past 25 years, the present, and the foreseeable future.

The response of landscapes to land disturbances is influenced by climate, physiographic, geologic, and ecologic conditions (USDA Forest Service 1990). Therefore, recovery coefficients are assigned based on local conditions. On the Feather River Ranger District, 25 years is used as the average recovery period for disturbed sites. The western slope of the Sierra Nevada, in the Plumas National Forest area, has a high rate of vegetative establishment and growth due to high annual precipitation quantities and the presence of highly productive forest soils.

Watersheds and their associated stream systems can tolerate given levels of land disturbance, but there is a point when land disturbances begin to substantially impact downstream channel stability and water quality. This upper estimate of watershed "tolerance" to land use is called the Threshold of Concern (TOC). At levels above the TOC, water quality may be impaired such that the water is no longer available for established beneficial uses, such as municipal water supplies or irrigation, or no longer provides adequate habitat for fisheries. Stream channels can deteriorate to the extent that riparian and meadowland areas become severely damaged. The ERAs of near-stream sensitive areas, and the subwatersheds as a whole, are compared to the TOC and reported as percent disturbed and percent of TOC. Near-stream sensitive areas include all RHCAs identified within the analysis area. The TOCs used in the CWE analysis area and the rationale are included in the "Methodology" section of the "Slapjack Hydrology Report." If the percent of TOC ranges from 80 to 99 percent, then the watershed condition is approaching the TOC. If the percent of TOC is 100 percent, then the watershed condition is at the TOC. If the percent of TOC is greater than 100 percent, then the watershed condition is over the TOC. The TOC does not represent an exact level of disturbance where cumulative off-site watershed effects will occur. Rather, it serves as a "yellow flag" indicator of increased risk of significant adverse CWEs occurring within a watershed.

The scope of the CWE analysis includes 42 subwatersheds ranging from 503 acres to 4,793 acres, with a total analysis area of 66,247 acres (see table 3-33). The locations of watersheds with respect to treatment units are displayed in figure 3-4. Subwatersheds 3 and 20 are located in the CWE analysis area and contribute to off-site cumulative effects; however, there are no treatments proposed within these subwatersheds. The major rivers in the analysis area include the Middle Fork and South Fork Feather River and the North Yuba River. The Middle Fork and South Fork Feather River drain into Lake Oroville, the Feather River, and the various conveyances of the State Water Project. The North Yuba River drains into Bullard's Bar Reservoir. Subwatersheds 1, 2, 3, 4, 9, 10, 17, 18, 23, 24, 26-36, and 42 eventually drain into Lake Oroville. Subwatersheds 5–8, 11–16, and 37–41 eventually drain into Bullard's Bar Reservoir. Subwatersheds 19–22, and 25 drain to the Yuba River downstream of Englebright Reservoir.

Table 3-33. Watersheds located in the CWE analysis area.

HFQLG[a] Number	HUC6 Name	HUC6 ID Number	Subwatershed Name	Subwatershed Label	Subwatershed Area A[b] (acres)	Subwatershed Area B[c] (acres)	Subwatershed Total Area (acres)
110015	McCabe Creek	180201230701	Nutmeg Creek	1	166	755	921
	McCabe Creek	180201230701	Kanaka Creek	2	276	601	877
	Ponderosa Reservoir	180201230603	Woodleaf Creek	3	251	1,175	1,426
	Ponderosa Reservoir	180201230603	Oroleve Creek	4	473	1,491	1,964
110010	New Bullard's Bar Reservoir	180201250203	Hampshire Creek	5	240	956	1,196
110007	New Bullard's Bar Reservoir	180201250203	Empire Creek	6	285	1,084	1,369
110007	New Bullard's Bar Reservoir	180201250203	Indian Creek	7	429	1,835	2,264
110007	New Bullard's Bar Reservoir	180201250203	Slapjack Creek	8	800	2,069	2,549
	New Bullard's Bar Reservoir	180201250203		9	116	493	609
	New Bullard's Bar Reservoir	180201250203	Internal Drainage New Bullard's Bar Reservoir	10	2,105	1,781	3,886
110003	New Bullard's Bar Reservoir	180201250203	Burnt Bridge Creek	11	306	1,323	1,629
110003	New Bullard's Bar Reservoir	180201250203		12	161	750	911
	New Bullard's Bar Reservoir	180201250203	Cottage Creek	13	148	772	919
	Dobbins Creek	180201250501	Chute Ravine	14	144	1,275	1,419
	Dobbins Creek	180201250501	Dobbins Creek	15	58	766	825
	Dobbins Creek	180201250501	Dobbins Creek	16	45	559	603
110006	Lower Dry Creek	180201250701		17	236	1,465	1,701
110006	Lower Dry Creek	180201250701		18	269	906	1,175
110006	Lower Dry Creek	180201250701	Internal Drainage Dry Creek	19	316	1,269	1,585
110006	Lower Dry Creek	180201250701		20	42	551	593
110006	Lower Dry Creek	180201250701	Golden Gate Ravine	21	224	897	1,121
110006	Lower Dry Creek	180201250701	Internal Drainage Costa Creek	22	525	1,800	2325
110003	New Bullard's Bar Reservoir	180201250203	Internal Drainage Little Oregon Creek	23	420	1,390	1,810
110003	New Bullard's Bar Reservoir	180201250203	Internal Drainage Little Oregon Creek	24	407	1,957	2,364
	Lower Dry Creek	180201250701		25	210	948	1,158
110012	Ponderosa Reservoir	180201230603	Forbestown Ravine	26	172	658	830
110012	Ponderosa Reservoir	180201230603	Internal Drainage Ponderosa Reservoir	27	314	1,255	1,569

Table 3-33. Watersheds located in the CWE analysis area (continued).

HFQLG[a] Number	HUC6 Name	HUC6 ID Number	Subwatershed Name	Subwatershed Label	Subwatershed Area A[b] (acres)	Subwatershed Area B[c] (acres)	Subwatershed Total Area (acres)
110012	Ponderosa Reservoir	180201230603		28	127	396	523
110012	Ponderosa Reservoir	180201230603		29	125	443	568
110012	Ponderosa Reservoir	180201230603	Internal Drainage South Fork Feather River	30	659	2,372	3,031
110012	Ponderosa Reservoir	180201230603		31	69	492	561
	Frey Creek	180201230702	McCabe Creek	32	449	2,498	2,947
	Frey Creek	180201230702		33	68	435	503
	Frey Creek	180201230702	Internal Drainage Lake Oroville	34	1,966	2,827	4,793
	Ponderosa Reservoir	180201230603	Little Sucker Run	35	226	1,113	1,339
	Ponderosa Reservoir	180201230603	Internal Drainage Sucker Run Creek	36	831	2,078	2,909
110019	New Bullard's Bar Reservoir	180201250203	Owl Gulch	37	264	1043	1,307
110019	New Bullard's Bar Reservoir	180201250203	Internal Drainage Dogwood Creek	38	595	1,921	2,516
110010	New Bullard's Bar Reservoir	180201250203	Internal Drainage North Fork Feather River	39	566	1,607	2,173
	New Bullard's Bar Reservoir	180201250203	Internal Drainage New Bullard's Bar Reservoir	40	970	1,318	2,288
	New Bullard's Bar Reservoir	180201250203	Internal Drainage North Yuba River	41	171	1,020	1,191
	New Bullard's Bar Reservoir	180201250203	Internal Drainage North Yuba River	42	879	2,125	3,004

Notes:

a. HFQLG = Herger-Feinstein Quincy Library Group.

b. Area A = near-stream sensitive areas (all RHCAs).

c. Area B includes all other areas in the subwatersheds.

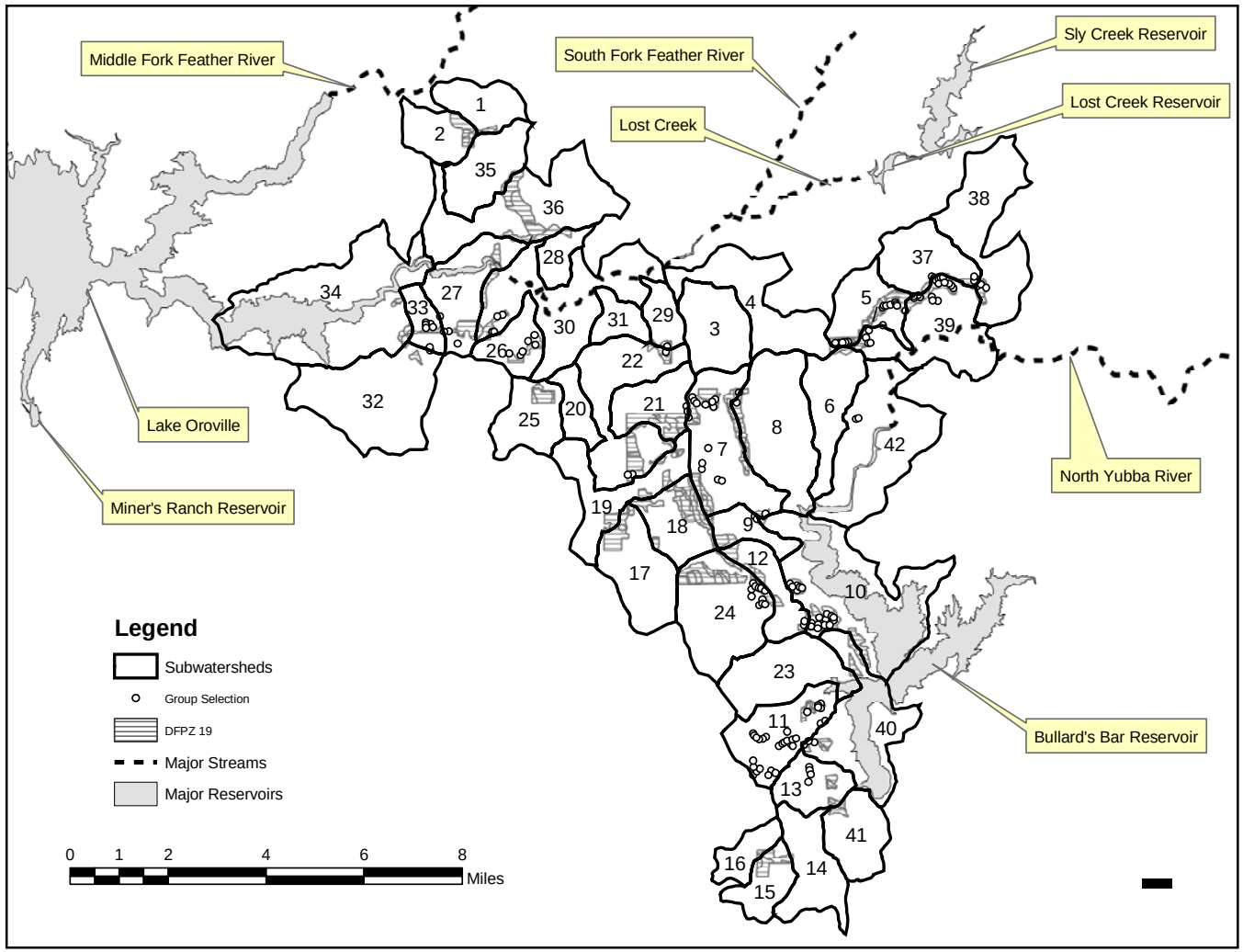

Figure 3-4. Locations of subwatersheds with respect to treatment units.

The CWEs of the Slapjack Project were also evaluated through site visits by the hydrologist, soil scientist, botanist, fisheries biologist, and wildlife specialist and use of photo interpretations, fisheries surveys, and professional judgment based on best available scientific literature. Streams located within proposed Defensible Fuel Profile Zone (DFPZ) treatment units were field checked by the hydrologists, and field results were compared to model results (see the "Environmental Consequences" section below).

Stream channels located within DFPZ treatments units were identified in the field as RHCAs or SMZs. RHCAs are streams with evidence of annual scour, and SMZs are ephemeral channels without annual scour (ephemeral swales). Refer to the "Regulatory Framework" section above or appendix B of the "Hydrology Report" for explanations and definitions of RHCAs and SMZs. Each stream section was identified with a number, and each location was marked using a Trimble Global Positioning System (GPS). This information was used to map streams using Geographic Information System (GIS) to create a near-stream sensitive area layer that will be used during on-the-ground layout of treatment units. Each RHCA in plantation units received a site visit to determine treatments needed to enhance RHCA conditions (for detailed information on RHCA and SMZ treatments, refer to appendix A of the "Hydrology Report"). The hydrologists conducted surveys in more detail to assess the condition of streams in RHCAs (streams with annual scour) that are located in DFPZ treatments units in order to compare those conditions with the ERA model results. The majority of the DFPZ treatment units either contained no stream channels or stream channels with no evidence of annual scour (ephemeral swales). All of the information was gathered during the spring and summer field season of 2004.

For a detailed discussion on the methodology and limitations of the CWE analysis and ERA model refer to appendix E of the "Hydrology Report."

Measure 2 — Herbicides and Water Quality. The area for the hydrologic analysis of effects from proposed herbicide application differs from the CWE analysis area. A larger area was analyzed for the existing condition of herbicide use. The existing condition analysis is by Hydrologic Unit Code (HUC) 6 watershed (refer to table 3-33 above for the list of HUC6 watersheds). The six HUC6 watersheds included in the Slapjack Project area were analyzed for pesticide use and for the potential cumulative effects of proposed herbicide application from the Slapjack Project. Refer to Slapjack Herbicide Risk Assessment for the rational of using HUC6 watersheds and methodology of the risk assessment.

The existing condition of herbicide use and presence in the analysis area is derived from the California Department of Pesticide Regulation data. It is assumed that hydrologically transmitted direct and indirect effects within the Slapjack Project boundary would be largely nonexistent or insignificant because no herbicides have been applied on Plumas National Forest lands since 1983, with the exception of the Challenge Experimental Forest. Cumulative effects associated with various pesticide treatments on adjacent private ownership and the Challenge Experimental Forest are potentially present. The quantities of chemicals applied and acres treated are summarized in section 3.7 ("Human Health and Safety"). Appendix C ("Human Health Risk Assessment") of this EIS details these quantities by product, application method, watershed, and type of use. A variety of chemicals for agricultural and silvicultural application are used on private timber and agricultural lands in the analysis area. It is not practical to quantitatively predict the environmental fate and cumulative toxicological effects of these various applications. Private landowners are required to

comply with state and federal laws governing pesticide use. These regulations include buffers to surface waters that generally preclude detectable or toxic concentrations of herbicides from entering surface waters or adversely affecting aquatic habitat or organisms. Private timber harvest plans filed in the analysis area indicate that no significant water quality or toxicological effects are anticipated to occur as the result of silvicultural herbicide use. Therefore, while the quantity and distribution of herbicides applied in the analysis area are documented, it is assumed that the risk of detrimental cumulative effects from herbicide application in the analysis area would be low to nonexistent.

Two herbicide formulations are proposed for use as part of the Slapjack Project proposed action (alternative B) and together or as individual components of alternatives D, E, and F. Imazapyr would be used for DFPZ maintenance, and triclopyr BEE would be used for noxious weed control. Direct, indirect, and cumulative effects of proposed herbicide treatments are discussed below in the "Environmental Consequences" section. The analyses of the possible effects of herbicide application are derived from the effects analyses performed for the HFQLG Act final supplemental EIS, where detailed discussion of the effects of herbicides for DFPZ maintenance is presented. The HFQLG Act final supplemental EIS does not discuss the effects of herbicides for noxious weed control. However, it does address ground application of triclopyr, and this discussion is incorporated in the analysis of proposed use of triclopyr for noxious weed control. Additional information from the Syracuse Environmental Research Associates, Inc. (SERA) 2003 and 2004 risk assessments is used to discuss the potential effects of both chemical formulations. The scope of analysis for direct and indirect effects of herbicide application is limited to the Slapjack Project area.

3.8.3 Affected Environment (Existing Conditions): Hydrology

3.8.3.1 Overview

The subwatersheds that make up the CWE analysis area are listed above in table 3-33 and displayed in figure 3-4. The existing condition information on these subwatersheds is based on site visits, historical references, aerial photography, Forest Service cooperate data, the cooperate data from Butte and Yuba Counties, and private land timber harvest plans. The subwatersheds lie within a mostly forested rural landscape on the western slope of the northernmost Sierra Nevada of California. Overall, 62 percent of the CWE analysis area is privately owned, and nearly two-thirds of the subwatersheds in the analysis area have a majority of private ownership (refer to table 3-32 above). Land ownership in subwatersheds 1, 2, 4, 6, 8, 10, 13–17, 19–26, 29, 32, 34–37, and 40–42 is greater than 50 percent private.

The productive nature of forest soils in the area and the climatic conditions have ensured that forest vegetative cover remains dense and vigorous. The western slope of the northernmost Sierra Nevada, which includes the Feather River Ranger District, receives the greatest amounts of mean annual precipitation in the range. The climatic regime is Mediterranean, with precipitation events concentrated between November and April, and drought conditions generally prevail the remainder of the year. The main factors that account for the precipitation conditions include the southwesterly aspect of the drainage network, which favorably intercepts Pacific storm energy; and the orographic influence of the rise of the western slope of the Sierra Nevada. The mean annual precipitation in the area ranges from around 40 inches at Lake Oroville to approximately 75 inches in the headwaters of Deadwood Creek and on Peterson Ridge in the northeastern most portion of the analysis area. Because of the relatively low elevation of the area, no more than 20 percent of the annual precipitation falls as snow (California Department of Water Resources [CDWR] 1978). The mean

annual runoff exceeds 40 inches per year (CDWR 1978), and 70 percent of annual precipitation appears as stream runoff (Benoit 1980). Because of the elevation of the analysis area, streamflow is typically storm flow-dominated throughout the fall and winter rainy season. The average monthly runoff peaks occur in December through February and decline to a monthly low in September. Rain-on-snow or rain-on-frozen-ground events occur infrequently over the analysis area but have a high potential for destructive flooding. The landscape setting and conditions that currently exist in the analysis area, including the physiographic and geologic framework, are described in the "Soils Effects Analysis Report."

Field data was collected to determine stream conditions in the CWE analysis area. The subwatersheds have been heavily influenced by past logging activities, roads, mining, wildland fires, urban development, and hydroelectric facilities. These influences have cumulatively modified the stream condition, resulting in changes in channel morphology, channel stability, water quality, and aquatic and riparian habitat quality. In site-specific locations, new cumulative effects are continuing to adversely affect streams, mostly due to poor road locations. Some of these locations include headwater channels in the Big Hill area, northeast along the ridgeline across the headwaters of Hampshire Creek, Missouri Creek, and Gophner Ravine. Channel enlargement and instability is evident in these areas, and channels without annual scour may be a result of channel network headward extension as a result of past land disturbance. Channel instability is also evident in plantation areas north of Challenge that were heavily disturbed during treatments on the Challenge Experimental Forest. In the CWE analysis area, there are 26 miles of perennial fish-bearing streams; 55 miles of perennial nonfish-bearing, intermittent, and ephemeral streams with annual scour; and 136 miles of ephemeral swales.

The Slapjack Project CWE analysis area has a high road density, high road density in near-stream sensitive areas, and a high stream crossing density under the existing condition. Road development has occurred for the following reasons: timber harvesting activities on public and private lands, urban development, access to hydrological facilities, and off-highway vehicle (OHV) recreation. Roads modify drainage networks and accelerate erosion processes, resulting in the alteration of physical processes in streams. These changes can be dramatic and long lasting and can degrade water quality and aquatic habitat. Roads can directly affect water quality and aquatic habitat by altering flow, sediment loading, sediment transport and deposition, channel morphology, channel stability, substrate composition, stream temperatures, and riparian conditions in watersheds (USDA Forest Service 1991). Common problems on roads include rutting, blocked drainages, lack of drainage structures with proper placement (in accordance with BMPs), and entrenchment of roads. The majority of the subwatersheds have a road density that does not meet the desired condition for minimizing road impacts on aquatic and riparian environments and associated wildlife. (For example, the Duncan Furbearer Interagency Workgroup and the *Mooretown Deer Herd Management Plan* both recommend a maximum road density of 2 miles per square mile in order to minimize disturbance to forest carnivores and mule deer, respectively.) The road densities for near-stream sensitive areas range from 0.3 mile to 7.7 miles per square mile, with an average of 4.5. The road densities of the subwatersheds, as a whole, range from 1.2 to 8.4 miles per square mile, with an average of 5.7.

The existing condition of meadows in the CWE analysis area ranges from good to adversely affected, depending on meadow location, degree of disturbance, and previously accomplished restoration activities. Adversely affected meadows in the analysis area include stream destabilization, invasion by conifers caused by lack of natural fire regime or disturbance from past logging practices, soil erosion from roads, season-long cattle grazing, OHV use, and past timber harvests.

3.8.3.2 Subwatershed History of Disturbance

Timber harvesting, road construction, and residential development have been the major recent land-disturbing activities in the watersheds. Historic gold mining, unmanaged timber harvest, grazing of both cattle and sheep, and an increase in fire frequency and magnitude all produced changes on the landscape prior to Forest Service management of the area. The decrease in canopy cover of mature timber and replacement with brush fields, as a combined consequence of these activities, may have altered hydrologic response and accelerated erosion and sedimentation during this era. Following National Forest proclamation in the early 1900s, a period of hydrologic recovery ensued, along with resource management and fire suppression. Extensive logging and road building began in the 1950s and 1960s, on both National Forest System lands and private lands in the analysis area. Routine road location and logging practices of that time resulted in extensive watershed damage that required 20 to 30 or more years to recover. Changes in timber practices alleviated disturbance to a degree by the 1970s, although large volumes of timber continued to be harvested on the National Forest into the 1980s, and substantial private timber harvest continues today. Until recently, most logging activities have occurred on the gently to moderately sloping ground that occupies broad ridgetop areas in the watershed. Most of the very steeply sloping areas were not historically harvested, but recent harvest activities using cable and helicopter logging systems have begun removing timber on steeper ground.

Fire suppression and reduced vegetation management have resulted in extensive fuel accumulations, which the Slapjack Project is designed to alleviate. While stand-replacing fire has been relatively uncommon on the western slope of the Plumas National Forest, several historic stand-replacing fires have occurred in the watershed. Fire history for the area within approximately one mile of the DFPZ units is described in the “Slapjack Fire and Fuels Report.”

Other influences that have impacted the subwatersheds include grazing, mining, urban development, and hydroelectric facilities associated with the State Water Project.

Restoration projects have occurred on Plumas National Forest lands. These restoration projects were designed to reduce and restore stream destabilization from past management activities. A list of these projects is located in appendix F of the “Hydrology Report.”

3.8.3.3 Existing Condition of Indicator 1: Watershed Condition

Measure 1 CWE Analysis. Table 5 of the Slapjack Hydrology Report includes the total ERA score and the final results for each subwatershed, represented as percent disturbed and percent of TOC for both near-stream sensitive areas and the subwatershed as a whole.

For the near-stream sensitive areas, there are 2 subwatersheds approaching the TOC and 24 above the TOC under the existing condition. Possible reasons for this are (1) prior to Scientific Analysis Team guidelines, stream protection zones were based on Forest Plan SMZ guidelines, so more land area received treatment than under current RHCA guidelines; (2) private timberland has smaller stream protection zones than public lands; (3) urban development and hydroelectric facilities impact portions of riparian areas; and (4) road development in the near-stream sensitive areas.

Table 3-34 lists 19 subwatersheds, out of the entire subwatersheds, that currently approach or exceed the TOC.

Table 3-34. Summary of the existing condition of subwatersheds that approach or exceed the Threshold of Concern.

Subwatershed Label	Calculated TOC of Entire Watershed (percent of watershed disturbed)	Percent of TOC	Reason that the Subwatershed Is Approaching or Exceeding the TOC
2	12	91	62 percent of the total ERA is from private land timber harvesting activities, followed by 20 percent roads, and 17 percent urban development. There have been no Forest Service activities in the last 25 years.
3	12	149	This subwatershed is entirely privately owned. 64 percent of the total ERA is from private land timber harvesting activities, followed by 18 percent roads, and 17 percent urban development.
4	12	141	60 percent of the total ERA is from private land timber harvesting activities, followed by 22 percent roads, 16 percent urban development, and 2 percent mines and infrastructures. There have been no Forest Service activities in the last 25 years.
6	14	90	61 percent of the total ERA is from private land timber harvesting activities, followed by 34 percent roads, and 6 percent from timber harvesting on the Plumas National Forest.
13	14	87	60 percent of the total ERA is from private land timber harvesting activities, followed by 27 percent roads, 6 percent urban development, 4 percent from timber harvesting on the Plumas National Forest, and 3 percent from mines and infrastructures.
14	14	93	70 percent of the total ERA is from private land timber harvesting activities, followed by 22 percent roads, 4 percent from mines and infrastructures, and 3 percent urban development. There have been no Forest Service activities in the last 25 years.
15	14	111	71 percent of the total ERA is from private land timber harvesting activities, followed by 20 percent roads, and 9 percent urban development. There have been no Forest Service activities in the last 25 years.
16	14	104	46 percent of the total ERA is from private land timber harvesting activities, followed by 19 percent roads, and 35 percent urban development. There have been no Forest Service activities in the last 25 years.
17	14	86	62 percent of the total ERA is from private land timber harvesting activities, followed by 28 percent roads, 9 percent urban development, and 1 percent from timber harvesting on the Plumas National Forest.
19	14	149	45 percent of the total ERA is from private land timber harvesting activities, followed by 20 percent roads, 33 percent urban development, and 1 percent mines and infrastructures. There have been no Forest Service activities in the last 25 years.
20	14	164	This subwatershed is entirely privately owned. 60 percent of the total ERA is from private land timber harvesting activities, followed by 16 percent roads, and 24 percent urban development.
21	14	121	62 percent of the total ERA is from private land timber harvesting activities, followed by 22 percent roads, 11 percent urban development, and 4 percent from timber harvesting on the Plumas National Forest.
22	14	146	67 percent of the total ERA is from private land timber harvesting activities, followed by 10 percent roads, 11 percent urban development, and 2 percent from timber harvesting on the Plumas National Forest.
24	14	92	58 percent of the total ERA is from private land timber harvesting activities, followed by 25 percent roads, 12 percent urban development, 2 percent from timber harvesting on the Plumas National Forest, and 2 percent mines and infrastructures.
25	14	105	45 percent of the total ERA is from private land timber harvesting activities, followed by 20 percent roads, 31 percent urban development, and 1 percent from timber harvesting on the Plumas National Forest.

Table 3-34. Summary of the existing condition of subwatersheds that approach or exceed the Threshold of Concern (continued).

Subwatershed Label	Calculated TOC of Entire Watershed (percent of watershed disturbed)	Percent of TOC	Reason that the Subwatershed Is Approaching or Exceeding the TOC
26	12	130	51 percent of the total ERA is from private land timber harvesting activities, followed by 30 percent roads, 19 percent urban development, and 2 percent from timber harvesting on the Plumas National Forest.
29	12	157	46 percent of the total ERA is from private land timber harvesting activities, followed by 54 percent roads.
37	14	87	56 percent of the total ERA is from private land timber harvesting activities, followed by 33 percent roads, and 10 percent urban development. There have been no Forest Service activities in the last 25 years.
38	14	83	54 percent of the total ERA is from private land timber harvesting activities, followed by 27 percent roads, 10 percent urban development, and 9 percent from timber harvesting on the Plumas National Forest.

Stream condition surveys were conducted in the RHCAs located in the proposed DFPZs treatment units. Surveys were conducted in subwatersheds under, approaching, and exceeding the TOC. The information gathered during the surveys was used to compare to the ERA model results. The CWE analysis area is a highly disturbed landscape. The subwatersheds approaching or over the TOC are mostly due to the following disturbances: (1) private timber harvesting activities on private land, (2) high-density road network, and (3) urban development.

Some of the stream reaches surveyed have no evidence of past cumulative effects, while other stream reaches have evidence of past cumulative effects from timber harvesting or mining activities. There have been very little timber harvesting activities on public lands during the last 25 years. The majority of the stream reaches surveyed in the proposed treatment units are in stable condition and have recovered from past cumulative effects. Some of the stream reaches surveyed are unstable due to current direct and cumulative impacts from roads adjacent to or crossing these stream reaches. Stream reaches cumulatively impacted from roads typically have unstable bare banks, a substrate dominated by fine sediments coming from the road, unstable channel morphology, and several headcuts.

Measure 2 – Herbicides and Water Quality. The presence, persistence, and mobility of herbicides on the landscape and in surface waters within the herbicide risk assessment analysis area, as defined above in the “Scope of Analysis” section, are important in determining if there would be significant risk of detrimental impacts on human health and ecological integrity.

Agricultural and silvicultural applications of herbicides occur in the analysis area on private lands and the Challenge Experimental Forest. Tables 3-29, 3-30, and 3-32 in the “Human Health and Safety” section (3.7) display the past use of herbicides within the analysis area for Human Health and Safety.

It is not practical to model the quantities and concentrations of these chemicals that may be transported through the air, soil, surface water, or groundwater from outside the project boundary. In

practice, most chemicals listed are not environmentally persistent and would likely not be detected a short period after application. Monitoring results indicate that silvicultural herbicides that were analyzed are seldom detected in surface waters following application, with the exception of hexazinone.

Based upon existing conditions, herbicide presence in the Slapjack Project area on Plumas National Forest lands is negligible or nonexistent. The only recent use of herbicides on the Plumas National Forest is associated with a Fuel Reduction Study on the Challenge Experimental Forest. As part of this study, four 0.5-acre plots were treated with Velpar L (hexazinone) in 2004, followed several months later with Accord Concentrate (glyphosate) and Arsenal (imazapyr). Soil solution samples are being analyzed at the University of California, Davis. In 1991 and 1997, herbicides (Garlon™ 4 and Roundup) were used to control tanoak on several 0.5-acre plots as part of a long-term soil productivity study.

Herbicide migration through soils or other pathways from adjacent private lands would likely be minimal. Known chemicals used in the analysis area include imazapyr, triclopyr, and hexazinone. Imazapyr can remain active in the soil for six months to two years; however, it is strongly adsorbed by soils and usually found only in the top few inches of soil, which means this chemical is not mobile (Information Ventures, Inc. 2005; USDA Forest Service 1989) Triclopyr is active in the soil and is absorbed by plant roots, clay particles, and organic matter particles. However, triclopyr degrades rapidly and has an average half-life in soils of 30 to 46 days (SERA Risk Assessment 2003; Information Ventures, Inc. 2005; USDA Forest Service 1989). Hexazinone is considered highly mobile, has a long half-life, and can travel with water through soil to enter the groundwater.

Hexazinone was recently applied in the analysis area but in small quantities. This project is not proposing the use of hexazinone; therefore, this project would not contribute any cumulative effects to any lingering effects associated with past use of hexazinone.

3.8.4 Environmental Consequences

3.8.4.1 Alternative A (No Action)

Direct Effects on Measure 1 – CWE Analysis. Under the no-action alternative, DFPZ treatments, individual tree selection, group selection, transportation improvements (road reconstruction, closure, decommissioning, and restoration), wildlife restoration, and watershed restoration would not occur; hence, there would be no direct effects on the channel network from the Slapjack Project.

Vegetation density and accumulation of fuels would continue to increase under alternative A. Without those changes, the potential for stand-replacing fire and associated effects on near-stream sensitive areas would remain similar or increase compared to the existing condition. While burn severity and the effects of wildfire disturbance are often limited in near-stream sensitive areas compared to upland areas, the effects of fire adjacent to channels would adversely affect the integrity of proper stream function and condition. Channel degradation, erosion, and sedimentation, and the resulting effects on stream and riparian habitats and water quality, would likely increase following a stand-replacing fire (Neary et al. 2005).

Under the no-action alternative, there would be no beneficial changes in stream and meadow conditions because transportation improvements and watershed restoration would not occur. Sediment would continue to be deposited directly into affected water bodies and riparian areas, and conditions would continue to degrade. Fish barriers would remain and continue to obstruct potential aquatic habitat (see the "Existing Condition" section above).

Indirect and Cumulative Effects on Measure 1 – CWE Analysis. Under the no-action alternative, DFPZ treatments, group selection, individual tree selection, transportation improvements, wildlife restoration, and watershed restoration would not occur, and there would be no project-related increase in ERA values or in the risk of CWE. However, vegetation density and accumulation of fuels would persist, and the potential for stand-replacing fire and its effects on upland watershed areas and near-stream sensitive areas would increase compared to the existing condition. As described in the Slapjack Project "Fire and Fuels Report," the project analysis area is at high risk of severe wildfire that could burn the entire area. ERA values following a stand-replacing fire would greatly exceed the TOC and greatly exceed increases in ERA values associated with implementation of proposed treatment activities under the action alternatives. Following a severe wildfire, proper stream function and condition of streams and the quantity and quality of aquatic habitat might remain compromised for decades to centuries (Neary et al. 2005).

Improvements would not occur under the no-action alternative. In the DFPZ treatment area, there is a need for the treatments proposed in all action alternatives besides having a need for fuel reduction, as demonstrated by the following discussion.

Alternative A (No Action)
- No treatments would be implemented.

Alternative B (Proposed Action)
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds with herbicides (up to 31 acres), mechanical and manual methods, and prescribed burning

Alternative C
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs without herbicides
- Control noxious weeds without herbicides

Alternative D
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs without herbicides
- Control noxious weeds with herbicides (up to 31 acres)

Alternative E
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds without herbicides

Alternative F
- Construct DFPZs
- Implement group selection (190 acres), except in watersheds over the Threshold of Concern
- Implement individual tree selection (148 acres); no proposed ITS units are located in watersheds over the Threshold of Concern
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds with herbicides (up to 31 acres)

Alternative G
- Construct DFPZs
- Implement group selection (190 acres), except in watersheds over the Threshold of Concern
- Implement individual tree selection (148 acres); no proposed ITS units are located in watersheds over the Threshold of Concern
- Maintain DFPZs without herbicides
- Control noxious weeds without herbicides

1. The 1999 Pendola Fire, a stand-replacing fire, was in subwatershed 11. The streams in this subwatershed have been cumulatively impacted by intensive salvage treatments that occurred on private land and by the removal of effective ground cover from the fire. Soil surveys of DFPZ treatment unit 5 determined that there is a lack of effective ground cover, and hillslope erosion occurred after the fire. Mastication is the proposed treatment in this unit under all action alternatives, and through the mastication process, soil cover would increase, thereby reducing erosion. In addition, the group selection treatments proposed under all action alternatives within this unit have extra mitigation measures to

reduce the impacts from bare ground caused by this type of treatment. All landings and skid trails would be mulched and/ or seeded (see the "Slapjack Soils Report" for more information).

2. There is a lack of large woody debris in most treatment units. In treatment units that are not plantations, large woody debris is available, and the amount needed to reach soil productivity standards would be met by using mitigation measures. Plantations in the Slapjack Project area range in age from 15 to 30 years old. Most of the plantations were established from previous clearcuts or wildfires and had different snag and down log requirements than the current Forest Plan standards and guidelines, as amended. Some plantation treatment units have no opportunities at this time to create additional snags or down logs at the appropriate sizes due to the current diameters at breast height (dbh) and heights of plantation trees. The continued management (precommercial and commercial thinning) of plantations that is proposed in all action alternatives would accelerate the diameter and height growth of residual trees (conifer species), provide periodic inputs of woody debris from thinning operations, and provide for future opportunities for recruitment of snags and down woody material (see the "Slapjack Soils Report" for more information).

Group selection and individual tree selection treatments are designed to promote the HFQLG Act desired condition of uneven-aged (all-age), fire-resilient, multistoried stands, while maintaining a healthy forest. These treatments would provide seral stage diversity by adding patches of the youngest seral stages to portions of larger California Wildlife Habitat Relationship (CWHR) size class 4 and 5 stands. Under the no-action alternative, these stand structure improvements would not occur. In the long term, possible benefits to aquatic and riparian systems associated with the fire resiliency of these stand improvements would not occur. Possible short-term increases in runoff and erosion related to these treatments would also not occur.

Under the no-action alternative, there would be no beneficial changes in stream and meadow conditions because transportation improvements and watershed restoration would not occur. Sediment would continue to directly and indirectly deposit into affected water bodies and riparian areas, and conditions would continue to degrade. Fish barriers would remain and continue to obstruct potential aquatic habitat (see the "Existing Condition" section above).

Direct, Indirect, and Cumulative Effects on Measure 2 – Herbicides and Water Quality. Under alternative A, the proposed Slapjack Project would not be implemented, and there would be no herbicide treatments. Thus, no environmental effects associated with the application of herbicides would occur, including any that might affect water quality or be transmitted through the hydrologic system.

3.8.4.2 Alternative B (Proposed Action)

Direct Effects on Measure 1 – CWE Analysis. Under the proposed action, there is potential for direct effects on hydrologic function from prescribed vegetation management activities, transportation improvements, wildlife restoration, and watershed restoration. Protection of headwaters and tributaries to larger watersheds, along with implementation of effective nonpoint source conservation measures (the BMPs), would provide protection of the CWE analysis area. Through implementation

of BMPs, there would only be a small potential of sedimentation to the immediate channel and channels downstream.

In the proposed DFPZ treatment units, RHCAs in plantations and brushfields would be treated to improve riparian habitat conditions. Plantations in the Slapjack Project area range in age from 15 to 30 years old. Most of the plantations were established from previous clearcuts or wildfires and had different requirements for stream protection zones and snag and down log requirements than the current Forest Plan standards and guidelines, as amended. Within the areas defined as RHCAs, plantation treatments had occurred. Under the existing condition, the plantations, brushfields, and RHCAs within these timber stands have a lack of large woody debris available, and these areas have a high fuel loading condition. Management (precommercial and commercial thinning) in the plantations, burshfields, and RHCAs located in these areas would reduce the fuel loading and accelerate the diameter and height growth of residual trees, provide periodic inputs of woody debris from thinning operations, and provide for future opportunities for recruitment of snags and down woody material. In RHCAs, no-tractor equipment zones would be marked on the ground, based upon SMZ guidelines contained in the 1988 Forest Plan and field surveys. In harvest units, equipment outside the exclusion zone may reach in a maximum of 18 feet into the no-tractor equipment zone to remove trees along RHCAs. Trees in streambank areas would be retained to ensure continued bank stability. SMZ designations for ephemeral swales would be marked on the ground; these are also considered no-tractor equipment zones. Equipment outside the exclusion zone could reach in a maximum of 18 feet into the no-tractor zone. Limiting equipment “reach” to a maximum of 18 feet ensures trees along streambanks would not be removed. In underburn units, fires would not be ignited in RHCAs but may be allowed to creep into them. In all other proposed treatment areas, hand treatment would be used if there is a need to reduce fuel loading conditions prior to following up with underburn treatments. The approximate acres of treatments include 101 acres of under burning, 97 acres of harvesting, 31 acres of mastication, and 69 acres of wildlife habitat improvements. In order to treat within RHCAs, the HFQLG Act requires that Riparian Management Objectives meet or exceed the existing condition (see appendix A of the “Riparian Management Objectives Report”).

No direct effects from group selection and individual tree selection treatments would occur because treatment units would not overlap RHCAs and SMZs.

There is the potential for short-term direct effects (such as increased sedimentation) on hydrologic function from transportation system improvements (reconstruction, decommissioning, and restoration) and watershed restoration activities, especially from in- or near-stream activities like culvert improvement, streambank stabilization, meadow restoration, and fish barrier removal. However, the long-term improvements would occur from transportation system improvements and would reduce effects on streams, especially on streams where roads are adjacent to or cross the streams. A net reduction in direct effects would occur after the completion of restoration activities.

Indirect Effects on Measure 1 – CWE Analysis. Under the existing condition, the CWE analysis area is a highly disturbed landscape. In order to reduce the potential to affect water quality and beneficial uses under the Slapjack Project, Best Management Practices (BMPs) and Management and Mitigation Measures (MMMs) have been prescribed and included in the Streamside Management Plan (appendix B of the Hydrology Report). Appendices A and B (of the Hydrology Report) discuss the criteria for protecting streams from proposed activities in the Slapjack Project area and in the

watersheds. These practices would be used to reduce sediment delivery and possible water contamination related to proposed activities or existing conditions. The BMPs and MMMs are site specific to the project area. The potential for sedimentation and stream degradation of the immediate channels and the channels downstream from the project area would be minimal with the implementation of BMPs.

There would be a long-term benefit from the reduction of high fuel loading conditions. The DFPZ network is designed to reduce the effects of a stand-replacing fire and provide fire fighters the ability to safely fight fires.

Even though intensive mechanical treatment would occur during group selection treatments, the proposed group selection units would mostly be situated in upland positions away from channels, and full RHCA and SMZ protection would apply. Consequently, the risk of indirect watershed effects on streams would be low.

The proposed road work or stream channel restoration work would result in short-term negative effects from increased sedimentation to the streams. These improvements would, in the long-term, benefit the hydrologic function, condition of the subwatersheds, and restoration of the habitat connectivity of stream systems. There would be a net reduction in sediment being mobilized and reaching the stream through road drainage improvement. Appendix H of the Hydrology Report discusses the strategy that would be used for road decommissioning.

Cumulative Effects on Measure 1 – CWE Analysis. The results of the CWE analysis for the proposed action include the sum of all ERA values for the existing condition, reasonable foreseeable future activities, and the proposed action. A summary of the CWE model outputs for the proposed action is presented in tables 10, 11, and 12 of the Slapjack Hydrology Report.

With implementation of activities proposed under alternative B, the ERA values for 26 subwatershed near-stream sensitive areas that approach or exceed the TOC under the existing condition would remain near or above the TOC with the proposed action. Some subwatershed near-stream sensitive areas would experience a slight increase in ERA from the proposed DFPZ treatments, or a slight decrease from the proposed road decommissioning.

For subwatersheds as a whole, the subwatersheds exceeding or approaching the TOC are summarized in table 3-35. There are 7 subwatersheds approaching and 12 subwatersheds exceeding the TOC. Subwatershed 24 is the only subwatershed that approaches the TOC under the existing condition and would exceed the TOC under alternative B. Subwatershed 23 would decrease in the percent of TOC due to the proposed road decommissioning activities. Subwatersheds 3 and 20 are not included in table 3-35 because they are entirely on private land. They are located in the CWE analysis area and contribute to off-site cumulative effects; however, there are no treatments proposed within these subwatersheds.

Table 3-35. Alternative B: Summary of subwatersheds that currently exceed or approach the Threshold of Concern.

Subwatershed Label	Percent of TOC	Subwatershed Label	Percent of TOC
2	96	21	143
4	155	22	165
6	93	24	107
13	95	25	105
14	93	26	147
15	125	29	170
16	106	37	98
17	98	38	85
19	159	—	—

The CWE analysis area under the existing condition is a highly disturbed landscape. The ERA model demonstrates that alternative B has the potential to increase cumulative effects on the analysis area. In the subwatersheds that exceed the TOC, private land harvest activities are the major contributor to the high ERA scores, followed by roads and urban development. For all subwatersheds, the past 25 years of harvest activities on the Plumas National Forest, plus the proposed Slapjack Project activities, may contribute anywhere from 1 to 71 percent of the total ERA score. In the subwatersheds that approach or exceed the TOC, past activities on the Plumas National Forest, combined with the proposed Slapjack Project activities, may contribute between 1 and 20 percent of the total ERA score. In only three of the subwatersheds, the past and future activities on the Plumas National Forest would contribute in excess of 10 percent to the total ERA score. The greatest contribution under the proposed action would be in subwatershed 21, where 20 percent of the total ERA would be a result of past activities and future activities on the Forest.

As stated in the “Fire and Fuels” section (3.5) in this EIS, the DFPZ treatments would be effective if a wildland fire at or below the 90th percentile weather conditions were to occur. An effective DFPZ may not entirely eliminate the possibility of high-severity wildfire affecting some subwatersheds, particularly where there is heavy fuel loading on steep canyon slopes. The DFPZ would, however, provide firefighters an opportunity to contain the fire to one or two subwatersheds and prevent it from spreading across larger portions of the landscape. Proposed future projects would similarly treat other portions of the landscape, and over time, the aggregate risk of stand-replacing fires would be further reduced. The potential risk of CWEs from stand-replacing wildfire in the long term would greatly exceed the short-term increased risk of CWEs related to the proposed DFPZ treatments under the Slapjack Project. For example, in subwatershed 24, the proposed action would result in a predicted 15 percent increase in the calculated TOC. However, if the entire area of subwatershed 24 were to experience a high-intensity wildfire, the TOC would increase a predicted 143 percent.

Group selection and individual tree selection treatments are designed to promote the HFQLG Act desired condition of uneven-aged, multistoried, fire-resilient stands, while maintaining a healthy forest. These treatments would provide seral stage diversity by adding patches of the youngest seral stages to portions of larger CWHR size class 4 and 5 stands. These stand structure improvements would occur under alternative B, and in the long term, benefits to aquatic and riparian systems associated with the fire resiliency of these stands would also occur.

Improvements to the transportation system, streambank stabilization projects, fish barrier removal, and meadow enhancement projects would have long-term benefits for the subwatersheds, especially in the near-stream sensitive areas. Benefits would include reduction in road- and bank-related erosion, drainage diversion and sediment deposition to channels; improved function and condition of channels and improved aquatic and riparian habitat, and increased availability of aquatic habitat to mobile species of fish, amphibians, and invertebrates from restoration of habitat connectivity. Short-term sediment increases may result from these restoration activities. However, the impacts would be mitigated by BMPs and would be offset by the ecological benefits and enhanced beneficial uses that are the intent of these restoration activities.

The majority of the subwatersheds have a road density that does not meet the desired condition for minimizing road impacts on aquatic and riparian environments and associated wildlife. (For example, the Duncan Furbearer Interagency Workgroup and the Mooretown Deer Herd Management Plan both recommend a maximum road density of 2 miles per square mile in order to minimize disturbance to forest carnivores and mule deer, respectively.) The proposed road decommissioning and closure under alternative B would reduce road mileage and road density (see figure A-3 in appendix A of this EIS for maps of the proposed road changes and tables 3-43 and 3-44 in the "Transportation System" section [3.11] of this EIS). The post-project road densities of near-stream sensitive areas would range from 0.1 mile to 7.5 miles per square mile, with an average of 4.2 miles per square mile. The post-project road densities of the subwatersheds would range from 1 mile to 8.3 miles per square mile, with an average of 5.5 miles per square mile.

Potential Cumulative Effects. Stream condition surveys were conducted on stream reaches located in the proposed DFPZ treatment units. The majority of the stream reaches surveyed are in stable condition and have not been or are no longer impacted by past activities. However, some of the stream reaches are in an unstable condition mostly due to roads adjacent to and crossing the stream reaches.

If a CWE were to occur, the most likely effect would be increased chronic sedimentation from increases in water yield and peak flow during high-intensity rain events. Peak flow changes, in particular, may cause increased sedimentation, changes in bedload transport, altered flow regimes, channel incision, undercuts and unstable banks, and channel morphology changes (Reid 1993). If a CWE were to occur from the Slapjack Project, it would most likely occur within low-gradient, third-order or greater reaches of the channel network and/or at major confluences.

While slope instability and active land sliding have not been mapped in the analysis area, there appear to be few areas in the analysis area that are over steepened and possess inner gorge morphology. These areas include slopes above Bullard's Bar Reservoir, the canyon of the South Fork Feather River upstream of Ponderosa Reservoir, and Golden Gate Ravine on the west slopes of Mount Hope, and in the Mosquito Gulch area north of Forbestown. These areas would likely not experience measurable peak flow alteration related to proposed activities of the Slapjack Project. However, existing disturbance, combined with future foreseeable private timber harvest in subwatersheds 4, 26, and 29, may have the potential to produce CWEs in the South Fork Feather River canyon because, as described above (and shown in table 3-35), these watersheds are well above the TOC. There could be some land sliding in steep tributary basins either in

1. unchanneled colluvial hollows (ephemeral swales) that have been roaded or that have had excessive runoff directed to them from ground disturbance or vegetation removal; or

2. steep, incised channel reaches where debris accumulation and subsequent removal by peak runoff induces streambank erosion and failure.

The identified CWEs from proposed activities would be mitigated during project planning, design, and implementation through

1. adoption of unit-by-unit Forest Plan standards and guidelines to protect water quality;

2. use of applicable BMPs;

3. inventory, funding, and completion of land restoration activities throughout the watershed; and

4. scheduling of future harvests to facilitate vegetative recovery.

Protection of headwaters and tributaries to larger watersheds, along with implementation of effective nonpoint source conservation measures (the BMPs), would provide protection of the entire watershed. The implementation of BMPs would ensure minimal delivery of project-related sediment to stream channels. Impacts on water quality in the analysis area could potentially occur from

1. failure to implement BMPs, riparian and wetland standards and guidelines, and other required mitigation;

2. extreme water yields resulting from abnormally high-intensity magnitude and duration storm events; and

3. removal of vegetative matter and ground cover resulting from a wildfire.

Potential Risk of CWEs on Beneficial Uses. As described previously, a number of subwatersheds in the analysis area are already approaching or above the TOC. The proposed Slapjack Project, combined with future foreseeable private land and other activities planned on the Plumas National Forest, would increase the level of disturbance in all subwatersheds. In theory, all listed beneficial uses of the South Fork Feather River and the Yuba River could be at some risk from water quality degradation due to activities on public and private lands in all subwatersheds analyzed in the CWE analysis area.

CWEs are a result of nonpoint source pollution caused by land clearing related to timber harvest activities and other land disturbances. These effects would relate to the following categories of state water quality objectives as defined in the Basin Plan (CRWQCB 1998):

> *Sediment*—The suspended sediment load and suspended sediment discharge rate of surface waters shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.

Turbidity—Waters shall be free of changes in turbidity that cause nuisance or adversely affect beneficial uses. (Specific allowable increases in turbidity levels are defined as natural turbidity levels measured in nephelometric turbidity units or NTUs).

Temperature—The natural receiving water temperature of intrastate waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Water Board that such alteration in temperature does not adversely affect beneficial uses. At no time or place shall the temperature of COLD or WARM intrastate waters be increased more than 5°F above natural receiving water temperature.

Pesticides—(1) No individual pesticide or combination of pesticides shall be present in concentrations that adversely affect beneficial uses; (2) Discharges shall not result in pesticide concentrations in bottom sediments or aquatic life that adversely affect beneficial use; (3) Pesticide concentrations shall not exceed those allowable by applicable antidegradation policies; (4) Pesticide concentrations shall not exceed the lowest levels technically and economically achievable; (5) Waters designated for use as domestic or municipal supply (MUN) shall not contain concentrations of pesticides in excess of the Maximum Contaminant Levels set forth in California Code of Regulations, Title 22, Division 4, Chapter 15.

Environmental analysis and proposed mitigations for herbicide use are described below in the section on herbicides and water quality. It is not projected that herbicide application would affect beneficial uses of water in these subwatersheds or any other portion of the analysis area.

If cumulative effects on the subwatersheds were to occur, they could increase sediment, turbidity, and temperature. The beneficial uses at risk if this were to occur include warm and cold freshwater habitat, spawning habitat, wildlife habitat, commercial and sport fishing, and noncontact water recreation. There would likely be minimal or no risk to domestic and municipal water supplies, agricultural uses, hydropower generation, and water contact recreation, although increased sedimentation in Lake Oroville would slightly shorten the expected usable lifespan of the reservoir. The greatest risk would likely be to those uses associated with habitat. The bulk of this risk from CWEs is associated with the existing condition of a highly disturbed landscape and the future foreseeable disturbance of that landscape from private timber operations.

As described above, the additional disturbance from the Slapjack Project proposed activities would contribute only a minor percentage of the total risk of CWEs. The application of BMPs and MMMs, including riparian buffers, are designed to reduce the risks of CWEs on beneficial uses of water from proposed activities under Alternative B. Protection of headwaters and tributaries to larger watersheds, along with implementation of effective nonpoint source conservation measures (the BMPs), would provide protection of the entire watershed. The implementation of BMPs would ensure minimal delivery of project-related sediment to stream channels.

General Effects – Measure 2: Herbicides and Water Quality. The proposed herbicide treatments for DFPZ maintenance under alternative B would be performed by manual ground

application of imazapyr (Arsenal® AC) using backpack sprayers. The formulation would also include a surfactant (Syl-Tac®) and a dye (Hi-Light® Blue). Standard HFQLG riparian buffers would be applied to all surface water bodies, and no herbicide application for proposed DFPZ maintenance would occur within the buffer areas. The HFQLG final supplemental EIS analyzed the likelihood of detection of imazapyr in surface waters with this application method, the buffers, and full implementation of all water quality BMPs. The HFQLG final supplemental EIS concluded that "imazapyr is unlikely to be detected in forest streams of the Pilot Project area when streamside buffers and ground applications are used." This conclusion is based on minimal data, none of which are from the Sierra Nevada. However, the assumption of low likelihood of detection is probably valid since imazapyr is minimally mobile in soils and breaks down rapidly in water to nonpersistent degradates.

The proposed herbicide treatments for noxious weed control would be performed by manual ground application of triclopyr BEE (Garlon™ 4) using backpack sprayers. Triclopyr BEE formulation would also include surfactant (Syl-Tac®) and a dye (Hi-Light® Blue), although at double the application rate as for imazapyr. The HFQLG final supplemental EIS states that, "With the establishment of adequate streamside buffers and ground application, and absent direct application onto surface waters, triclopyr concentrations in surface waters are typically not detected in forestry applications." Triclopyr is also described as variably persistent in soil, with minimal mobility and leaching. Triclopyr groundwater concentrations in forested areas are not well known, but surveys of groundwater in urban and agricultural areas did not detect triclopyr. Triclopyr degrades primarily to 3,5,6-trichloro-2-pyridinol (TCP), which may be more persistent in soil than triclopyr (Stanislaus National Forest 2004). The other chief metabolite of triclopyr BEE is butoxyethanol, which rapidly dissipates by microbial degradation (one day or less). Triclopyr BEE might be applied in close proximity to a very limited length of intermittent stream channels for alternative B. Triclopyr does have a rapid degradation rate in water, and therefore, it is unlikely to persist in aquatic ecosystems for sufficient periods to cause harm to sensitive organisms. The HFQLG final supplemental EIS further states that there is some evidence that triclopyr can persist in floodwaters. With the very limited application of triclopyr in riparian areas proposed for the Slapjack Project, dilution under flood conditions would ensure that harmful concentrations do not occur.

If herbicides are applied as proposed for the Slapjack Project, and by employing BMPs, erosion rates would not increase from herbicide application. Therefore, sediment production from treated areas would not increase, and detrimental water quality impacts from sedimentation or turbidity would not increase. Consequently, no ERA is applied in the cumulative watershed effects model for proposed herbicide application.

Both herbicides are considered to have minimal toxicity to humans and other organisms beyond the target species of plants and other sensitive species of plants. The surfactant, Syl-Tac®, is a mixture of two other products, Hasten® and Sylgard® 309. Its use is not addressed in the HFQLG final supplemental EIS. Hasten consists of esterified vegetable oil and a small amount of isopropyl amine, and Sylgard® consists of siloxanes (organosilicones). Syl-Tac® has a "Caution" signal word on the label and is considered only slightly toxic. It is a minor eye and skin irritant in humans and has an LC_{50} of greater than 0.5 milligram per liter (mg/L) in aquatic species (trout and *Daphnia*). No known toxic effects on wildlife under expected exposure concentrations have been documented, although studies of effects of organosilicones on terrestrial insects have demonstrated toxicity at high exposure

levels (Bakke 2002). It is unlikely that Syl-Tac® presents a significant risk of adverse environmental effects in the aquatic ecosystem. The dye, Hi-Light® Blue, is not a registered pesticide and has no label signal word. It is water soluble, contains no listed hazardous substances, and is considered virtually nontoxic to humans. No known toxic effects on wildlife have been documented. It is commonly used in toilet bowl cleaners and as a colorant for lakes and ponds (Bakke 2002). It is unlikely that Hi-Light® Blue presents a significant risk of adverse environmental effects in the aquatic ecosystem. See the "Slapjack Risk Assessment" for more information.

Direct Effects on Measure 2 – Herbicides and Water Quality. Under alternative B, herbicides would be used to maintain the effectiveness of DFPZs and to control noxious weeds. The proposed quantities and application rates of the herbicides are listed above in table 3-32 of the "Human Health and Safety" section (3.7) and tables C-1 and C-2 in appendix C (the "Human Health Risk Assessment").

Herbicide use for DFPZ maintenance is proposed on 1,954 acres in the Slapjack Project area, with a single application two to three years after DFPZ construction. Herbicides would be used to control noxious weeds on a maximum of 31 acres in the project area, with up to five successive annual applications to ensure successful removal. Up to 5 acres of overlap might occur between DFPZ and weed control applications. No herbicides are proposed for use in conjunction with proposed transportation system improvements or with aquatic and wildlife habitat restoration. The HFQLG Act standard riparian buffers would be employed for the DFPZ treatments, and no herbicides would be used within the buffered areas. Herbicides would not be used in the 500-foot buffers where Threatened, Endangered, or Sensitive amphibian species occur. There is a red-legged frog (*Rana aurora draytonii*) population in the southern portion of the project area.

For weed control, 50-foot buffers would be applied to perennial streams. No-spray buffers would be applied to intermittent streams, and a Limited Operating Period would be imposed to restrict spraying to the driest portion of the year when these streams are not flowing. Spraying would not occur if precipitation is forecasted. These and other restrictions on herbicide application are listed in appendix F of this EIS.

Herbicide application is proposed along 500 feet of a 550-foot perennial stream reach in unit 77. This 500-foot segment is located in a headwater portion of a tributary to Sucker Run (SE 1/4 of NW 1/4, Section 26, R6E T20N), where there is an approximately 8-acre stand of French broom (*Genista monspessulana*). Approximately 2.9 acres of RHCA would be treated with triclopyr BEE in this stand. A no-spray buffer (50 feet) would be applied along the stream.

Herbicides would also be used to treat French broom in other riparian areas, which are roadside occurrences north of Challenge in unit 29 (Section 19, T19N R7E). Approximately 0.2 acre of RHCA would be treated in this area. In this unit, a Limited Operating Period would be imposed to restrict spraying to the driest time of year (August and September) when these streams are not flowing. Spraying would not occur if precipitation is forecasted.

The BMPs are designed to maximally reduce or eliminate the possibility of detection of herbicides in aquatic ecosystems. To ensure these BMPs are met, monitoring plans for the presence and concentration of herbicides in soil, surface water, and groundwater would be applied. The

monitoring plans would include baseline monitoring prior to the first herbicide applications to establish baseline conditions and to assess the risk of cumulative effects.

As described above in general effects discussion, there would be no significant adverse environmental effects from proposed herbicide use under alternative B. Direct effects of herbicide use for DFPZ maintenance would be prevented by employing BMPs and the HFQLG Act standard riparian buffers, which should adequately protect all known beneficial uses of water, thus water quality objectives would be achieved. No direct effects would occur where herbicides are applied in RHCAs for weed control because Limited Operating Periods would restrict application to the driest portion of the year when intermittent channels are dry.

Indirect Effects on Measure 2 – Herbicides and Water Quality. Indirect effects of herbicide use for DFPZ maintenance under alternative B would be prevented by applying BMPs and HFQLG Act standard riparian buffers. Riparian buffers and BMPs would adequately protect all known beneficial uses of water, and water quality objectives would be achieved. No indirect effects would occur where herbicides are applied in RHCAs for weed control because Limited Operating Periods would restrict application to the driest portion of the year when intermittent channels are dry. Also, the rapid degradation of triclopyr in water and the distance from perennial channels would protect downstream aquatic ecosystems and organisms from adverse effects.

Cumulative Effects on Measure 2 – Herbicides and Water Quality. Cumulative effects of herbicide use for DFPZ maintenance or noxious weed control under alternative B would not occur because (1) no herbicides have been applied in the project area (except limited use on the Challenge Experimental Forest) since 1983; (2) a single application is proposed for DFPZ maintenance, so no additive effects would occur as a result of the proposed action; and (3) riparian buffers and BMPs would prevent detectable amounts of herbicides from entering the stream system. Although some detectable residue from herbicide use on adjacent private lands or on the Challenge Experimental Forest may be present, the proposed project-related activities would not increase the detected amounts. There would be a minor (up to 5 acres) overlap between areas proposed for herbicide use to maintain DFPZs and areas to control noxious weeds. Cumulative effects from these concurrent uses would be prevented due to these small areas of overlap, the creation of riparian buffers for all DFPZ applications and any weed control applications near perennial streams, and the strict adherence to BMPs. Although successive applications of triclopyr BEE may occur for noxious weed control for up to five years, rapid degradation of triclopyr in water and the distance from perennial channels would prevent persistence of triclopyr in downstream aquatic ecosystems and any cumulative effects.

3.8.4.3 Alternative C

Direct, Indirect, and Cumulative Effects on Measure 1 – CWE Analysis. There would be no differences in mechanical treatments for DFPZ implementation, group selection, individual tree selection, transportation system improvements, and aquatic and wildlife habitat restoration between this alternative and alternative B. DFPZ maintenance would not occur for approximately 10 years; therefore, any increase in ERAs from mechanical DFPZ maintenance cannot be analyzed at this time. The net acreage of hand treatment for noxious weed control would be minimal, and no detectable increase in direct, indirect, or cumulative effects on watershed or stream conditions from mechanical versus chemical noxious weed control is anticipated.

Direct, Indirect, and Cumulative Effects on Measure 2 – Herbicides and Water Quality. Under alternative C, herbicides would be not be used to maintain the effectiveness of DFPZs, and herbicides would be not be used to control noxious weeds. Therefore, no direct, indirect, or cumulative environmental effects from herbicides would be possible under this alternative.

3.8.4.4 Alternative D

Direct, Indirect, and Cumulative Effects on Measure 1 – CWE Analysis. There would be no differences in mechanical treatments for DFPZ implementation, group selection, individual tree selection, transportation system improvements, and aquatic and wildlife habitat restoration between this alternative and alternatives B and C (refer to sections 3.8.4.2 and 3.8.4.3 above). DFPZ maintenance would not occur for approximately 10 years; therefore, any increase in the ERAs from mechanical DFPZ maintenance cannot be analyzed at this time.

Direct and Indirect Effects on Measure 2 – Herbicides and Water Quality. Alternative D does not propose the use of herbicides to maintain the effectiveness of DFPZs, but it does propose herbicide use to control noxious weeds. Alternative D, as with alternative B, would not result in significant adverse environmental effects from proposed herbicide use. There would be no direct effects where herbicides are applied in RHCAs for weed control because Limited Operating Periods would restrict application to the driest portion of the year when intermittent channels are dry. Also, the rapid degradation of triclopyr in water and the distance from perennial channels would protect downstream aquatic ecosystems and organisms from adverse effects.

Cumulative Effects on Measure 2 – Herbicides and Water Quality. There would be no cumulative effects of herbicide use to control noxious weeds because no herbicides have been applied in the project area (except in the Challenge Experimental Forest) since 1983, and riparian buffers and BMPs would prevent detectable amounts of herbicides from entering the stream system. Although some detectable residue from herbicide use on adjacent private lands or on the Challenge Experimental Forest may be present, the proposed activities under the Slapjack Project would not increase the detected amounts. Successive applications of triclopyr BEE may occur for noxious weed control for up to five years, but rapid degradation of triclopyr in water, and the distance from perennial channels, would prevent persistence of triclopyr in downstream aquatic ecosystems and any cumulative effects.

3.8.4.5 Alternative E

Direct, Indirect, and Cumulative Effects on Measure 1 – CWE Analysis. There would be no differences in mechanical treatments for DFPZ implementation, group selection, individual tree selection, transportation system improvements, and aquatic and wildlife habitat restoration between this alternative and alternative B. The net acreage of mechanical treatment for noxious weed control would be minimal, and no detectable increases in direct, indirect, or cumulative effects on stream or watershed conditions from mechanical versus chemical noxious weed control are anticipated.

Direct and Indirect Effects on Measure 2 – Herbicides and Water Quality. Under alternative E, herbicides would be used to maintain the effectiveness of the DFPZ, but herbicides would be not be used to control noxious weeds. As with alternative B, direct and indirect effects of

herbicide use for DFPZ maintenance would be prevented by applying BMPs and the standard HFQLG Act riparian buffers, which would adequately protect all known beneficial uses of water; thus, water quality objectives would be achieved.

Cumulative Effects on Measure 2 – Herbicides and Water Quality. Cumulative effects of herbicide use for DFPZ maintenance would not occur because (1) no herbicides have been applied in the project area (except in the Challenge Experimental Forest) since 1983; (2) a single application is proposed for DFPZ maintenance, so no additive effects would occur as a result of the proposed action; and (3) riparian buffers and BMPs would prevent detectable amounts of herbicides from entering the stream system. Although some detectable residue from herbicide use on adjacent private lands or on the Challenge Experimental Forest may be present, the proposed activities under the Slapjack Project would not increase the detected amounts.

3.8.4.6 Alternative F

Direct Effects on Measure 1 – CWE Analysis. There would be no difference in mechanical treatments for DFPZ implementation, transportation system improvements, aquatic restoration, and wildlife habitat improvements between alternative F and alternatives B, C, D, and E. There would be no direct effects on stream channels from group selection treatments and individual tree selection because these types of treatments are located outside of RHCAs and SMZs. Since there would be no direct effects from these types of treatments, direct effects are expected to be the same as alternative B.

Indirect Effects on Measure 1 – CWE Analysis. Indirect effects would be similar to those described for alternative B. This alternative would only change indirect effects in subwatersheds 21, 22, 24, 26, and 29. A total of 19 group selection units are dropped: 1 group selection unit is located in subwatershed 21; 1 is in subwatershed 22; 11 are in subwatershed 24; 6 are in subwatershed 26; and 1 is in subwatershed 29. None of the action alternatives proposed individual tree selection treatments in subwatersheds over the TOC.

The reduction in the number of groups decreases the risk of indirect effects from the proposed group selection treatments. The proposed group selection units are mostly situated in upland areas away from stream channels, and although group selection would involve intensive mechanical treatment, the distribution of the treatments with respect to stream channels and RHCAs would be sparse, and consequently, the risk of indirect watershed effects on streams would be low.

Cumulative Effects on Measure 1 – CWE Analysis. The CWE analysis model results for alternative F include the sum of ERA values for the existing condition, reasonable foreseeable future activities, and for the proposed action (alternative B) within subwatersheds where areas available for group selection were dropped. This includes 1 group selection unit located in subwatershed 21; 1 in subwatershed 22; 11 in subwatershed 24; 6 in subwatershed 26; and 1 in subwatershed 29. None of the action alternatives propose individual tree selection treatments in subwatersheds over the TOC. A summary of the CWE model outputs for alternative F is include in tables 16 and 17 of the Slapjack Hydrology Report.

There would be no change in the ERA scores for near-stream sensitive areas under alternative F compared to alternative B. Group selection treatment units would be located outside of RHCAs;

therefore, the reduction in acres of group selection would have no impact on the ERA scores for these areas. There would be less than a 1 percent reduction in percent of TOC scores in subwatersheds 21, 22, 24, 26, and 29 under alternative F compared to alternative B. This less than 1 percent difference is statistically insignificant because such a small difference in already highly disturbed watershed landscapes would not result in observably different conditions on the ground. The high TOC scores are due to harvest activities on private land, roads, and urban development (refer to the discussion of existing condition and discussion of cumulative effects of alternative B). The reduction in the number of groups would decrease the short-term risk of additional cumulative effects, but the long-term benefits of group selection would not occur. In the long term, possible benefits to aquatic and riparian systems associated with the fire resiliency of these stand improvements would not occur.

Direct, Indirect, and Cumulative Effects on Measure 2 – Herbicides and Water Quality. The effects would be the same as those described for alternative B.

3.8.4.7 Alternative G

Direct, Indirect, and Cumulative Effects on Measure 1 – CWE Analysis. There would no difference in this alternative compared to alternative F.

Direct, Indirect, and Cumulative Effects on Measure 2 – Herbicides and Water Quality. Under alternative G, herbicides would be not used to maintain DFPZs, nor would they be used for noxious weed control; thus, environmental effects from herbicide use would not be possible under this alternative.

3.8.5 Past, Present, and Reasonably Foreseeable Future Actions

In the CWE analysis area, known land-disturbing activities where a proposed action has been defined were included in the final cumulative effects assessment. In this analysis area, there are currently no activities with a proposed action on the Plumas National Forest; however, the DFPZ treatments for the Slapjack Project would be connected to other DFPZ projects currently being implemented. There are several timber harvest plans on private lands. A list of past, present, and reasonably foreseeable future projects in the CWE analysis area are included in appendices F and G of the “Hydrology Report.” Subwatersheds 5, 7, 8, 21, 22, 26, 27, 29, 30, 32, 33, 35, 36, and 37 have proposed future private land activities.

3.8.6 Summary of Cumulative Effects

Measure 1: CWE Analysis. A comparison of ERA scores in relation to the TOC for each alternative is included in table 3-36.

Table 3-36. Summary of CWEs for each alternative.

Subwatershed Label	Alternative							
	A (No Action)		B (Proposed Action)		C, D, and E		G and F	
	Area A[a]	Total	Area A[a]	Total	Area A[a]	Total	Area A[a]	Total
1	115	75	115	76	115	76	115	76
2	154	91	152	96	152	96	152	96
4	264	141	273	154	273	154	273	154
5	44	29	35	53	35	53	35	53
6	168	90	168	93	168	93	168	93
7	93	49	90	70	90	70	90	70
8	133	75	133	79	133	79	133	79
9	53	44	58	48	58	48	58	48
10	3	9	1	16	1	16	1	16
11	94	39	85	45	85	45	85	45
12	105	50	96	63	96	63	96	63
13	188	87	182	95	182	95	182	95
14	242	93	242	93	242	93	242	93
15	173	111	175	125	175	125	175	125
16	345	104	346	106	346	106	346	106
17	240	86	284	97	284	98	284	98
18	60	30	82	57	82	57	82	56
19	365	149	375	159	375	159	375	159
21	318	121	316	143	316	143	316	143
22	405	146	430	165	430	165	430	165
23	102	76	101	75	101	75	101	75
24	233	92	237	107	237	107	237	106
25	244	105	244	105	244	105	244	105
26	168	130	168	146	168	146	168	145
27	53	36	53	42	53	42	53	42
28	39	15	41	16	41	16	41	16
29	679	157	686	170	686	170	686	171
30	35	37	37	42	37	42	37	42
31	34	55	34	54	34	54	43	54
32	61	73	58	72	58	72	58	72
33	63	32	63	65	63	65	63	65
34	36	40	36	41	36	41	36	41
35	104	69	121	74	121	74	121	74
36	79	42	93	53	93	53	93	53
37	190	87	199	98	199	98	199	98
38	164	83	164	85	164	85	164	85
39[c]	6	7	6	19	6	19	6	19
40	33	44	33	48	33	48	33	48
41	40	75	40	78	40	78	40	78
42	22	28	22	28	22	28	22	28

Note:

a. Area A = near-stream sensitive areas (all RHCAs).

3.8.6.1 Alternative A

1. The CWE analysis area is a highly disturbed landscape. Under the existing condition in the near-stream sensitive areas, there are 2 subwatersheds approaching the TOC and 24 above the TOC. For the subwatersheds as a whole, there are 8 approaching the TOC and 11 over the TOC. Subwatersheds 3 and 20 are also over the TOC but do not have any proposed Forest Service activities. However, activities within these watersheds contribute to downstream cumulative effects. The reasons all subwatersheds are approaching or over the TOC are due to the following: (1) timber harvesting practices on private land, (2) the high-density road network, and (3) urban development.

2. Stream condition surveys were conducted in RHCAs located within proposed DFPZ treatment units. Some of the stream reaches surveyed have no evidence of past cumulative effects, while other stream reaches have evidence of past cumulative effects from timber harvesting or mining activities. There have been very little timber harvesting activities on public lands during the last 25 years. The majority of the stream reaches surveyed in the proposed treatment units are in stable condition and have recovered from past cumulative effects. Some of the stream reaches surveyed are unstable due to current direct and cumulative impacts from roads adjacent to or crossing these stream reaches. Stream reaches cumulatively impacted from roads typically have unstable bare banks, a substrate dominated by fine sediments coming from the road, unstable channel morphology, and several headcuts.

3. Under the no-action alternative, DFPZ treatments, individual tree selection, group selection, transportation improvements (road reconstruction, closure, decommissioning, and restoration), wildlife restoration, and watershed restoration would not occur; hence, there would be cumulative effects on watershed conditions from the Slapjack Project.

4. The proposed action alternatives would provide long-term benefits, which would include reduced high fuel loading; increased soil cover in areas burned in the Pendola Fire and in areas absent of large woody; and the creation or enhancement of large woody debris and seral-stage diversity. Under alternative A, there would continue to be sediment increases from roads, fish barriers obstructing potential aquatic habitat, and continued degradation of meadow and stream channels.

5. There would be no herbicide treatments and no environmental effects associated with the application of herbicides would occur.

3.8.6.2 All Action Alternatives

1. The percent of TOC values for the 26 subwatershed near-stream sensitive areas that approach or exceed the TOC under the existing condition would remain near or above the TOC after implementation of activities proposed under all action alternatives. The percent of TOC would remain the same for alternative A and all action alternatives for subwatersheds 1, 3, 6, 8, 14, 25, 26, 27, 31, 33, 34, 38, 39, 40, 41, and 42. The percent of TOC would decrease in subwatersheds 2, 5, 7, 10, 11, 12, 13, 15, 21, 23, and 32 due to proposed road decommissioning and restoration activities. The percent of TOC would increase in subwatersheds 4, 9, 16, 17, 18, 19, 22, 24, 28, 29, 30, 35, 36, and 37 due to

proposed RHCA enhancement activities in plantations and brushfields. These treatments have been designed to improve conditions within the RHCAs, and these treatments would meet Riparian Management Objectives (see appendix A of the Hydrology Report).

2. In alternative B, C, D, and E for subwatershed as a whole, there are 7 subwatersheds approaching and 12 subwatersheds exceeding the TOC. Subwatershed 24 approaches the TOC under the existing condition, and would exceed the TOC under alternative B. Subwatershed 23 would decrease in the percent of TOC due to the proposed road decommissioning activities. In the subwatersheds that currently exceed the TOC, private land harvest activities are the major contributor to the high ERA scores, followed by roads and urban development. For all subwatersheds, the past 25 years of harvest activities on the Plumas National Forest, plus the proposed Slapjack Project activities, may contribute anywhere from 1 to 71 percent of the total ERA score. In the subwatersheds that currently approach or exceed the TOC, past activities on the Plumas National Forest, combined with the proposed Slapjack Project activities, may contribute between 1 and 20 percent of the total ERA score. In only 3 of the subwatersheds, the past and future activities on the Plumas National Forest would contribute in excess of 10 percent to the total ERA score. The greatest contribution under the proposed action would be in subwatershed 21, where 20 percent of the total ERA would be a result of past activities and future activities on the Forest.

3. Alternatives F and G propose to drop areas available for group selection treatments in subwatersheds over the TOC. There would be no measurable difference in the percent of TOC between alternatives F and G and alternatives B, C, D, and E. The group selection treatments would help to promote the goal of working toward a healthy, fire-resilient forest, and these benefits would not occur under alternatives F and G.

4. The CWE analysis area is a highly disturbed landscape under the existing condition. The ERA model demonstrates that all action alternatives have the potential to increase cumulative effects on the analysis area. In the subwatersheds that currently exceed the TOC, private land harvest activities are the major contributor to the high ERA scores, followed by roads and urban development. For all subwatersheds, the past 25 years of harvest activities on the Plumas National Forest, plus the proposed Slapjack Project activities, may contribute anywhere from 1 to 71 percent of the total ERA score. In the subwatersheds that currently approach or exceed the TOC, past activities on the Forest, combined with the proposed Slapjack Project activities, may contribute between 1 and 20 percent of the total ERA score. In only 3 of the subwatersheds, past and future activities on the Plumas National Forest would contribute in excess of 10 percent to the total ERA score. The greatest contribution under the proposed action would be in subwatershed 21, where 20 percent of the total ERA would be a result of past activities and future activities on the Forest.

5. The proposed DFPZ, group selection, and individual tree selection treatments are designed to promote the HFQLG Act desired condition of uneven-aged, multistoried, fire-resilient stands, while maintaining a healthy forest. An effective DFPZ would not entirely eliminate the possibility of high-severity wildfire affecting some watersheds, however, it

would provide firefighters an opportunity to contain the fire and prevent it from spreading across larger portions of the landscape. DFPZ projects across the HFQLG Pilot Project region would treat other portions of the landscape, and over time, the aggregate risk of stand-replacing fires would be reduced. The potential risk of CWEs from stand-replacing wildfire in the long term would greatly exceed the short-term increased risk of CWEs related to the proposed DFPZ treatments under the Slapjack Project. Overtime, implementation of these DFPZ, group selection, and individual tree selection treatments across the landscape would provide seral stage diversity by adding patches of the youngest seral stages to portions of larger CWHR size class 4 and 5 stands. Under all action alternatives, these stand structure improvements would occur, and in the long term, possible benefits to aquatic and riparian systems associated with the fire resiliency of these stand improvements would also occur. Possible short-term increases in runoff and erosion related to these treatments could occur.

6. Improvements to the transportation system, streambank stabilization projects, fish barrier removal, and meadow enhancement projects would have long-term benefits for the subwatersheds, especially in the near-stream sensitive areas. Benefits would include reduction in road- and bank-related erosion, drainage diversion and sediment deposition to channels, improved function and condition of channels and improved aquatic and riparian habitat, and increased availability of aquatic habitat to mobile species of fish, amphibians, and invertebrates from restoration of habitat connectivity. Short-term sediment increases that may result from these restoration activities would be offset by the ecological benefits and enhanced beneficial uses that are the intent of these restoration activities.

7. If a CWE were to occur, the most likely effect would be increased chronic sedimentation from increases in water yield and peak flow during high-intensity rain events. Peak flow changes, in particular, may cause increased sedimentation, changes in bedload transport, altered flow regimes, channel incision, undercuts and unstable banks, and channel morphology changes (Reid 1993). If a CWE were to occur from the Slapjack Project, it would most likely occur within low-gradient, third-order or greater reaches of the channel network and/or at major confluences.

8. It is assumed that protection of headwaters and tributaries to larger watersheds, along with implementation of effective nonpoint source conservation measures (BMPs), would provide protection of the entire watershed. If sedimentation is controlled through implementation of BMPs, the potential for project-related sediment delivery to the immediate channel and channels downstream would be small.

9. Cumulative effects of herbicide use for DFPZ maintenance or noxious weed control under alternatives B, D, E, and F would not occur because (1) no herbicides have been applied in the project area (except in the Challenge Experimental Forest) since 1983; (2) a single application is proposed for DFPZ maintenance, so no additive effects would occur as a result of the proposed action; and (3) riparian buffers and BMPs would prevent detectable amounts of herbicides from entering the stream system. Although some detectable residue from herbicide use on adjacent private lands or on the Challenge Experimental Forest may be present, the proposed project-related activities would not increase the detected

amounts. There would be a minor (up to 5 acre) overlap between areas proposed for herbicide use to maintain DFPZs and areas to control noxious weeds. Cumulative effects from these concurrent uses would be prevented due to these small areas of overlap, the creation of riparian buffers for all DFPZ applications and any weed control applications near perennial streams, and the strict adherence to BMPs. Although successive applications of triclopyr BEE may occur for up to five years for noxious weed control, rapid degradation of triclopyr in water and the distance from perennial channels would prevent persistence of triclopyr in downstream aquatic ecosystems and any cumulative effects.

3.9 Recreation, Visuals, Lands, and Minerals

3.9.1 Introduction

Recreation and land and mineral operations have historically been important activities in the vicinity of Bullard's Bar Reservoir and the communities of Challenge, Forbestown, Clipper Mills, and Feather Falls, California. The early trails and wagon roads (including those from the gold rush period of the 1850s) throughout the area still serve as important access routes for people in the nearby mountain and river communities to hunt, fish, mine, access land, and camp on the Plumas National Forest.

Most of the recreational use consists of dispersed activities such as hunting, picnicking, camping, fishing, wood cutting, hiking, backpacking, horseback riding, driving for pleasure, off-highway vehicle (OHV) use, and observing nature. Other recreational activities include, but are not limited to photography, mushrooming, and collection of basket-weaving materials. Madrone Cove Campground (accessible only by boat) is the one developed campground on the Plumas National Forest. The campground is on Bullard's Bar Reservoir and administered by the Tahoe National Forest.

The 1988 *Plumas National Forest Land and Resource Management Plan* (often referred to as the "Forest Plan") projected increases, over the next 50 years in recreation demand for all Recreation Opportunity Spectrum (ROS) classes. The ROS classes have been assessed for the Slapjack Project area and are defined in the Forest Plan. Approximately 50 percent of the project area is in a Roaded Modified Setting, where the sights and sounds of people are moderate, and roads, landings, and debris are evident. Approximately 25 percent of the project area (predominantly along the Oregon Hill Road, South Fork Feather River, and the area near Pike County Lookout) is in a Roaded Natural Setting, where sights and sounds of people are moderate. The area is mostly naturally appearing as viewed from sensitive roads and trails, and access travel is conventional motorized. The remaining 25 percent is designated as a Rural Setting and encompasses areas near Forbestown, Woodleaf, Clipper Mills, and Oregon Peak. Sights and sounds of people are evident, and the natural environment is culturally modified, yet attractive. Access and travel facilities are for individual intensive motorized use.

It should be noted that OHV use is increasing significantly, and this use is not being limited to roads and trails. OHV use in areas where access can be obtained (open ridges, firelines, and open country) is increasing rapidly. The Plumas National Forest is currently undergoing an OHV route inventory and designation process that will eventually restrict OHV use to specific routes and areas. No roads proposed for decommissioning or closure in the project area would be decommissioned or closed until the OHV route inventory and designation process is complete, which is scheduled for no later than 2008, unless egregious resource damage is occurring.

There are several Special Use Authorizations for nonfederal land uses in the vicinity of the project area. These authorizations are for road access into private property, stream gauge and monitoring equipment, a water tank and associated water line, telephone lines, and power lines.

Currently, there are no known Notices of Intent in the project area or Plans of Operation on file for mineral operations within the last five years.

3.9.1.1 Regulatory Framework

The 1988 Forest Plan (*Plumas National Forest Land and Resource Management Plan*) established goals, policies, and objectives for the management of the Forest (pages 4-3 to 4-11 and 4-13 to 4-20). The following list presents the specific Forest Plan goals that apply to recreation, lands, and minerals in the Slapjack Project area:

- Provide for a variety of forest-related recreation, and coordinate recreation with other resource use through the Recreation Opportunity Spectrum system.
- Improve and expand developed facilities and trails to meet demand while reducing unit costs and protecting other resources.
- Minimize conflicts between various recreational users.
- Allow use of off-highway vehicles wherever user conflicts or unacceptable resource damage are unlikely.
- Maintain high visual quality on lands committed to other uses or readily apparent from recreation developments, major travel routes, and other high use areas.
- Authorize nonfederal use of Plumas National Forest lands only if compatible with Management Area direction, use of other land is not feasible, conditions of issuance will mitigate all significant environmental impacts, and the public interest is protected.
- Encourage mineral and materials development throughout the Forest, except in specified areas withdrawn to protect sensitive resources or substantial investments that cannot otherwise be protected.

A key goal of the Recreation Opportunity Spectrum is to provide high-quality scenery (especially scenery with naturally appearing landscapes), which enhances people's lives and benefits society. The Visual Management System was developed to provide a process for the management of the "seen" aspects of the land and also the activities that occur on it. The process involves inventory, analysis, and the determination of Visual Management Objectives and provides for their input into an integrated resources planning and decision-making process. The synthesis of this information is used to determine Visual Quality Objectives for managing forest lands; the objectives describe different degrees of acceptable alteration of the natural landscape.

3.9.2 Methodology for Assessing Impacts on Recreation, Visuals, Lands, and Minerals

3.9.2.1 Scope of the Analysis

The analysis area for recreation, lands, and minerals that may be directly, indirectly, and cumulatively affected is the Slapjack Project area. Vegetation and transportation management proposals in the project area could affect recreational, land, and mineral opportunities and use, as well as the visual quality in the area. The proposed actions would have little effect on recreation, lands, and minerals outside the project area.

The indicators analyzed in detail for recreation include the Recreation Opportunity Spectrum and Visual Quality Objectives. Indicators analyzed in detail for lands and minerals include numbers of Special Use Authorizations, Notices of Intent, and Plans of Operation that were issued within the last five years or may be proposed in the foreseeable future.

3.9.2.2 Analysis Methods

The Visual Management System presents a vocabulary for managing scenery and a systematic approach for determining the relative value and importance of scenery and associated recreation in a National Forest. High-quality scenery, especially scenery with naturally appearing landscapes, enhances people's lives and benefits society. Ecosystems provide the environmental context for this scenery management system. The system is used in the context of ecosystem management to inventory and analyze scenery in a National Forest, to assist in the establishment of overall resource goals and objectives, to monitor the scenic resource, and to ensure high-quality scenery for future generations.

The Recreation Opportunity Spectrum (ROS) classes (as described in the Forest Plan), including Visual Management System and Visual Quality Objectives for the Slapjack Project area, were evaluated for changes that would result from project implementation.

Reviews of special uses and minerals files and databases were used to determine the extent of any current or foreseeable future land or mineral use in the project area and were evaluated for changes or potential changes that would result from project implementation.

3.9.3 Affected Environment (Existing Conditions)

The Slapjack Project area is located in the front country, which is predominantly intermixed with the Wildland Urban Interface towns of Forbestown, Challenge, Feather Falls, and Clipper Mills, and the recreational influence zone near Bullard's Bar Reservoir. Ground-based logging systems would be used to construct DFPZs and to conduct timber harvest in group selection units.

The 1988 Forest Plan characterized the ecological and social conditions in the Slapjack Project area and provided a context for future forest management decisions in the area.

3.9.3.1 Motorized Recreation

Motorized recreation is an important use of the Plumas National Forest, and OHV use has increased dramatically over the last decade, both locally and nationally. This use is expected to increase in the future. Trails and roads in the affected watersheds generally meet current recreation needs, although an OHV route inventory and designation process is in progress to identify routes and areas to be established by Forest Order. All other areas would be restricted from OHV use.

3.9.3.2 Recreation Opportunity Spectrum

Maintaining and improving current dispersed camping, hunting, fishing, and other recreational opportunities is a moderate priority. The Recreation Opportunity Spectrum (1986 ROS Book)

describes the recreation setting and opportunities and is used to evaluate recreation potential in the area. The Plumas National Forest ROS inventory is described in appendix R of the 1988 Forest Plan. The Plumas National Forest has been inventoried and divided into five classes: Primitive, Semi-primitive Non-motorized, Semi-primitive Motorized, Roaded Natural, and Rural.

The Roaded Natural class, as described in the ROS User's Guide, has been divided into two subclasses: Roaded Natural and Roaded Modified. Approximately 50 percent of the project area is Roaded Modified, 25 percent is Roaded Natural, and the other 25 percent is Rural. These classes are defined as follows:

- Roaded Modified is defined as those Roaded Natural areas that are also coded as Middleground, Background, or Unseen and Sensitivity Level II or III. This is the general resource management area of the forest, typified by pickup trucks and many miles of dirt and gravel roads. Other than trails and trailheads, virtually no improvements are present. Users experience low interaction.

- Roaded Natural is defined as those original Roaded Natural areas that are also coded as Foreground and Sensitivity Level I. These lands lie along the major travel ways and viewsheds, and nearly all developed sites are in this class. Paved roads and hardened sites are common. User interaction is moderate to high at developed sites.

- Rural is a substantially modified natural environment. Sights and sounds of people are evident. Renewable resource modification and utilization practices enhance specific recreation activities or provide the protection of vegetative soil cover.

3.9.3.3 Visual Quality Objectives

Visual Quality Objectives (VQOs) were mapped as part of the forest planning process using Agriculture Handbook 462 – Visual Management System, volume 2, chapter 1 (1974). The VQOs describe different degrees of acceptable alteration of the natural and characteristic landscape. The objectives are considered the measurable standards for the management of the "seen" aspects of the land. The following VQO definitions apply to the landscape in the project area:

- **Retention** – activities are not to be evident to the casual forest visitor.

- **Partial Retention** – activities may be evident but must remain subordinate to the characteristic landscape.

- **Modification** – activities may dominate the characteristic landscape but must, at the same time, utilize naturally established form, line, color, and texture. Activities should appear as a natural occurrence when viewed in the Foreground or Middleground.

Approximately 50 percent of the project area has a VQO of Modification, while the remaining approximately 50 percent is almost equally divided between Retention and Partial Retention.

3.9.3.4 Special Use Authorizations

There are several Special Use Authorizations in the project area for access roads, gates, telephone lines, power lines, a stream gauge, and a water tank and associated waterlines. The permittees include private citizens, local water agencies, and large corporations such as Pacific Gas and Electric Company and Pacific Bell Telephone Company. No new authorizations are known to exist in the project area.

3.9.3.5 Notices of Intent and Plans of Operation

Currently, there are no known Notices of Intent or Plans of Operation on file for any mineral operations in the project area.

3.9.4 Existing Conditions: Indicator 1 — ROS/VQO

The ROS details approximately 50 percent of the project area as Roaded Modified, with the remaining 50 percent somewhat equally divided between Roaded Natural and Rural.

Approximately 50 percent of the project area has a VQO of Modification, while the remaining 50 percent is divided almost equally between Retention and Partial Retention.

3.9.5 Environmental Consequences: Indicator 1 — ROS/VQO

3.9.5.1 Alternative A (No Action)

Direct and Indirect Effects. The no-action alternative would not initiate human-caused changes to the existing scenic conditions of the Slapjack Project area, except for wildland fire suppression. No timber harvest, road construction, road decommissioning, dispersed campsite improvement, or prescribed burning would be scheduled. The natural evolution of the vegetative component of the landscape would continue to change the scenic qualities of the area. The potential for catastrophic wildfire, along with the inherent changes in visual character, would continue to increase.

Alternative A (No Action)
- No treatments would be implemented.

Alternative B (Proposed Action)
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds with herbicides (up to 31 acres), mechanical and manual methods, and prescribed burning

Alternative C
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs without herbicides
- Control noxious weeds without herbicides

Alternative D
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs without herbicides
- Control noxious weeds with herbicides (up to 31 acres)

Alternative E
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds without herbicides

Alternative F
- Construct DFPZs
- Implement group selection (190 acres), except in watersheds over the Threshold of Concern
- Implement individual tree selection (148 acres); no proposed ITS units are located in watersheds over the Threshold of Concern
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds with herbicides (up to 31 acres)

Alternative G
- Construct DFPZs
- Implement group selection (190 acres), except in watersheds over the Threshold of Concern
- Implement individual tree selection (148 acres); no proposed ITS units are located in watersheds over the Threshold of Concern
- Maintain DFPZs without herbicides
- Control noxious weeds without herbicides

Cumulative Effects. There would be no cumulative effects.

3.9.5.2 All Action Alternatives

Direct and Indirect Effects. Action alternatives B, C, D, E, F, and G propose various amounts of vegetation management. Current VQOs would remain the same at the Moderate Modification level, which is 50 percent of the project area. Current VQOs of Retention would be met in all action alternatives because the types of proposed harvest activities would be designed to be visually unobtrusive.

Cumulative Effects. Past vegetation and transportation activities have influenced the current recreation, land, and mineral opportunities and use of the Slapjack Project area, so their effects are part and parcel of the existing conditions described above. There are no expected cumulative effects for any of these alternatives for the existing array of recreation, land, and mineral opportunities beyond the anticipated increase in dispersed recreational use.

3.9.6 Existing Conditions: Indicator 2 — Special Use Authorizations

There are several known Special Use Authorizations issued for nonfederal land uses in the project area. These authorizations are for access roads into private property (some with gates), several miles of power lines and telephone lines, and a water tank and associated waterline. These features would require protection during the layout and implementation of the Slapjack Project. There are no known new proposals now or in the reasonably foreseeable future.

3.9.7 Environmental Consequences: Indicator 2 — Special Use Authorizations

3.9.7.1 Alternative A (No Action)

Direct and Indirect Effects. The no-action alternative would not initiate human-caused changes in the project area except for wildland fire suppression. No timber harvest, road construction, road decommissioning, dispersed campsite improvement, or prescribed burning would be scheduled. The natural evolution of the vegetative component of the landscape would continue to change the scenic qualities of the area. The potential for catastrophic wildfire would continue to increase.

Cumulative Effects. There would be no cumulative effects from alternative A.

3.9.7.2 All Action Alternatives

Direct and Indirect Effects. Action alternatives B, C, D, E, F, and G propose various amounts of vegetation management. Known special use improvements would require contractual protection. With the required protection of these improvements, there would be no direct or indirect effects with implementation of this mitigation measure.

Cumulative Effects. Past vegetation and transportation activities have influenced the current opportunities and use of the Slapjack Project area, so their effects are part and parcel of the existing conditions described above. There are no expected cumulative effects for any of these alternatives for the existing array of other opportunities, beyond the anticipated increase in other recreational use.

3.9.8 Past, Present, and Reasonably Foreseeable Future Actions

The proposed Defensible Fuel Profile Zone (DFPZ) treatments for this project would be part of the network of other DFPZ projects currently being implemented or proposed on National Forest System lands in the area. A future project includes a roadside noxious weed risk assessment. There are several timber harvest plans on private lands within the Slapjack Project boundary. There are no known additional recreational uses, Special Use Authorization proposals, or mineral entries in the reasonably foreseeable future in the project area.

3.9.9 Summary of Cumulative Effects

Past vegetation and transportation activities have influenced the current recreational, land, and mineral opportunities and use in the Slapjack Project area, so the effects of the activities are part and parcel of the existing conditions described above. There would be no other cumulative effects associated with alternative A beyond the anticipated increase in use, especially recreation.

The action alternatives would not exclude any of the existing uses but could modify the amount of recreational access. The proposed transportation management activities would slightly reduce the level of OHV access. This would primarily be through road closing or decommissioning following the OHV route inventory and designation process. The proposed transportation management activities are discussed in more detail under “Transportation System” (section 3.11 in this EIS).

Past vegetation management activities in the project area have left vegetation in various stages of recovery. Impacts of past activities on the visual quality of sensitive travel routes become less evident as vegetation continues to recover. There are no expected cumulative effects on visual resources from the proposed vegetation and transportation management activities because the adopted VQOs for the area would be met.

3.10 Soils

3.10.1 Regulatory Framework

3.10.1.1 National Forest Management Act

The *National Forest Management Act of 1976* (see appendix G of this EIS for the findings) mandates that land management plans be prepared for each National Forest (see the *Plumas National Forest Land and Resource Management Plan* discussion below), and that guidelines be specified that

- ensure research on and (based on continuous monitoring and assessment in the field) evaluation of the effects of each management system to the end that it will not produce substantial and permanent impairment of the productivity of the land; and

- ensure that timber will be harvested from National Forest System lands only where soil, slope, or other watershed conditions will not be irreversibly damaged.

3.10.1.2 Plumas National Forest Land and Resource Management Plan

The 1988 *Plumas National Forest Land and Resource Management Plan* (commonly referred to as the "Forest Plan") specifies standards and guidelines for the maintenance and improvement of soil resources (USDA Forest Service 1988). The following is a summary of these standards and guidelines, which are described in detail in the "Slapjack Soils Report" on file in the project record.

1. Minimize excessive loss of organic matter and limit soil disturbance during project activities according to the Erosion Hazard Rating (her) as follows: (1) EHR 4-8: Conduct normal activities, (2) EHR 9-10: Minimize or modify use of soil-disturbing activities, and (3) EHR 11-13: Severely limit soil-disturbing activities.

2. Determine adequate amounts of effective ground cover in planned treatment areas using the following as a guide: (1) Low EHR (4-5): 40 percent minimum effective ground cover, (2) Moderate EHR (6-8): 50 percent minimum effective ground cover, (3) High EHR (9-10): 60 percent minimum effective ground cover, and (4) very high EHR (11-13): 70 percent minimum effective ground cover.

3. Dedicate no more than 15 percent of timber stands to landings and permanent skid trails in order to avoid land base productivity loss due to soil compaction.

3.10.1.3 National Soil Management Handbook

The Soil Management Handbook (USDA 1991) is a national soils handbook that defines soil productivity and components of soil productivity, establishes guidance for measuring soil productivity, and establishes thresholds to assist in forest planning. Although terms used in the analysis are defined in this document, more detailed descriptions of all definitions and guidance contained in the handbook are included in the "Slapjack Soils Report" on file in the project record. The following is a summary of the guidance:

A fifteen percent reduction in inherent soil productivity potential which can be used as a basis for setting threshold values for measurable or observable soil properties or conditions. The threshold values, along with the areal extent limits, would serve as an early warning signal of reduced productive soil capacity.

3.10.1.4 Region 5 Soil Management Handbook

The Forest Service Region 5 Soil Management Handbook establishes regional soil quality analysis standards (USDA 1995). The Region 5 soil quality analysis standards apply only to those areas dedicated to growing vegetation. They are not applied to other dedicated uses, such as specified roads and developed campgrounds. The handbook supplement establishes consistent analysis standards across the region. These analysis standards provide threshold values that indicate when changes in soil properties and soil conditions would result in significant change or impairment of the soil productivity potential, hydrologic function, or buffering capacity of the soil. Detrimental soil disturbance is the resulting condition when thresholds are exceeded. The handbook states that the extent of detrimental soil disturbance that affects soil productivity, shall not be of a size or pattern that would result in a significant change in production potential for the activity area. Detrimental soil disturbance indicators include soil productivity, soil hydrologic function, and soil buffering capacity. Included in the “Slapjack Soils Report” is a list of soil properties, conditions, and associated threshold values to avoid detrimental soil disturbance and evaluation management effects on soil productivity, soil hydrologic function, and soil buffering capacity. The following is a summary of these threshold values:

1. A 10 percent reduction in total soil porosity corresponds to a threshold for soil bulk density that indicates detrimental soil compaction.

2. Organic matter is maintained in amounts sufficient to prevent significant short- or long-term nutrient cycle deficits and to avoid detrimental physical and biological soil conditions.

3. Prescribe surface organic matter in amounts that would not elevate wildfire risk or severity to the point that desired organic matter for nutrient cycling cannot be achieved or maintained because of increased wildfire risk potential. If there is no viable alternative for providing surface organic matter without elevating wildfire risk, prescribe an amount that does not significantly increase wildfire risk and monitor soil nutrient status. Apply mitigation measures if decreased nutrient supply has the potential to affect ecosystem health, diversity, or productivity. The prescribed amount shall not reduce the amount needed for soil cover to prevent accelerated erosion.

4. Soil organic matter is used as an indicator of soil displacement effects on nutrient and soil moisture supply. Use the kinds and amounts of organic matter identified below; these may be supplemented with local analyses.

    a. Fine organic matter includes plant litter, duff, and woody material less than 3 inches in diameter and occurs over at least 50 percent of the area. The preference is for fine organic matter to be undisturbed, but if disturbed, the quantity and

quality should avoid detrimental short- and long-term nutrient cycle deficits. Determine minimum organic layer thickness and distribution locally and base it on amounts sufficient to persist through winter season storms and summer season oxidation. Use the presence of living vegetation that could contribute significant annual litter fall to compensate for conditions when immediate post-disturbance fine organic matter coverage is too thin or less than 50 percent. If the soil and potential natural plant community are not capable of producing fine organic matter over 50 percent of the area, adjust minimum amounts to reflect potential soil and vegetation capability.

b. Large woody material consists of at least five well-distributed logs per acre and represents the range of decomposition classes. Desired logs are at least 20 inches in diameter and 10 feet long. Protect logs in decomposition classes 3 through 5 from mechanical disturbance. Do not count logs less than 12 inches in diameter or stumps as large woody material. Adjust the minimum logs per acre to account for ecological type (FSH 2090.11) potential and site-specific needs as data become available. To help meet fuel management objectives, minimum logs can be adjusted to take advantage of short-term large woody material contributions in snag recruitment areas.

c. Other surface organic matter (3 inches to 20 inches in diameter), or amounts of fine organic matter and large woody material in excess of amounts described in detail above, need not be retained. The amount of large woody material and fine organic matter may be reduced (except when needed for essential erosion control) to meet fuel management objectives in strategic fuel treatment areas, on fuel breaks, and in other critical areas. Evaluate or monitor soil nutrient status in fuel treatment areas and other areas that lack sufficient large woody material and fine organic matter.

5. To avoid accelerated surface runoff, ensure infiltration and permeability are not reduced to ratings of 6 or 8 as defined in the Region 5 Erosion Hazard Rating system.

Region 5 also recommends standard mitigation measures to avoid detrimental soil disturbance. Detailed descriptions of all recommended mitigation measures contained in the handbook have been incorporated into project design features and mitigation measures for all action alternatives and are included in Appendix F of this EIS and the “Slapjack Soils Report” on file in the Project Record.

3.10.2 Methodology for Assessing Impacts on Soils

3.10.2.1 Scope of Analysis

Geographic Scope of the Analysis for Effects on Soil Properties. The scope of the analysis for direct, indirect, and cumulative effects on soil properties from all proposed treatments is limited to the proposed treatment units. The effects of all treatments on soil productivity would only occur in the location of the proposed treatments. All treatment units where ground-based mechanical treatments (that is, DFPZ, group selection, and individual tree selection) are proposed were surveyed for ground cover, compaction, and organic matter. The DFPZ treatment units were surveyed prior to their final boundary designations. Some of these treatment units were later split, and data are reported as the

total average for the units composing the original treatment area surveyed. For group selection treatment areas, the silviculturalist determined the maximum area available for group selections. Multiple 1- to 2-acre plots could be treated for group selections within this larger area. The maximum area available for group selection was surveyed, rather than individual group selection treatments, to analyze for the maximum area that could potentially create disturbance to soil properties. Data collection included point sampling in treatment units along systematic randomized transects, which were designed to sample the geographic and topographic extent and variation of those treatments. Transect locations were initially determined using a topographic map and modified in the field to ensure collection of the necessary information. Transect length, number of sample points, distance between sample points, and number of transects required for adequate sample size were determined using the topographic map scale. Sample size depended on unit variation and size and included at least 15 sample points. Data on slope, soil texture, detrimental soil compaction, ground cover, soil disturbance, and large woody debris were recorded along transects. These proposed treatment units were field surveyed in the spring and fall of 2004 and early summer 2005. For a more detailed discussion of field methods, refer to the “Slapjack Soils Report” in the project record. The proposed treatment units are displayed in figure A-1 in appendix A of this EIS.

The treatment units proposed for underburn treatments only or skyline were not surveyed. Underburning and skyline were selected for this method of treatment due to the steep slopes. Observations of past projects that used prescribed burning on areas with similar conditions have not resulted in a loss of soil cover below Forest Plan standards and guidelines. This is due to an existing condition having a thick duff and litter layer that does not burn all the way to the topsoil and needle cast following the burn. It is expected that these conditions would be similar for the Slapjack Project underburn treatment units. Skyline treatments do not employ mechanical ground-based equipment; because of this, ground cover would not be removed, and there would not be additional detrimental soil compaction. Underburing and skyline treatments are not expected to cause detrimental soil disturbance because they do not result in soil compaction or loss of effective ground cover below standards and guidelines; thus, they were not included in the scope of this analysis. Areas of road reconstruction or new road construction were not analyzed for effects on soil properties. The amount of new soil disturbance during road reconstruction would be minor; however, reconstruction would probably re-initiate new sedimentation. Proposed road decommissioning and restoration activities were analyzed and are considered an improvement to soil properties. Road decommissioning would restore land that was once unsuitable for tree growth.

The effects of herbicide use on soils are also limited to the area of the proposed treatments. Herbicide presence in the Slapjack Project area under the existing condition is negligible or nonexistent due to the breakdown rate of herbicides in soils. Herbicide migration through soils or other pathways from adjacent private lands is likely minimal and was not analyzed. The only recent use of herbicides on the Plumas National Forest is associated with a Fuel Reduction Study on the Challenge Experimental Forest. As part of this study, four 0.5-acre plots were treated with Velpar L (hexazinone) in 2004, followed several months later with Accord Concentrate (glyphosate) and Arsenal (imazapyr). Soil solution samples are being analyzed at the University of California, Davis. In 1991 and 1997, herbicides (Garlon™ 4 and Roundup) were used to control tanoak on several 0.5-acre plots on the Experimental Forest as part of a long-term soil productivity study.

3.10.2.2 Timeframe for the Analysis

The soils analysis does not incorporate a time limit for considering past or future activities. The current soil conditions reflect the cumulative effects of past activities, regardless of when they took place. For example, if multiple activities have occurred in a given treatment unit over the past 50 years, it is not possible to separate the effects of older treatments from more recent ones. As a result, it is not practical to set a time constraint on those effects. The future timeframe for the soils analysis must extend until the resource has recovered from the impact of the proposed activities. The persistence of soil effects into the future can vary widely. For example, ground cover may recover within one to two years following a treatment. Soil compaction, however, may last for decades.

3.10.2.3 Analysis Method for Assessing Effects to Soil Properties

The methods used to assess the effects of proposed activities under all action alternatives are based on the Forest Plan standards and guidelines and the Forest Service Region 5 soil quality analysis standards defined in the Soil Management Handbook (refer to the "Regulatory Framework" section above). These analysis standards provide threshold values that indicate when changes in soil properties and soil conditions would result in significant change or impairment of the productivity potential, hydrologic function, or buffering capacity of the soil. When these threshold values are exceeded, the result is detrimental soil disturbance.

Indicator 1: Soil Productivity. Soil productivity is the inherent capacity of a soil to support growth of plants, plant communities, and soil biota (USDA Forest Service 1995). The important measures of soil productivity include soil cover, soil porosity, and organic matter.

Measure 1: Soil Cover**—**An effective soil cover (also called ground cover) consists of low-growing vegetation (grasses, forbs, and prostrate shrubs), plant and tree litter (fine organic matter), and surface rock fragments. Soil cover may also include applied mulches (straw or chips) (USDA Forest Service 1995). Vegetative cover serves several purposes in the mitigation of accelerated soil erosion (California Soil Survey Committee 1989). Effective ground cover was measured in field surveys, and the Erosion Hazard Rating (EHR) system was used to quantify the kind, amount, and allowable disturbance of soil cover necessary to prevent detrimental accelerated soil erosion (USDA Forest Service 1988b). The EHR is a risk assessment of specific soil factors that induce accelerated erosion (USDA Forest Service 1990). The purposes of the EHR are to (1) evaluate the likelihood of accelerated sheet and rill erosion from a specific soil-disturbing activity, (2) evaluate the risk for adverse consequences, and (3) identify approximate soil cover amounts needed to achieve an acceptable risk. The EHR was computed using the California Soil Survey Committee Erosion Hazard Rating Computation Form (CSSC 1989). The form is based on four components: soil erodibility factors, runoff production factors, runoff energy factor, and soil cover factors. These components are described in detail in the "Slapjack Soils Report" on file in the project record.

Measure 2: Soil Porosity**—**Soil porosity, which is the volume of pores in a soil that can be occupied by air, gas, or water, varies depending on the size and distribution of the particles and their arrangement with respect to each other. The measure used to assess detrimental disturbance to soil porosity is the level of detrimental compaction of the soil, which occurs at a depth of 4 to 8 inches in the soil profile. This information was collected during field surveys and determined by using the spade method. The point at which soil is considered detrimentally compacted is when the spade is

resistant to penetration, the soil structure is platy or massive, and/or roots are growing parallel. To ensure the data collectors were collaborated correctly, core samples were taken to test for soil bulk density. In the majority of the samples, the data collectors were correct in their determination. In cases where they were incorrect, the samples were borderline (barely compacted or uncompacted).

***Measure 3: Organic Matter*—**The organic matter of forest soils can be grouped into two types: soil organic matter and surface organic matter, which is further divided into fine organic material and large woody debris. Fine organic material includes plant litter, duff, and woody material less than 3 inches in diameter. Data for both fine organic matter and large woody debris were collected during field surveys. Soil organic matter is the cache for plant nutrients and is the primary source of plant-available nitrogen, phosphorous, and sulfur. Soil organic matter provides habitat for all of the diverse organisms in soil that carry out energy transformation and cycle nutrients. It is also responsible for the strong granular structure and high porosity in healthy forest soils. Organic matter increases water storage capacity and encourages higher infiltration rates. Accumulated duff and litter moderate soil temperature and moisture, providing an environment favorable for the macroinvertebrates that recycle plant and animal remains. Surface organic material also protects soils from erosion, enhances infiltration, and hydrologic function. Large woody debris decays slowly, providing a structural habitat for organisms that fix nitrogen and an excellent growth medium for mycorrhizae fungi. Surface organic matter was assessed through field surveys.

Indicator 2: Soil Hydrologic Function. Soil hydrologic function is the inherent capacity of a soil to intake, retain, and transmit water (USDA Forest Service 1995). Soil hydrologic function is influenced by infiltration, permeability, and the depth to permeability reduction. These factors affect the rate of water movement into and through the soil. Infiltration is the rate of water movement into the soil, and soil texture and soil porosity are used to determine infiltration rates (USDA 1990). Permeability is the rate at which water moves down through the soil. The principal factor controlling the movement of water through soil is its porosity. Subsoil and substrate permeability rates are compared to surface infiltration rate to evaluate the likelihood of water accumulating in the soil (USDA 1990). The Plumas National Forest soil resource inventory included the estimation of infiltration and permeability for each soil map unit. The information in the inventory is used to estimate the ratings as defined in the EHR system. Infiltration rates are described as high (low runoff potential), moderate, slow, and very slow (high runoff potential). Infiltration rates are grouped according to the intake of water when soils are thoroughly wet and receive precipitation from long-duration storms. The infiltration rates of each soil map unit located in the Slapjack Project area are included in appendix B of the Soils Report. Permeability ratings assess the quality of the soil that enables water to move downward and are based on the least permeable horizon. The main factor controlling permeability is soil porosity. Permeability is measured as the number of inches per hour that water moves downward through saturated soil. Permeability is described as very slow, slow, moderately slow, moderate, moderately rapid, rapid, and very rapid. The permeability ratings of each soil map unit located in the Slapjack Project area are included in appendix B of the Soils Report.

Indicator 3: Soil Buffering Capacity. Soil buffering capacity is the inherent capacity of soil to absorb, filter, or degrade added chemicals, heavy metals, or organic materials (USDA Forest Service 1995). The soil buffering capacity of soils in the project area is not known. No materials would be added to soil that would alter reaction classes, buffering, or exchange capacity. It is not expected that soil buffering capacity would be changed by management activities in the Slapjack Project area.

3.10.3 Existing Condition

3.10.3.1 Physical Framework

Physiography. The Slapjack Project area lies within the Sierra Nevada geologic and geomorphic province. The Feather River and Yuba River watersheds include the majority of the Plumas National Forest and the entire project area. These are the northernmost major rivers draining the west slope of the Sierra Nevada. The topography of the Yuba-Feather River region is relatively gentle in comparison to the higher, more rugged relief of the range further south. Peaks in the area do not exceed 7,000 to 8,000 feet at a maximum. The western slope of the Sierra Nevada in this region is characterized by broad, rolling highlands incised by steep river canyons and their tributary streams. The highest elevation in the watersheds analyzed for the project is 4,160 feet on Peterson Ridge in the northeastern most portion of the area. The lowest elevation at Lake Oroville is 900 feet at full pool. The total relief of the project area watersheds is approximately 3,200 feet. The greatest relief in the area occurs in the canyons of the South Fork Feather River and the North Yuba River (north arm of New Bullard's Bar Reservoir), with ridge crest-to-channel elevation differences of approximately 2,000 feet in 1 mile. Steep side slopes in these canyons exceed 100 percent gradients in some areas. Gently convex ridgetop areas between the major canyons break abruptly to steep tributary canyons. The proposed treatment units for the Slapjack Project would be distributed across all elevations of the watershed area, ranging from about 1,000 feet to over 3,500 feet. The proposed DFPZ harvest and mastication units would generally be situated in upland positions with gently to moderately sloping topography, but some group selection and underburn units would be located on steeply sloping ground.

Geologic Composition. The bedrock geology of the watershed area is comprised proportionally of approximately 63 percent metamorphic rocks and 37 percent intrusive rocks. Tertiary volcanic rocks are not exposed in the project area.

Glaciation. The watershed area lies below the elevation of late Pleistocene glaciation, and no evidence of glacial geomorphic features are found in the area.

Slope Instability and Sediment Sources. The distribution of slope instability within the watershed area is not well known at this time. Areas in the inner canyons of the South Fork Feather River and North Yuba River (north arm of New Bullard's Bar Reservoir) are over steepened and may experience inner gorge land sliding and rock fall. Steep tributary streams, particularly first- and second-order channels in canyon side slope settings, appear prone to debris flows, particularly following disturbance induced by wildfire and low-recurrence interval and high-intensity precipitation events. Outside of these over-steepened areas, mass wasting does not appear to be a dominant source of sediment in the area. Sheet and rill erosion and channel incision contribute sediment, probably to the greatest extent following disturbance by fire and large storms. Roads, and to a somewhat lesser degree timber harvest, appear to be the primary human-caused sediment sources on the modern landscape.

Soil Types and Map Units. Soil map units in the project area are identified in the Plumas National Forest Soil Resource Inventory (Churchill 1989), which is an Order 3 soil survey. Sixty-nine soil map units are included within the project area boundary. The map units, with their areal extent and proportion of the project area, are included in the "Slapjack Soils Report" on file in the project record. The project area falls entirely within soil map unit 8, Aiken-Josephine. The landscape of

general soil map unit 8, as described within a group of landscapes states, “Dominantly nearly level to very steep soils that are moderately well to well drained.” The Aiken-Josephine group is further described as “Gently sloping to very steep, deep, moderately well drained, loamy or clayey soils on toe slopes and steep side slopes.” The soils in the survey area consist of about 50 percent Aiken soils and 35 percent Josephine soils, with the remainder composed of Holland soils, basic soils, and ultic haploxeralfs. These proportions are roughly accurate for the project area, with a somewhat lower proportion of Josephine soils present, and a somewhat greater area of Holland soils. Texturally, Aiken soils are dominantly clay, especially in the subsoil; Holland soils are loams to clay; and Josephine soils are loams to clay loams. Aiken soils are highly susceptible to rutting and compaction; Holland soils are highly susceptible to compaction; and Josephine soils are moderately susceptible to rutting and compaction. These soils are considered at high risk for reduced site productivity due to compaction, if heavy equipment operation occurs when soils are wet. Holland soils are highly erodible and subject to mass instability, gullying, and surface erosion. Together, these three soil families occupy about 70 percent of the project area. Chaix, Clallam, Dubakella, and Wapi soil families are minor representatives, with 5 percent or less of the project area occupied by each. A table of all soil families located in the Slapjack Project area is located in the “Slapjack Soils Report.”

Herbicides and Soil Quality. Herbicide presence in the Slapjack Project area on Plumas National Forest lands is negligible or nonexistent—this is based on existing conditions. The only recent use of herbicides on the Plumas National Forest is associated with a Fuel Reduction Study on the Challenge Experimental Forest. As part of this study, four 0.5-acre plots were treated with Velpar L (hexazinone) in 2004, followed several months later with Accord Concentrate (glyphosate) and Arsenal (imazapyr). Soil solution samples are being analyzed at the University of California, Davis. In 1991 and 1997, herbicides (Garlon™ 4 and Roundup) were used to control tanoak on several 0.5-acre plots on the Experimental Forest as part of a long-term soil productivity study.

Herbicide migration through soils or other pathways from adjacent private lands is likely minimal. Imazapyr can remain active in the soil for six months to two years; however, it is strongly adsorbed by soils and usually found only in the top few inches of soil, which means this chemical is not mobile (Information Ventures, Inc. 2005; USDA Forest Service 1989). Triclopyr is active in the soil and is absorbed by plant roots, clay particles, and organic matter particles, but it degrades rapidly and has an average half-life in soils of 46 days (Information Ventures, Inc. 2005; USDA Forest Service 1989). As a result, under the existing condition, the project area is determined to be largely free of herbicide chemicals or their degradate byproducts and to be in reference condition with respect to the effects of herbicides on soil properties. Hexazinone was used on private land within the Health and Human Risk Assessment analysis area. Hexazinone is considered highly mobile, has a long half-life, and can travel with water through soil to enter the groundwater. It is possible that hexazione could exist in the soils analysis area for herbicides because it has been applied on private land (USDA Forest Service 1989). This project is not proposing the use for hexazinone and therefore was not analyzed because there would be no cumulative effects from hexazonine.

3.10.3.2 Existing Condition: Indicator 1 — Soil Productivity

A table listing soil map unit number, number of data points collected, and known past management activities for each proposed treatment unit surveyed is provided in the Slapjack Soils Report.

Existing Condition: Measure 1 – Soil Cover. The existing condition of all proposed treatment units surveyed and calculated EHR ratings are listed in the Slapjack Soils Report. For a detailed description of the existing condition for each treatment unit surveyed, refer to the "Slapjack Soils Report" on file in the project record.

All of the proposed treatment units surveyed have an EHR rating with a numerical value below 8, meaning that normal activities can be conducted, according to Forest Plan standards and guidelines.

The majority of the proposed treatment units surveyed meets or exceeds the Forest Plan standards and guidelines for effective ground cover. Table 3-37 shows the proposed treatment units that do not meet ground cover standards and guidelines under the existing condition.

Table 3-37. Proposed treatment units that do not meet cover standards and guidelines under the existing condition.

Proposed Treatment Unit Number	Percent Effective Ground Cover	Reason for Treatment Unit Below Threshold
5, 7, and 607	27	These proposed treatment units are located in the area of the stand-replacing Pendola Fire. Soil surveys determined that there is a lack of effective ground cover, and hillslope erosion has resulted from the fire event (see table 3 in Soils Report).

These areas are proposed for treatments to create a DFPZ, reduce the high fuel loading conditions, and to accelerate development of the timber stands. These treatment units are proposed for mastication, and ground cover would increase as a result of the proposed treatments. There are group selection treatment areas within these DFPZ units, and the landings and skid trails that would be used would have additional mitigation measures (for example, spreading of slash from mastication, seeding, or mulching) to add soil cover in areas where ground cover is removed from the group selection treatments (see appendix F).

Existing Condition: Measure 2 – Soil Porosity. Standards and guidelines on page 4-44 of the Forest Plan state, "to avoid land base productivity loss due to soil compaction, dedicate no more than 15% of timber stands to landings and permanent skid trails." The Plumas National Forest has not dedicated landings and permanent skid trails in past timber activities. The areas of disturbance have been allowed to naturally revegetate through time or have been subsoiled to reduce impacts from detrimental compaction. However, there are areas within timber stands that have not fully recovered since the stand was last entered.

There are no established threshold standards on the Plumas National Forest for areal detrimental soil compaction. Forest Service Region 5 analysis standards for soil quality state that a 10 percent reduction in total soil porosity corresponds to a threshold for soil bulk density that indicates detrimental soil compaction (USDA Forest Service Region 5 Soil Management Handbook 1995). This analysis standard is for site-specific measurements and does not establish a standard for a threshold of detrimental compaction for activity areas. The National Soil Management Handbook (USDA Forest Service 1991) provides a guideline of 15 percent reduction in inherent soil productivity potential which can be used as a basis for setting threshold values for measurable or observable soil properties or conditions. The threshold values, along with the areal extent limits, would serve as an early warning signal of reduced productive soil capacity.

The existing condition of areal detrimental soil compaction analyzed in proposed treatment units is displayed in tables 5 and 6 of the Soils Report. Detrimental compaction occurs when compaction exists at a depth of 4 to 8 inches in the soil profile.

The majority of the proposed treatment units are currently below the detrimental compaction threshold provided in the National Soil Management Handbook. Table 3-38 lists treatment units that exceed the 15 percent detrimental compaction threshold under the existing condition.

Table 3-38. Proposed treatment units that exceed the 15 percent detrimental compaction threshold under the existing condition.

Proposed Treatment Unit Number	Percent of the Proposed Treatment Unit That Is Determinately Compacted	Reason Why Treatment Unit Is Above Threshold
52, 152, 402, and 9401	22	These treatment units are plantations that are 20 to 30 years old. The legacy detrimental compaction is a result of past Plumas National Forest management activities on a soil type that is highly susceptible to detrimental soil compaction by heavy equipment during wet periods.
53	22	This unit is not a plantation, but through the surveys, legacy skid trails were found within the unit. The legacy detrimental compaction is a result of past Plumas National Forest management activities on a soil type that is highly susceptible to detrimental soil compaction by heavy equipment during wet periods.
504	18	This unit is not a plantation, but through the surveys, legacy skid trails were found within the unit. The legacy detrimental compaction is a result of past Plumas National Forest management activities on a soil type that is highly susceptible to detrimental soil compaction by heavy equipment during wet periods.
505	26	This unit is a maximum area available for group selection treatments. Within this area there was a sanitation salvage in 1983. The legacy detrimental compaction is a result of past Plumas National Forest management activities on a soil type that is highly susceptible to detrimental soil compaction by heavy equipment during wet periods.
515	20	This unit is not a plantation, but through the surveys, legacy skid trails were found within the unit. The legacy detrimental compaction is a result of past Plumas National Forest management activities on a soil type that is highly susceptible to detrimental soil compaction by heavy equipment during wet periods.

These areas are proposed for treatments to create DFPZs, reduce the high fuel loading conditions, and to accelerate development of the timber stands. Some treatment units are proposed for mastication, which would not cumulatively increase detrimental compaction. The treatment units proposed for harvesting with ground-based mechanical equipment would have additional mitigations measure (such as subsoiling) that would reduce the cumulative effects of detrimental soil compaction (see the “Environmental Consequences” section below for more information).

Existing Condition: Measure 3 – Organic Matter. Field-collected data for fine organic matter and large woody material for proposed treatment units is displayed in tables 7 and 8 in the Soils Report. Tables 3-39 and 3-40 below show the proposed treatment units that do not meet the Region 5 soil quality analysis standards for organic matter.

Table 3-39. Proposed treatment units that do not meet the Region 5 soil quality analysis standards for organic matter.

Treatment Unit Number	Percent of Fine Organic Matter	Reason for Treatment Unit Below Standards
5, 7, and 607	26	These proposed treatment units were located within the stand-replacing Pendola Fire. Soil surveys determined there is a lack of effective ground cover, and hillslope erosion occurred as a result of the fire.

Table 3-40. Proposed treatment units that are below the large woody material threshold under the existing condition.

Treatment Unit Number	Amount of Large Woody Debris (per acre)	Reason for Treatment Unit Below Standards
4	2.4	According to California Wildlife Habitat Relationship (CWHR) data, this unit has an average diameter at breast height (dbh) of 24 inches. The available data sets (CWHR) do not provide enough information for historical context for lack of woody debris. Field surveys verified that woody debris available was less than what is recommended by the Forest Service Region 5 Soils Management Handbook.
5	3.4	This unit was located within the stand-replacing Pendola Fire. Large woody debris on the ground was lost as a result of the fire.
6	0	Plantation
96	2.7	Plantation
97	0	Plantation
91	3.2	Plantation
98	0	Plantation
26	0	Plantation
29n	2.1	Plantation
29s	2.1	Plantation
229	2.7	According to CWHR data, this unit has an average dbh of 24 inches. The available data sets (CWHR) do not provide enough information for historical context for lack of woody debris. Field surveys verified that available woody debris was less than what is recommended by the Region 5 Soil Management Handbook.
32	4.8	According to CWHR data, this unit has an average dbh of 24 inches. The available data sets (CWHR) do not provide enough information for historical context for lack of woody debris. Field surveys verified that available woody debris was less than what is recommended by the Region 5 Soil Management Handbook.
52	1.5	According to CWHR data, this unit has an average dbh of 24 inches. The available data sets (CWHR) do not provide enough information for historical context for lack of woody debris. Field surveys verified that available woody debris was less than what is recommended by the Region 5 Soil Management Handbook.
63	0.9	Part of the treatment unit is a plantation.
64	0	According to CWHR data, this unit has an average dbh of 24 inches. The available data sets (CWHR) do not provide enough information for historical context for lack of woody debris. Field surveys verified that available woody debris was less than what is recommended by the Region 5 Soil Management Handbook.
78	4.8	Part of the treatment unit is locate in a plantation, and within part of the treatment unit, there was a commercial thinning.
82	1.6	According to CWHR data, this unit has an average dbh of 6–11 inches. The majority of the trees within this treatment unit would not allow for the requirement of large woody debris.
84	1.3	According to CWHR data, this unit has an average dbh of 11–24 inches. The available data sets (CWHR) do not provide enough information for historical context for lack of woody debris. Field surveys verified that available woody debris was less than what is recommended by the Region 5 Soil Management Handbook.

Table 3-40. Proposed treatment units that are below the large woody material threshold under the existing condition (continued).

Treatment Unit Number	Amount of Large Woody Debris per Acre	Reason for Treatment Unit Below Standards
284	1.3	According to CWHR data, this unit has an average dbh of 11–24 inches. The available data sets (CWHR) do not provide enough information for historical context for lack of woody debris. Field surveys verified that available woody debris was less than what is recommended by the Region 5 Soil Management Handbook.
85	3.6	According to CWHR data, this unit has an average dbh of 11–24 inches. The available data sets (CWHR) do not provide enough information for historical context for lack of woody debris. Field surveys verified that available woody debris was less than what is recommended by the Region 5 Soil Management Handbook.
159	4.2	Part of the treatment unit is a plantation.
504	4.3	The available data sets (CWHR) do not provide enough information for historical context for lack of woody debris. Field surveys verified that available woody debris was less than what is recommended by the Region 5 Soil Management Handbook.
526	1.6	The available data sets (CWHR) do not provide enough information for historical context for lack of woody debris. Field surveys verified that available woody debris was less than what is recommended by the Region 5 Soil Management Handbook.
535	2.4	Part of the area available for group selection is located within a plantation.

The following proposed treatment units are below the fine organic matter thresholds under the existing condition. Fine organic matter includes plant litter, duff, and woody material less than 3 inches in diameter. Litter from existing trees, forbs, and brush would contribute to the development of effective ground cover by adding fine organic matter.

These areas are proposed for treatments to create DFPZs, reduce the high fuel loading conditions, and to accelerate development of the timber stands. The treatment units that do contain at least 50 percent fine organic matter are proposed for mastication, which would cumulatively increase fine organic matter.

Plantations in the Slapjack Project area range in age from approximately 15 to 30 years old. Most of the plantations were established from previous clearcuts or wildfires. Previous management activities were performed under different snag and down log requirements than the threshold values in the current Region 5 Soil Management Handbook. Trees in the plantations have not yet reached suitable diameters at breast height (dbh) or heights for the development of large woody material (desired logs are at least 20 inches in diameter and 10 feet long, but need to be at least 12 inches in diameter)

These areas are proposed for treatments to create DFPZs, reduce the high fuel loading conditions, and to accelerate development of the timber stands Treatment units below the large woody material threshold proposed for harvest by using ground-based mechanical equipment would have additional site-specific measures that would cumulatively increase the amount of large woody material, if it is available (see the effects section for more information).

3.10.3.3 Existing Condition: Indicator 2 — Hydrologic Function

The majority of soil map units in the project area have water movement in soil ratings (infiltration and permeability) less than six. However, under the existing condition, there are several soil map units that have a slow infiltration rate under natural conditions. These soil map units are 101, 102, 103, 104, 128, 138, 144, 145, 146, 200, 206, 208, 209, 211, 218, 219, 225, and 280. These soil conditions indicate a higher level of risk of accelerated runoff if effective ground cover does not exist. Proposed treatment mastication treatment units 5, 7, and 607 contain soil map unit 102. These treatment units were located within the Pendola Fire area and experienced a change in hydrologic function. Excessive runoff occurred when effective ground cover was removed from the-stand replacing fire. The mastication process would increase ground cover and reduce surface erosion, which would help restore hydrologic function of the soil. Proposed treatment units 52, 152, 402, 9401, 53 (soil map units 101 and 211), 504 (soil map unit 101), 505 (soil map unit 101 and 198), and 515 (soil map unit 218 and 104) exceed the detrimental compaction threshold as a result of legacy effects from past management activities on Plumas National Forest. Compacted areas included skid trails, temporary roads, and/or landings. All of these units are in soil types that are susceptible to soil hydrological function. Past logging activities altered the soil hydrological function, which has not fully recovered from past management activities.

3.10.3.4 Existing Condition: Indicator 3 — Soil Buffering Capacity

The soil buffering capacity of soils in the project area was not measured; therefore, it is unknown, but it is probably not outside the range of natural variability for the landscape. No large wildfires or widespread applications of chemicals that might affect soil pH, cation (positive ion) exchange capacity, or nitrogen availability have occurred in most of the project area. Areas within the Pendola Fire in the southernmost portions of the project area may have experienced alterations in soil chemistry immediately following the fire, but reforestation activities and natural vegetation recovery within the last five years have likely restored pH resiliency to levels resembling pre-fire conditions.

3.10.4 Environmental Consequences

3.10.4.1 Definition of Direct, Indirect, and Cumulative Effects of Each Indicator

Indicator 1 — Soil Productivity

Measure 1 — Soil Cover

Direct and Indirect Effects. The potential direct and indirect effects on this measure include the removal of an effective soil cover, which induces accelerated soil erosion. Groundcover dissipates the energy of falling raindrops through interception. At higher velocities, falling rain causes rain splash, a force that detaches and mobilizes soil particles. The litter layer absorbs water and increases storage capacity and slows the velocity of overland flow. High-velocity overland flow occurs as sheet-wash, another erosive force. Without vegetative cover, an intense storm can generate large quantities of sediment from hillslopes (Cawley 1990). Removing ground cover also reduces habitat for macro/microorganisms and removes the soil temperature and moisture buffer.

Cumulative Effects. According to the HFQLG Soil Monitoring Report, there is an average 27 percent reduction of ground cover in thinning and group selection treatment areas (USDA 2005). This average was applied as the methodology in thinning and group selection units to calculate cumulative effects of this project.

Alternative A (No Action)
- No treatments would be implemented.

Alternative B (Proposed Action)
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds with herbicides (up to 31 acres), mechanical and manual methods, and prescribed burning

Alternative C
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs without herbicides
- Control noxious weeds without herbicides

Alternative D
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs without herbicides
- Control noxious weeds with herbicides (up to 31 acres)

Alternative E
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds without herbicides

Alternative F
- Construct DFPZs
- Implement group selection (190 acres), except in watersheds over the Threshold of Concern
- Implement individual tree selection (148 acres); no proposed ITS units are located in watersheds over the Threshold of Concern
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds with herbicides (up to 31 acres)

Alternative G
- Construct DFPZs
- Implement group selection (190 acres), except in watersheds over the Threshold of Concern
- Implement individual tree selection (148 acres); no proposed ITS units are located in watersheds over the Threshold of Concern
- Maintain DFPZs without herbicides
- Control noxious weeds without herbicides

Measure 2 — Soil Porosity

Direct and Indirect Effects. The direct and indirect effects on this measure occur when there is an increase of soil compaction. The use of heavy forestry equipment and frequent stand entries increases the potential for soil compaction (Powers 1999), which increases bulk density and decreases the porosity of soils. Effects of soil compaction include slowed plant growth, impeded root development, poor water infiltration, restricted percolation, and increased overland flow during high precipitation events. Compaction may increase soil strength, causing vegetation to use more energy to access nutrients and water, which results in poorer vegetation cover. Under compacted conditions, less pore volume is available for roots and mycorrhizae fungi to occupy, and plant nutrients are relatively immobile. The effects of compaction on tree growth are well documented (Poff 1996). The degree and extent of susceptibility to compaction is primarily influenced by soil texture, soil moisture, depth of surface organic matter, ground pressure weight of the equipment, and whether the load is applied in a static or dynamic fashion.

Cumulative Effects. Cumulative effects on compaction could occur if project activities, combined with past or future foreseeable actions, were to result in an unacceptable proportion of the landscape experiencing detrimental compaction.

According to the 2005 HFQLG Soil Monitoring Report,

- Group selection treatments within a 1- to 2-acre activity area, followed by subsoiling, result in an average 5 percent increase of detrimental compaction (above the existing condition).

- Thinning treatments followed by subsoiling can decrease detrimental compaction by an average of 7 percent below the existing condition (USDA Forest Service 2005). (These averages were applied to thinning and group selection areas to calculate cumulative effects of the Slapjack Project.)

- Without subsoiling, both thinning and group selection can result in an average 12 percent increase in detrimental compaction (USDA Forest Service 2005). (Subsoiling of landings, 200 feet of the main skid trail, and temporary roads are proposed as a mitigation measure in all harvest treatment units proposed for the Slapjack Project.)

Measure 3 — Organic Matter

Direct and Indirect Effects. The direction and indirect effects on this indicator include the removal of organic matter reduction of soil nutrients and loss of habitat for organisms inhabiting organic matter.

Cumulative Effects. The cumulative effects on fine organic matter is a component of soil cover, and the cumulative effects of organic matter from the proposed treatments are the same as the cumulative effects of soil cover (see *Measure 1* above). Large woody material is assessed using the HFQLG 2005 monitoring data. The data suggests large woody material decreases by an average of six logs per acre (USDA Forest Service 2005), usually due to follow-up fuels treatments. Typically, treatments reduce the quantity of large woody material but do not entirely eliminate it. The Region 5 Soil Management Handbook states that the threshold for large woody material can be reduced when fuel management treatments are needed.

Indicator 2 — Soil Hydrological Function

Direct and Indirect Effects. Infiltration rates and permeability rates can be reduced by various management activities. Compaction, puddling, and hydrophobic conditions caused by fire can change infiltration rates and permeability. Effects include slowed plant growth, impeded root development, and increased overland flow during high precipitation events.

Cumulative Effects. The Erosion Hazard Rating (EHR) is used to assess the project effects on soil hydrologic function.

3.10.4.2 Alternative A: Effects on Indicator 1 — Soil Productivity

Effects on Measure 1 — Soil Cover

Direct, Indirect, and Cumulative Effects. The no-action alternative would allow effective soil cover to remain in the Slapjack Project area. The continued accumulation of material on the forest floor beyond recommended effective soil cover would contribute to increased ground and surface fuel loads, which may lead to increased fire severity and intensity during a fire event. If soil cover is reduced to bare soil following a wildfire, the soil would be more susceptible to erosion. In addition, a high-intensity fire could induce the formation of hydrophobic soil layers (soils that do not absorb or mix easily with water), thus increasing runoff and erosion in the short term. Immediately following a fire, the affected stand may not meet the Forest Plan standards and guidelines for effective soil cover. No improvement activities would occur, so there would be no new management sources of surface

erosion from transportation improvements, meadow enhancements, fish barrier removals, or streambank stabilization.

Implementation of the no-action alternative (alternative A) would not result in increased detrimental soil compaction or adversely effect soil porosity.

No improvement activities would occur, so there would be no new sources of surface erosion or benefits from transportation improvements, meadow enhancements, fish barrier removals, or streambank stabilization.

Effects on Measure 2 — Soil Porosity

Direct, Indirect, and Cumulative Effects on Measure 2. No new soil compaction or displacement would occur as a consequence of activities proposed for the Slapjack Project. The extent and degree of existing detrimental compaction is expected to decline slowly over time—this process may take several decades in forested environments (Grigal 2000). Root penetration, extension, and decay, along with the burrowing action of soil dwelling animals, would contribute to the increase in soil porosity and decrease in compaction. In addition, incorporation of organic matter into the soil by biological processes, such as invertebrate and vertebrate soil mixing and decomposition, would help reduce soil bulk density and the degree of compaction in affected areas over time. As the degree and extent of soil compaction is reduced slowly over time, soil productivity would increase. Soil infiltration would be enhanced as porosity is increased. Increased infiltration may reduce surface runoff and subsequent erosion and sedimentation.

Implementation of the no-action alternative (alternative A) would not result in adverse effects from herbicide use because herbicides would not be used in the project area. The benefits from proposed fuel reduction treatments, group selection treatments, watershed restoration, and black-oak stand restoration would not occur. In the event of a future wildfire, severe soil heating may cause physical changes in soils, including a reduction in soil porosity (Clark 1994).

Effects on Measure 3 — Organic Matter

Direct, Indirect, and Cumulative Effects on Measure 3. Accumulation of organic matter would continue at current rates and would not be affected by harvest or prescribed fire. Increased organic matter would contribute to ground and surface fuel loads, which may lead to increased fire severity and intensity during a fire event. Fires would change the decomposition pathway, rapidly oxidizing organic matter and releasing available nutrients to plants and soil organisms.

Within several months of a wildfire, a thin layer of needles dropped from scorched trees would likely increase surface cover of organic matter for fires of low to medium intensity (Pannkuk and Robichaud 2003); however, needles are usually consumed during high-intensity fires. When organic matter burns, essential nutrients can be transferred to the atmosphere through volatilization and ash convection (Raison et al. 1984). Nutrients may also be lost following fire due to leaching (Boerner 1982). Some nutrients are returned relatively quickly by terrestrial cycling pathways. Compared to the pre-burn condition, a large reduction in the organic matter covering the soil would reduce the insulating effect this layer has on soil temperature. Under a reduced organic layer, soils would experience greater temperature extremes. In addition, a blackened surface, due to partially combusted

organic materials, would absorb more light and become warmer than a soil without a dark surface (Ahlgren and Ahlgren 1960). Soil temperatures may be elevated for months or years depending on the degree of organic matter consumption (Neary et al. 1999). Such changes in the soil temperature regime would affect the rates of biological activity in the soil, resulting in altered nutrient cycling regimes. The effects on organic matter from high-intensity fires would be detrimental to soil condition.

Implementation of the no-action alternative (alternative A) would not result in adverse effects because herbicides are not proposed for use in the project area.

3.10.4.3 Alternative B: Effects on Indicator 1 — Soil Productivity

Effects on Measure 1 — Soil Cover

General Effects on Soil Condition from Proposed Herbicide Treatments. Herbicide treatments for DFPZ maintenance would be performed by manual ground application of imazapyr (Arsenal® AC) using backpack sprayers. The formulation would also include a surfactant (Syl-Tac®) and a dye (Hi-Light® Blue). Herbicide treatments for noxious weed control would also be performed by manual ground application of triclopyr BEE (Garlon 4™) using backpack sprayers. The same surfactant and dye used with triclopyr BEE would be used with imazapyr applications for DFPZ maintenance, although at double the application rate compared to imazapyr (refer to the "Health and Human Safety" section (3.7) in this chapter for more information). The proposed rates and volumes for each herbicide for each application type are listed in tables C-1 and C-2 in appendix C of this EIS.

The Best Management Practices (BMPs) that would be applied under this alternative are designed primarily to reduce or eliminate any risk from herbicides to aquatic ecosystems and other sensitive habitats and species. To ensure these BMPs are met, monitoring plans for the presence and concentration of herbicides in soil, surface water, and groundwater would be implemented (refer to the Monitoring Plan in appendix F for more information). These plans would include baseline monitoring prior to the first herbicide applications to establish baseline conditions and to assess the risk of cumulative effects. Refer to the "Hydrology Report" on file in the project record for more information on BMPs and monitoring plans.

Both imazapyr and triclopyr are described as being relatively persistent in soils, and both have been found in most studies to have minimal mobility and leaching potential in soils, although some variability has been cited. Evidence cited in the Forest Service Region 5 final EIS for vegetation management (USDA Forest Service 1989) indicates that moderate to high soil organic matter and clay content are primary factors that reduce the persistence and mobility of herbicides. The majority of the soils in the study area have clayey subsoils, and organic matter is abundant throughout the project area, suggesting that herbicide persistence and mobility in soils in the Slapjack Project area would be low.

Direct and Indirect Effects. Increases in forest floor material generally correlate with increases in soil cover. It is difficult to accurately predict treatment effects on forest floor materials. Harvest operations may increase activity fuels and forest floor material, while pile burning and underburning would reduce the cover of this material. Mastication would increase soil cover and organic matter as materials are broadcast away from the machine. Pile burning would remove forest floor materials locally, and underburning is expected to occur under prescribed conditions that would not result in

complete combustion of the duff and litter layers. Typically the duff layer is thick, and fire and fuels specialists have observed that only small quantities duff layer is burned, especially on steep slopes where underburning is the only proposed treatment.

A reduction in forest floor cover would increase the risk of erosion in affected areas. The removal of forest material is most likely to occur in areas where landings, skid roads, temporary roads, and equipment tracks are located. The amount and type of erosion depends on the character of the area. For example, patches of forest floor material across a large area would be more effective at intercepting surface water than large areas devoid of cover. Local reductions in forest floor material may have local effects on soil temperature. Larger reductions may result in greater temperature extremes in the soil. Removal of canopy cover may result in increased temperatures at the forest floor, as well as reduced moisture content of forest floor materials (Erickson et al. 1985).

The goal of road decommissioning, as described in the proposed action, is to restore the designated land base to natural conditions and increase overall soil cover conditions on existing roadbeds. Fish passage improvements and meadow restoration would not affect soil cover in areas where ground-based mechanical equipment would not be used. If ground-based mechanical equipment is used, the soil cover would be maintained with the use of standards, guidelines, mitigation measures, and BMPs (appendix F). Streambank restoration would increase soil cover on unstable streambanks. Stabilization of streambanks would require the enhancement (such as planting willows and placing large boulders, logs, and so forth) of an effective soil cover to prevent further erosion.

In general, soil cover is likely to increase as a consequence of herbicide application. Some short-term reduction in the herbaceous component of ground cover may occur; this is a minor component of overall ground cover in most areas. The vegetation killed by herbicides would remain on site and provide ground cover to prevent soil erosion and would eventually become incorporated into the soil organic matter constituent. Material resting directly on the ground surface generally provides more effective erosion protection than canopy cover. The dead vegetation resulting from herbicide application would become incorporated into the ground surface layer more rapidly and may assist in providing ground cover in areas where canopy and soil cover is depleted by mechanical or thermal treatments.

Cumulative Effects. A wildfire entering a treated area may result in a greater reduction in ground cover than the proposed treatments alone. Proposed DFPZ treatments would help reduce impacts that could result from a large and intense wildfire. Group selection treatments are designed to promote the *Herger-Feinstein Quincy Library Group Forest Recovery Act* (HFQLG Act) desired condition of uneven-aged fire-resilient stands, while maintaining a healthy forest. These treatments provide seral stage diversity by adding patches of the youngest seral stages to portions of larger CWHR class (stage) 4 and 5 stands.

Table 3-41 shows the mastication treatment units that have a low effective ground cover under the existing condition. Cumulatively, mastication of existing brush would create soil cover and fine organic matter. There is enough brush cover in these units to meet or exceed standards and guidelines post-treatment. Appendix F lists several mitigation requirements that would be used to reduce the potential of soil cover loss from mastication treatments. The mitigation requirements included equipment specifications, equipment use, and soil wetness conditions.

Table 3-41. Mastication treatment units that have a low effective ground cover under the existing condition.

Proposed Treatment Unit Number	Desired Condition Percent of Effective Ground Cover	Existing Condition Percent of Effective Soil Cover
5, 7, and 607	50	27

Thinning, group selection, and burning treatments proposed in alternative B are expected to reduce forest floor materials from the existing condition. According to the 2005 HFQLG Soil Monitoring Report (USDA 2004), there is an average 27 percent reduction in soil cover observed during post-harvest monitoring for ground cover in thinned units and areas harvested with group selection silvicultural techniques. The cumulative impacts of the thinning and group selection proposed treatments were assessed using an average of a 27 percent reduction in soil cover (refer to tables 11 and 12 in the Soils Report).

Soil cover conditions are expected to remain within Forest Plan standards and guidelines for all of the proposed thinning and group selection treatment units. In areas of group selection treatments, additional mitigation measure would apply (see appendix F). Slash from mastication, mulch, and seeds would be spread on bare ground in areas of landings and skid trails.

Effects of Herbicides on Measure 1 – Soil Cover

Direct, Indirect, and Cumulative Effects. In general, soil cover is likely to increase as a consequence of herbicide application. Some short-term reduction in the herbaceous component of ground cover may occur—this is a minor component of overall ground cover in most areas. The vegetation killed by herbicides would remain on site and provide ground cover to prevent soil erosion and would eventually become incorporated into the soil organic matter constituent. Any material resting directly on the ground surface generally provides more effective erosion protection than canopy cover. The dead vegetation resulting from herbicide application would become incorporated in the ground surface layer more rapidly and may assist in providing ground cover in areas where canopy and soil cover is depleted by mechanical or thermal treatments.

Effects on Measure 2 — Soil Porosity

Direct and Indirect Effects. The use of heavy forestry equipment and re-entry of stands would increase the potential for soil compaction (Powers 1999). The relationship between compacted and heavily disturbed ground to the decline in soil productivity over time is well documented (Horwath et al. 2000; Grigal 2000). For any mechanical harvest, the degree of soil compaction varies with soil texture and moisture content, while plant responses to compaction depend strongly on changes in the soil water regime (Gomez et al. 2002). Increases in compacted areas are expected due to the need for new skid trails. In these areas, compaction may reduce the infiltration capacity, reduce available water in the soil, impede root growth, and alter nutrient uptake and tree growth.

Under the existing condition, proposed mastication treatment units 52, 152, 402, and 9401 exceed the recommendation of an areal threshold of 15 percent detrimental compaction. Landings and skid trails in mastication units are not re-used or created, so additional detrimental compaction should not

occur in those units. Mastication equipment is usually able to travel over the chipped material, so there would be less ground pressure, and it is unlikely that additional compaction would occur. However, there is the potential for soil compaction to occur if operations occur when soils are too wet. Potential for detrimental soil compaction in mastication treatment units would be reduced through the implementation of operating mitigations, including equipment specifications and soil moisture conditions (see appendix F).

The transportation system improvements described in the proposed action (see chapter 2) would help alleviate the overall extent of detrimental compaction within the project boundary. Road decommissioning would reduce the total area of compacted roadbed and return these areas to the productive forest land base. Fish passage improvements and meadow restoration would not increase soil compaction where ground-based mechanical equipment would not be used. Where ground-based mechanical equipment is used, standards would be met by applying the standards, guidelines, mitigation measures, and BMPs listed above in the "Regulatory Framework" section and appendix F of this EIS. The removal of streamside roads during streambank restoration would reduce detrimental soil compaction on unstable streambanks. Stabilization of streambanks would include enhancements of riparian vegetation, and these measures would reduce compaction as well.

Cumulative Effects. The following mitigation measures would apply in order to reduce the risk of detrimental soil compaction in thinning and group selection treatment units: re-use existing landings and skid trails, if possible; subsoil all landings used; subsoil 200 feet of the main skid trail approach to the landing; and subsoil all temporary roads. These heavily used areas nearly always exceed threshold for bulk density change or porosity loss. By subsoiling these areas, a reduction of cumulative effects would occur in the most severely disturbed areas. When properly designed and implemented, subsoiling is effective at reducing compaction (Kolka and Schmidt 2004). Subsoiling on skid trails would not exceed a 25 percent slope—this is to prevent unacceptable risks of soil erosion and risks to tree health. Subsoiling would create loose soil material that is susceptible to erosion, and erosion is more likely to occur on steeper slopes. There is some risk of root damage to trees during subsoiling. Areas to be subsoiled must be determined by the silviculturist and soil scientist.

According to the 2005 HFQLG Soil Monitoring Report (USDA Forest Service 2006), group selection treatment, followed by subsoiling, results in an average 5 percent increase of detrimental compaction. The average 5 percent increase was measured in the 1- to 2-acre group activity areas, not the treatment unit as a whole. Thinning treatments, followed by subsoiling, would lead to an average 7 percent decrease in detrimental compaction (USDA Forest Service 2006).

The Slapjack Soils Report (tables 13 and 14) displays the predicted cumulative increase of detrimental compaction for all proposed harvest treatment units where ground-based mechanical equipment would be used. Table 3-42 is a summary of cumulative effects that would be at or above threshold.

Detrimental compaction is expected to decrease in harvest treatment units as a result of subsoiling landings, temporary roads, and portions of skid trails. Harvest treatment units 52, 152, 402, and 9401 are above the 15 percent threshold under the existing condition, and they are expected to stay at the 15 percent threshold following applied mitigation measures. Detrimental compaction is expected to increase by an average of 5 percent in the 0.5- to 2-acre group activity areas within units 504, 505,

515, 517, 525, 527, and 537, rather than across the entire treatment area available for group selection treatments. However, to minimize detrimental compaction as a result of project activities, the main skid trails would be subsoiled to a slope break of 25 percent.

Table 3-42. Proposed treatment units that could potentially go to 15 percent threshold for detrimental compaction.

Thinning and/or Group Selection Treatment Unit Number	Existing Condition Percent Detrimental Compaction	Cumulative Effects of Alternative B on Percent Detrimental Compaction
53	22	15
504	18	23
505	26	31
515	20	25
517	10	15
525	11	16
527	10	15
537	13	18

Effects of Herbicide Treatments on Measure 2 – Soil Porosity

Direct, Indirect, and Cumulative Effects. Herbicide application is not expected to have measurable or significant effects on soil porosity.

Effects on Measure 3 — Organic Matter

Direct and Indirect Effects. Fine organic matter is a component of soil cover. Therefore, effects on fine organic matter were discussed in the soil cover section above. A discussion of general effects on organic matter is provided below.

Mastication is expected to increase the amount of surface fine organic matter and result in minimal soil displacement. Mechanized thinning, biomass removal, and group selection in treatment units could reduce the amount of fine organic matter and large woody material. Mechanized thinning in biomass removal treatment units could reduce the amount of total nitrogen available to vegetation, particularly on areas with low site potential. A small portion of this nitrogen is harbored within the boles of trees, while a larger percentage is contained within the actively growing crowns. Thinning from below would remove trees with poorly developed crowns and retain trees with more foliage and a higher percentage of total nitrogen.

The overall effect of thinning on the forest ecosystem is not known because, at any site, a complex balance exists between natural nitrogen accumulations (atmospheric nitrogen, nitrogen fixing bacteria and excretions and decomposition from animals) and losses (leaching of nitrates, denitrification, volatilization and removal of vegetation). It has been found that following thinning, more nutrients frequently become available to vegetation as forest floor temperatures increase. This enhances biological activity, accelerates decomposition, and releases available nutrients.

In the proposed group selection treatment areas, removal of the majority of live overstory would occur, while the understory of shrubs, herbs, and grasses would be retained. A large proportion of all living biomass would be removed from group selection units, with little retention of standing live trees or the carbon/nutrient pools they represent. In the groups, an average of 7 to 8 trees greater than 30 inches dbh would be retained per acre (table A-15, Silviculture Report). These trees would serve as a source for ground cover and fine organic matter until the next generation of overstory trees grow to maturity. Existing dead organic matter would be retained on the forest floor or as remnant standing dead snags, and residual matter would be sloughed off trees as they are removed from forest sites, but the majority of overstory biomass would be removed from the forest within the proposed group selection treatment areas.

Underburning and pile burning have many of the same effects on organic matter that are associated with wildfires. However, the effects of prescribed burning are generally less extreme because ignition can be limited to periods when soil moisture is sufficiently high, and weather conditions are within a range conducive to preventing complete consumption of the duff, litter, and large woody material and minimizing hydrophobic soil development. Also, the goal would be to avoid burning the residual stand, or igniting the neighboring stand, to a group selection.

Studies show that underburns essentially oxidize the forest floor more rapidly than natural biological processes, removing organic matter and releasing nutrients in forms that recycle more rapidly. Plant growth is stimulated by nutrients released into the ash layer in forms easily cycled by plants. Nitrification is stimulated by underburning, possibly by elevated levels of ammonium and the reduced amount of repressive tannins in the duff and litter. It is not expected that underburning would affect the nutrient budget within the treatment units, if fire intensity and resultant burn severity is maintained within prescription.

New temporary roads, skid trails, and landings would temporarily remove organic matter and soil nutrients. Whenever possible, pre-existing skid trails and landings would be used. Fish passage improvements and meadow restoration would not create new losses in organic matter and soil nutrients. Streambank restoration would decrease loss of organic matter and soil nutrients on unstable streambanks. Stabilization of streambanks would include the enhancement of riparian vegetation, and organic matter and soil nutrients levels would increase as vegetative recovery proceeds.

Cumulative Effects. Cumulative effects on fine organic matter are closely related to cumulative effects on soil cover. Refer to the above discussion of soil cover in section 3.10.3.3 for information regarding cumulative effects of proposed activities on fine organic matter and soil cover. Cumulative effects on large woody material are discussed below.

According to the HFQLG 2005 Soil Monitoring Report (USDA 2004), there is an average decrease of six large woody debris logs per acre due to thinning and group selection treatments. Based on this data, there are several harvest units under that could go below the Region 5 guidelines for large woody material. The Region 5 guidelines allow for the adjustment of this threshold when fuel management treatments are needed.

Contract clause C6.705 would be used for all proposed thinning and group selection treatment units. Clause C6.705 is used when soil requirements are below standards and guidelines. The clause states that, “The contractor will be required to leave 5 logs per acre that are 12 inches or greater in

small end diameter and 10 feet long or longer. Logs will be evenly disturbed within units to the extent possible. If there are not enough logs to meet these requirements, then all available logs within the unit will be left to satisfy this requirement. In addition, fuel treatments would be designed to maximize retention of large woody material. Cull logs can be left on-site to meet downed log requirements. In areas with sufficient snags and deficient large down woody material, additional snags may be felled after harvest operations or prescribed burning treatments are completed in order to replenish down logs lost due to treatment activities."

Plantations in the Slapjack Project area range in age from 15 to 30 years old. Most of the plantations were established from previous clearcuts or wildfires. Previous management activities were performed under different snag and down log requirements than the current Forest Plan standards and guidelines, as amended. In general, trees in the plantations have not yet reached suitable diameters at breast height (dbh) or heights for the development of large woody material (desired logs are at least 20 inches in diameter and 10 feet long, but need to be at least 12 inches in diameter). Some of the trees in the plantations are expected to reach diameters greater than 20 inches after approximately 40 years of growth (Oliver 1997).

Continued management of plantations as part of the Slapjack Project would accelerate the diameter and height growth of residual trees, provide periodic inputs of woody debris from thinning operations, and provide for future opportunities for recruitment of snags and down woody material. Precommerical thinning, especially by mastication, would generate shredded woody material to be left on the soil surface, which may have beneficial effects to soil moisture, temperature, and nutrient cycling. Subsequent commercial thinning would also generate woody material from tops and limbs, which could be piled and burned or some of the piles could be left unburned to meet wildlife and soil requirements. Once trees in the plantations reach diameters of at least 20 inches (expected after approximately 40 years of growth; Oliver 1997), these 20 inch dbh and greater trees could be used during subsequent harvests to create snag and large down logs in areas where they are deficit.

Effects of Herbicide Treatments on Measure 3 – Soil Organic Matter

Direct, Indirect, and Cumulative Effects. Herbicide application would have no detrimental effects on soil organic matter. In general, soil organic matter is likely to increase as a consequence of herbicide application. The vegetation killed by herbicides would remain on site and provide ground cover to prevent soil erosion and would become incorporated into the soil organic matter constituent. Any short-term loss of nitrogen availability from the death of nitrogen-fixing plants, such as broom or *Ceanothus* species, would be replaced by the incorporation of dead vegetation in the soil and the greater availability of solar energy for plant material decomposition. Plant material that is left onsite after herbicide application would become available for organic matter constituents, as opposed to being removed from the ecosystem if biomass treatments are performed.

3.10.4.4 Alternative B: Effects on Indicator 2 — Soil Hydrologic Function

Direct, Indirect, and Cumulative Effects. Infiltration rates and permeability rates can be reduced by various management activities. Compaction, puddling, and hydrophobic conditions caused by fire can change infiltration rates and permeability. Effects would include slowed plant growth, impeded root development, and increased overland flow during high precipitation events.

Under the existing condition, treatment units 5, 7, and 607 were located in the area of the stand-replacing Pendola Fire and experienced a loss of effective ground cover below Forest Plan standards and guidelines, excessive erosion, and a change in soil hydrological function. These treatments are proposed for mastication. Mastication would increase ground cover and create no change in soil porosity (see the above discussion of the effects on soil cover and soil porosity). In areas where group selection is proposed, additional mitigation measures would be applied to areas with bare ground and areas at highest risk for detrimental compaction. As a result, treatments should help restore soil hydrologic function in these proposed treatment units. All other proposed treatment units are expected to meet or exceed Forest Plan standards and guidelines for effective ground cover following treatments.

The proposed treatment units 52, 152, 402, 9401, 53, 504, 505, and 515 under the existing condition exceed the detrimental compaction threshold as a result of legacy effects from past management activities on the Plumas National Forest. The compacted areas included skid trails, temporary roads, and/or landings. Past logging activities altered the soil hydrological function, which has not fully recovered from past management activities. In addition, proposed treatment units 517, 525, 527, and 537 could exceed the detrimental compaction threshold, which could possibly alter soil hydrological function. Additional mitigation would occur (that is, subsoiling areas mostly likely to be determinately compacted) to reduce the effects of harvesting on soil porosity. These mitigations should, in return, reduce the effects on soil hydrologic function.

Direct, Indirect, and Cumulative Effects of Herbicide Treatments. Disturbance to soil hydrologic function from proposed herbicide use would likely be minimal. The loss of live vegetation and root strength would likely be compensated by the addition of ground cover, and the protective soil organic matter and soil porosity would not be altered.

3.10.4.5 Alternative B: Effects on Indicator 3 — Soil Buffering Capacity

Direct and Indirect Effects. No detrimental effects on soil buffering capacity are expected from herbicide application or other proposed treatments. While some minor changes in the composition and balance of microbial soil communities might occur if exposed to high peak concentrations of herbicides, no observable long-term effects on soil productivity are anticipated. For DFPZ treatments, a single application is prescribed, and no background load of herbicide is anticipated. The SERA risk assessments for imazapyr (SERA 2004b) and triclopyr (SERA 2003) both indicated low risk of impacts on soil microbial function. In the case of both products, experimental concentrations that had significant effects on most test organisms substantially exceeded the long-term modeled soil concentrations of these chemicals. For imazapyr, the effective concentration also exceeded the peak modeled soil concentration by a factor of four.

Under laboratory conditions, triclopyr has a very high degree of variability in soil microorganism response. Peak modeled soil concentrations of triclopyr exceed the No Observed Adverse Effects Level (NOAEL – see the “Glossary” for a definition) for some soil bacteria and fungi. Thus, it is possible that the balance of species composition of microbial soil communities might change, but the SERA risk assessment concludes that “substantial impacts on soil—that is, the gross changes in the capacity of soil to support vegetation—do not seem plausible” (SERA 2004b). Field evidence bears out that there is not substantial damage to vegetation-supporting characteristics of soil

microorganisms from application of these herbicides because associated losses in soil productivity and vegetation vigor have not been observed. While successive annual applications may occur for noxious weed control, any product remaining onsite after the initial application would probably degrade to concentrations with no potential for cumulative effects by the following year. Triclopyr has generally been found to have minimal mobility in soils, but the HFQLG Act final supplemental EIS lists its half-life as 46 days (USDA Forest Service 2003a). Some studies have indicated longer persistence (SERA 2003), but it is unlikely that sufficient concentrations to produce significant cumulative effects would persist from year to year.

The surfactant Syl-Tac® may affect soil adsorption and movement properties of the herbicides that it is mixed with, although specific studies of this surfactant are not available. The general conclusion has been that extremely high concentrations of surfactants, perhaps present in a spill scenario, would have to be present to affect the mobility of herbicides in soil or their effects on soil microorganisms. It is unlikely that Syl-Tac® presents a significant risk of adverse environmental effects on soil microorganisms and soil productivity.

The dye, Hi-Light® Blue, is not a registered pesticide and has no label signal word. It is water-soluble and contains no listed hazardous substances. It is considered virtually nontoxic to humans, and no known toxic effects on aquatic or terrestrial species have been documented. It is commonly used in toilet bowl cleaners and as a colorant for lakes and ponds (Bakke 2002). It is unlikely that Hi-Light® Blue presents a significant risk of adverse environmental effects on soil microorganisms and soil productivity.

3.10.4.6 Alternative C: Effects on All Indicators

Direct, Indirect, and Cumulative Effects. The only difference between alternatives B and C is that herbicide use is not proposed under alternative C. No environmental effects associated with the application of herbicides would occur, including any that might affect soil quality indicators.

3.10.4.7 Alternative D: Effects on Indicator 1 — Soil Productivity

Measure 1 — Soil Cover

Direct and Indirect Effects. The direct and indirect effects would be similar to alternative B, but herbicide-killed vegetation contributions to ground cover would be minimal because herbicide use for DFPZ maintenance would not occur.

Cumulative Effects. Cumulative effects would be similar to alternative B, but herbicide-killed vegetation contributions to EHR reduction would be minimal because herbicide use for DFPZ maintenance would not occur.

Measure 2 — Soil Porosity

Direct, Indirect, and Cumulative Effects. These effects would be the same as under alternative B (proposed action).

Measure 3 — Organic Matter

Direct and Indirect Effects. The direct and indirect effects would be similar to alternative B, except that organic matter contribution from herbicide-killed vegetation would be minimal because herbicide use for DFPZ maintenance would not occur.

Cumulative Effects. Cumulative effects would be similar to alternative B. There may be some difference in the quantity and distribution of nitrogen contributions from treated vegetation because herbicide use for DFPZ maintenance would not occur.

3.10.4.8 Alternative D: Effects on Indicator 3 — Soil Buffering Capacity

Direct Effects. Herbicide application is not expected to have any detrimental direct effects on soil buffering capacity.

Indirect Effects. Effects would be similar to alternative B, but with a reduction in any potential changes to soil microbial community balance because herbicide use for DFPZ maintenance would not occur.

Cumulative Effects. Effects would be similar to alternative B, but minimal changes in the composition and balance of microbial soil communities are likely because herbicide use for DFPZ maintenance would not occur.

Measure 1 — Herbicides and Soil Quality

Direct and Indirect Effects. The direction and indirect effects would be similar to alternative B, but herbicide-killed vegetation contributions to ground cover would be minimal because herbicide use for DFPZ maintenance would occur.

Cumulative Effects. Effects would be similar to alternative B, but herbicide-killed vegetation contributions to EHR reduction would be minimal because herbicide use for DFPZ maintenance would not occur.

3.10.4.9 Alternative E: Effects on Indicator 1 — Soil Productivity

Measure 1 — Soil Cover

Direct and Indirect Effects. The direct and indirect effects would be the same as alternative B, with a slight reduction in herbicide-killed vegetation contributions to ground cover because noxious weed control with herbicides would not occur.

Cumulative Effects. The cumulative effects would be the same as alternative B, with a slight reduction in herbicide-killed vegetation contributions to EHR reduction because noxious weed control with herbicides would not occur.

Measure 2 — Soil Porosity

Direct, Indirect, and Cumulative Effects. The effects from alternative E would be the same as alternative B (proposed action).

Measure 3 — Organic Matter

Direct Effects. Herbicide application would have no detrimental direct effects on soil organic matter. Other effects would be similar to alternative B (proposed action).

Indirect Effects. Indirect effects would be the same as alternative B, with a slight reduction in organic matter contribution from herbicide-killed vegetation because noxious weed control with herbicides would not occur.

Cumulative Effects. Cumulative effects would be the same as alternative B. There may be a minor change in the quantity and distribution of nitrogen contributions from treated vegetation because noxious weed control with herbicides would not occur.

3.10.4.10 Alternative E: Effects on Indicator 3 — Soil Buffering Capacity

Direct Effects. Herbicide application is not expected to have any detrimental direct effects on soil buffering capacity.

Indirect Effects. Indirect effects would be the same as alternative B, with a slight reduction in any potential changes to soil microbial community balance because noxious weed control with herbicides would not occur.

Cumulative Effects. Cumulative effects would be the same as alternative B, except noxious weed control with herbicides would not occur, and there would be no potential for cumulative effects from successive annual applications of triclopyr.

3.10.4.11 Alternative F: Effects on All Indicators

Direct, Indirect, and Cumulative Effects. The effects of alternative F would be similar to alternative B (proposed action). Proposed DFPZ and individual tree selection treatments would not change. Twenty-nine acres of group selection treatment units are dropped from the proposed action (alternative B)—there would be no effects on all soil indicators in these areas.

Herbicides effects would be the same as alternative B.

3.10.4.12 Alternative G: Effects on All Indicators

Direct, Indirect, and Cumulative Effects. The effects from DFPZ, group selection, and individual tree selection treatments would be the same as alternative F.

Herbicides are not proposed for use under alternative G, so there would be no direct, indirect, or cumulative effects.

3.10.5 Past, Present, and Reasonably Foreseeable Future Actions

The proposed DFPZ treatments for the Slapjack Project would eventually be connected to other DFPZ projects currently being implemented. A future project includes a roadside noxious weed risk assessment.

3.10.6 Summary of Cumulative Effects

The analysis for cumulative effects on soil properties for all proposed actions and activities is limited to the proposed treatment units where ground-based mechanical equipment would be used. The treatment units proposed for underburn treatments only or skyline were not analyzed for cumulative effects. Underburning and skyline were selected for this method of treatment due to the steep slopes. The sivilculturist, fuel specialist, and soil scientist have conducted site visits in these treatment units to determine if treatments were needed for fuel reduction. Fuel loading conditions on these steep slopes are high, with ground cover over 90 percent and a very thick layer of duff and litter. Past project monitoring has occurred for the Brush Creek DFPZ underburn units, which have ground cover conditions similar to the Slapjack Project. The underburn treatment only removed the top of the thick layer of duff and litter, and high quantities of ground cover remained. Therefore, it is expected that detrimental soil disturbance below standards and guidelines would not occur in underburn treatment units. Ground-based equipment would not be used in the skyline treatment units. Areas of road reconstruction or new road construction were not analyzed for effects on soil properties. National Forest System roads are designated by the Forest Plan as areas unsuitable for timber growth and are not include as part of a timber stand. Proposed road decommissioning and restoration activates were analyzed and are considered an improvement to soil properties. The effects of herbicide use on soils would also be limited to the area of the proposed treatments.

The soils analysis does not incorporate a time limit for considering past activities. The current soil conditions reflect the cumulative effects of past activities, regardless of when they took place. For example, if multiple activities have occurred in a given treatment unit over the past 50 years, it is not possible to separate the effects of older treatments from more recent ones. As a result, it is not practical to set a time constraint on those effects. The future timeframe for the soils analysis must extend until the resource has recovered from the impact of the proposed activities. The persistence of soil effects into the future can vary widely. For example, ground cover may recover within one to two years following a treatment. Soil compaction, however, may last for decades. Thirty years was chosen as a future timeframe for soil effects based on available science determining soil recovery. After this time, the degree and variability of soil conditions are expected to be similar to the no-action alternative.

The methods used to assess the cumulative effects of proposed activities include using the analysis threshold defined in the Soil Management Handbook and data from the HFQLG Soil Monitoring Report.

3.10.6.1 Cumulative Effects of Alternative A

Under the no-action alternative,

- existing soil cover would remain and accumulate at current rates;
- no new detrimental compaction would occur, and areas already detrimentally compacted would continue to recover at current rates;
- existing fine organic matter would remain and continue to accumulate at current rates;

- existing large woody material would remain and continue to accumulate if there are trees meeting specified requirements. There are no trees available to meet large woody material requirements in plantations; and
- soil hydrologic function would not be altered.

The no-action alternative would not allow for

- a reduction in fuel loading. In the event of a high-intensity fire, reductions in soil productivity could exceed changes expected under the action alternatives;
- actions to be taken to accelerate development of soil cover, fine organic matter, and large woody material in treatment units (primarily plantations); and
- implementation of watershed restoration improvements.

3.10.6.2 Cumulative Effects of the Action Alternatives

The cumulative effects on soil resources would be the reduction of soil productivity measures below standards and guidelines (refer to tables 3-39 and 3-42 above), or the reduction of soil properties below Forest Service Region 5 analysis thresholds. The effects of all action alternatives would be similar for proposed treatments. Maintenance of DFPZ and noxious weed treatments vary between alternatives, but herbicide treatments are not anticipated to cumulatively alter indicators. In order to reduce the potential for cumulative effects to soil resources, the action alternatives would accomplish the following:

- Implement mitigation measures, including mulching or seeding of all disturbed areas (C clause 6.602) to accelerate recovery of soil cover and fine organic matter conditions in units that are deficient in the existing condition or following treatments (see appendix F of this document).
- Implement mitigation measures (such as re-use existing landings and skid trails if possible, subsoil all landings used, subsoil 200 feet of the main skid trail approach to the landing, and subsoil all temporary roads) to prevent detrimental soil compaction from exceeding recommended thresholds in all thinning and group selection treatment units. Because several units could exceed the threshold after treatment, the main skid trails would be subsoiled to a slope break of 25 percent, instead of stopping at 200 feet. This mitigation would apply to units 53, 504, 505, 515, 517, 525, 527, and 537.
- Accelerate the development of large woody debris. Continued management (pre-commercial and commercial thinning) would accelerate the diameter and height growth of residual trees, provide periodic inputs of woody debris from thinning operations, and provide for future opportunities for recruitment of down woody material. The contractor would be required (contract clause C6.705) to leave five logs per acre that are 12 inches or greater in small-end diameter and 10 feet long or longer. Logs would be evenly distributed within units to the extent possible. If there are not enough logs to meet these requirements, then all available logs within the unit would be left to satisfy this requirement.

- It is anticipated that soil hydrological function would not be altered due to implementation of project design mitigation measures.
- Herbicide application would not affect soil properties because the types of herbicides proposed for use are neither mobile nor persistent.
- Road decommissioning would restore soil properties, and watershed and wildlife restoration projects would occur.

3.11 Transportation System

3.11.1 Regulatory Framework

The roads in the Slapjack Project area that are proposed for decommissioning or closure are causing significant resource impacts. These roads are not needed because other roads are available to provide the necessary access to implement group selection harvests and Defensible Fuel Profile Zone (DFPZ) construction as directed in the *Herger-Feinstein Quincy Library Group Forest Recovery Act* (HFQLG Act) (Section 401 (b) (1), (d) (1), and (d) (2)) and the Sierra Nevada Forest Plan Amendment (SNFPA). The Forest Service is directed to reduce impacts of the transportation system on resources by implementing road relocation or improvements as part of the *Riparian Management Plan* (see appendix R of the HFQLG final environmental impact statement [EIS]) as required by the HFQLG Act (Section 401 (b) (1), (c) (2) (B), and (d) (4)).

3.11.2 Methodology for Assessing Impacts on the Transportation System

3.11.2.1 Scope of the Analysis

The proposed Slapjack Project area is located in Butte and Yuba Counties, California, within the Feather River Ranger District of the Plumas National Forest. The proposed project area comprises approximately 34,725 acres of public and private land and is generally situated between Lake Oroville to Dobbins on the west, the North Yuba River to Wambo Bar on the east, and from Barton Hill to the town of Feather Falls to the north. The area ranges in elevation from approximately 1,300 to 3,800 feet above mean sea level. The project area includes portions of Management Areas 10 (Feather Falls) and 11 (Challenge) as defined in the 1988 *Plumas National Forest Land and Resource Management Plan*.

3.11.2.2 Analysis Methods

The transportation system for the Slapjack Project area was evaluated through a roads analysis process. The following needs were identified based on that analysis and known access needs for proposed DFPZ and group selection treatments:

- Road reconstruction and maintenance are needed to bring existing classified roads into compliance with current maintenance standards and to provide access to the DFPZ and group selection treatment areas. Reconstruction and road maintenance are also necessary to reduce erosion and sedimentation and to provide for public safety.
- Road decommissioning is needed to reduce erosion, sedimentation, soil compaction, road density, and impacts on wildlife.
- Closure of spur roads is needed to reduce erosion, sedimentation, soil compaction, and impacts on wildlife.
- Culvert replacement, removal, or upgrade is needed to improve watershed connectivity.
- Temporary road construction is needed to access group selection and DFPZ units where existing road access is absent.

- Harvest landing construction and reconstruction are needed to facilitate removal of wood products.

3.11.2.3 Design Criteria (Prescriptions)

The purpose of the National Forest road system is to provide suitable conditions for passage of all Forest Service and cooperator emergency vehicles and to meet resource management and public access needs. The road system and improvements should minimize adverse effects on watershed and wildlife values. Roads near streams or in riparian zones have the greatest probability of intercepting, concentrating, and diverting flows from natural flow paths and should therefore be minimized where feasible. Road-stream crossings have the potential for failing and diverting water and should therefore be minimized where feasible. Roads can reduce and fragment wildlife habitat, but they can also provide access for habitat protection from wildfire and treatments designed to improve habitat quality. Roads should be minimized where adverse effects outweigh benefits to wildlife.

To protect watershed resources, the desired conditions for roads that would be retained and improved (through road construction, reconstruction, or relocation) include the following:

- Accommodation of the 100-year flood at stream crossings, including streamflow, bedload, and debris;
- No diversion of streamflow along roads in the event of crossing failure;
- No diversion of natural hydrologic flow paths at stream crossings, including paths of streamflow, surface runoff, and groundwater; and
- No roads located in wetlands and meadows and minimization of road effects on natural flow patterns in wetlands and meadows.

3.11.3 Affected Environment (Existing Conditions)

Two major arterial routes access the project area: the LaPorte Road running southwest to northeast and the Challenge Cut-off Road-Oregon Hill Road running north to south. The Slapjack Project area is considered to have a fully developed arterial and collector road system. Soper Wheeler Industries and Chy Industries are major private landholders in the area. The Plumas National Forest has entered into cooperative road cost-share agreements with Soper Wheeler Industries. These agreements were made in an effort to share the cost of National Forest road construction, reconstruction, and maintenance.

There are a total of approximately 165.7 miles of existing classified roads in the project area. In addition to the existing classified roads, there are numerous unclassified roads, abandoned roads, and skid trails in the project area. There are 3.6 miles of Level 1 roads assigned to intermittent service. There are 79.5 miles of Level 2 roads assigned where management direction requires the road to be open for limited passage of traffic. There are 55.7 miles of Level 3 roads where management direction requires the road to be open and maintained for safe travel by a prudent driver in a passenger car. There are 26.9 miles of Levels 4 and 5 roads where management direction requires the road to provide a moderate to high degree of user comfort and convenience at moderate travel speeds.

3.11.4 Environmental Consequences

3.11.4.1 Alternative A (No Action)

Direct Effects. Reconstruction of classified roads would not occur, and impacts on watershed and user safety would continue on roads needing reconstruction. There would be no new direct impact on road surfaces from log haul activity. There would be no increase in hazards to driver safety from logging traffic. Classified roads, unclassified roads, and abandoned skid trails would not be decommissioned and would continue to cause resource damage. Normal routine maintenance would occur based on current maintenance levels.

Roads would continue to negatively impact watersheds and public safety because no roads would be reconstructed, decommissioned, or closed. Fire access would be restricted because some roads would remain or become impassable.

Indirect Effects. No rights-of-way would be needed for the normal road maintenance completed in this area.

Cumulative Effects. No reduction in classified or unclassified roads would occur during normal road maintenance completed in this area.

3.11.4.2 All Action Alternatives

Direct Effects. Approximately 7 miles of existing classified road could potentially be closed with barriers upon project completion (see table 3-43). In addition to the information contained in the tables in this section, figure A-3a in appendix A contains three maps that depict the proposed transportation system changes.

Alternative A (No Action)
- No treatments would be implemented.

Alternative B (Proposed Action)
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds with herbicides (up to 31 acres), mechanical and manual methods, and prescribed burning

Alternative C
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs without herbicides
- Control noxious weeds without herbicides

Alternative D
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs without herbicides
- Control noxious weeds with herbicides (up to 31 acres)

Alternative E
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds without herbicides

Alternative F
- Construct DFPZs
- Implement group selection (190 acres), except in watersheds over the Threshold of Concern
- Implement individual tree selection (148 acres); no proposed ITS units are located in watersheds over the Threshold of Concern
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds with herbicides (up to 31 acres)

Alternative G
- Construct DFPZs
- Implement group selection (190 acres), except in watersheds over the Threshold of Concern
- Implement individual tree selection (148 acres); no proposed ITS units are located in watersheds over the Threshold of Concern
- Maintain DFPZs without herbicides
- Control noxious weeds without herbicides

Table 3-43. Potential road closures under the Slapjack Project.

Slapjack Road Closure Opportunities					
Road No.	**Classified**	**Location Township/Range Section**	**Classified Miles**	**Dead End**	**Loop**
1	18N09	18/7 S14	0.7	Yes	
2	18N10	18/7 S14	0.6	Yes	
3	19N04A	19/7 S20	0.3	Yes	
4	19N04C	19/7 S28	0.4	Yes	
5	19N05	19/7 S34	0.7		Yes
6	19N08	19/7 S30	0.6	Yes	
7	19N10	19/7 S32	0.6		Yes
8	19N21	19/6 S9	0.3	Yes	
9	19N36	19/6 S8	0.8	Yes	
10	19N48	19/6 S3	0.7	Yes	
11	19N49	19/7 S32	0.3		Yes
12	19N52	19/6 S5	0.6	Yes	
13	20N67	20/6 S15	0.7	Yes	
Classified Road Mileage			**7.3**		
Miles – Number of Dead-end Roads			**5.7**	**10**	
Miles – Number of Loop Roads			**1.6**	**3**	
Total			**7.3**		

The Slapjack Project proposes road decommissioning (see table 3-44) to reduce impacts on watersheds and wildlife, while allowing adequate access for fire suppression, forest management, and public use. Approximately 19 miles of existing classified or unclassified road would be decommissioned during project implementation. Roads slated for decommissioning are not needed for fire access or resource management and are causing watershed and wildlife impacts. Proposed road decommissioning, closure, or reconstruction would contribute to watershed restoration, including meadow enhancement, fish passage, and stream stabilization. There are many unsurfaced roads in the Slapjack Project area that are contributing to degradation of water quality and aquatic habitat. This low-elevation area is accessible for year-round use and is susceptible to rutting during wet weather use. For those roads that would be decommissioned and/or closed, the roadbed would be stabilized or removed, and culverts would be pulled and stream crossings stabilized.

The Plumas National Forest is currently undergoing an off-highway vehicle (OHV) route inventory and designation process. Through project planning, the public was given the opportunity to participate and comment on proposed road closures and decommissioning for this project. The Forest Supervisor has provided direction on the Plumas National Forest that no roads proposed for decommissioning or closure will be closed until the route designation process has been completed, with the exception of situations where the following criteria apply:

- Dead-end spurs or routes that show no evidence of OHV use, which are also contributing to resource damage.

Table 3-44. Slapjack Project classified and unclassified road decommissioning opportunities.

Road Number	Location Township/Range Section	Classified Miles	Unclassified Miles	Dead-end Spur	Loop Road
20N67	20/6 S15	0.36		Yes	
20N53	20/6 S26	0.26		Yes	
20N24B	19/6 S8	0.86		Yes	
19N19A	19/6 S4	0.47		Yes	
19N40	19/6 S4	0.47			Yes
19N64	19/6 S2/3	0.28		Yes	
19N64A	19/6 S2	0.09		Yes	
U1367	19/7 S1		0.44		Yes
20N04D	19/7 S1	0.65		Yes	
20N04B	19/8 S5	0.69			
20N82	19/8 S4	0.31		Yes	
U1239	19/6 S9		0.20	Yes	
U1366	19/7 S8		0.15	Yes	
U1429	19/7 S11		0.28	Yes	
19N44	19/7 S17	0.56		Yes	
U1424	19/7 S16		0.51	Yes	
U----	19/7 S20		0.14	Yes	
U1464	19/7 S21		0.56		Yes
19N16B	19/7 S21	0.55		Yes	
19N53A	19/7 S21	0.21			Yes
U----	19/7 S30		0.20	Yes	
U----	19/7 S30		0.23	Yes	
U----	19/7 S30		0.19	Yes	
U1483	19/7 S28		0.31		Yes
U1471	19/7 S27/28		0.74	Yes	
U1492	19/7 S27		0.15	Yes	
U1497	19/7 S27/34		0.27	Yes	
U1496	19/7 S33		0.45	Yes	
19N38	19/7 S33	0.44			Yes
19N00D	19/7 S34	0.44		Yes	
19N00	18/7 S2	0.30			
19N26	18/7 S2	0.35		Yes	
19N28	18/7 S2	0.51		Yes	
18N08	18/7 S15	0.57			Yes
18N07	18/7 S15	0.49			Yes
18N09A	18/7 S14	0.09		Yes	
18N01	18/7 S22	0.32			Yes
18N11	18/7 S22	0.40			Yes
18N11B	18/7 S22	0.20		Yes	
U1590	18/7 S22		0.28	Yes	
18N16	18/7 S26	0.15		Yes	
18N14B	18/7 S26	0.12		Yes	
18N14	18/7 S26	0.55		Yes	

Table 3-44. Slapjack Project classified and unclassified road decommissioning opportunities (continued).

Road Number	Location Township/Range Section	Classified Miles	Unclassified Miles	Dead-end Spur	Loop Road
19N16	18/7 S26	0.65			Yes
20N25	19/7 S1	0.50			
19N50	19/6 S7	0.49			Yes
20N88	19/8 S5	0.08		Yes	
U1244	19/6 S8		1.08	Yes	
U----			0.28	Yes	
U----			0.26	Yes	
Classified Road Mileage		**12.41**			
Unclassified Road Mileage			**6.72**		
Total Classified and Unclassified		**19.13**			

- User-created routes in areas that are already closed by existing Forest Orders.
- Routes that are creating unacceptable resource damage, to the extent that a delay in their closure would result in unacceptable and irretrievable impacts on the resource.

The Interdisciplinary Team evaluated the approximately 19 miles of roads proposed for decommissioning against the above three criteria. Three road segments (19N00, 20N04B, and 20N25), totaling 1.5 miles, were found to meet the criteria. Because of the extent of resource damage, these roads are proposed for decommissioning prior to the completion of the route inventory and designation process. These roads are listed above in table 3-38 and shown on figures A-3a through A-3c in appendix A. The route inventory designation process is anticipated to precede finalization of project implementation to determine what will be done with the other 17.5 miles proposed for decommissioning that did not meet the three criteria above.

Approximately 16 miles of existing classified roads would be reconstructed prior to project use (see table 3-45) as part of the timber sale package, and approximately 2 miles would be reconstructed as part of a service contract. Reconstruction would consist of brushing, blading the road surface, improving drainage, and replacing/upgrading culverts where needed.

Approximately 6 miles of temporary roads would be constructed then decommissioned after use.

Table 3-45. Slapjack Project proposed road reconstruction. Changes from the draft EIS are the result of refinements to units, unit boundaries, and engineering mileage.

Road Number	Miles	Maintenance Level	Changes Since Draft EIS	Road Number	Miles	Maintenance Level	Changes Since Draft EIS
18N01A	0.15		TS[a] – Reduced Miles	19N38	0.10	2	SC[b] – No Change
18N01E	1.00		TS – No Change	19N42	0.40	2	TS – No Change
18N14	0.60		TS – Reduced Miles	19N46	0.90	2	TS – Increase Miles
19N00	0.33		TS – Increase Miles	19N52	0.34	2	SC – No Change
19N09	1.70	2	TS – Reduced Miles	19N53	1.10	2	SC – No Change
19N16N	1.27	2	TS – No Change	19N57	0.40	2	SC – No Change
19N16S	1.67	2	TS – No Change	20N04	3.05	2	TS – No Change
19N17	2.57	2	TS – No Change	18N01W	0.00		No reconstruction
19N18	0.32	2	TS – No Change	19N43	0.00	2	Maintenance, not reconstruction
19N19	1.55	2	TS – Reduced Miles	20N67	0.00	2	No reconstruction
19N39	0.50	2	TS – Add Road	20N67A	0.00	2	No reconstruction
19N29	0.52	2	SC – No Change				
Total Miles = 18.5							

Notes:

a. TS = Timber Sale.

b. SC = Service Contract.

Existing harvest landings in group selection units and DFPZs would be reconstructed, and new ones would be constructed.

The road improvements proposed in the action alternatives would provide access needed for the DFPZ and group selection units. The proposed improvements would also provide access needed for fire suppression and fuels management to reduce the chance of catastrophic fire through intensive vegetation manipulation at a lower cost because of the improved access. The action alternatives would generate traffic from log trucks, chip vans, and support vehicles. Traffic-related safety problems would be mitigated with standard contract requirements.

Indirect Effects. There are eight roads on private property that would be needed to access portions of the project area (see table 3-46). Two would be obtained through a cost-share agreement, and the other six may be obtained through easements or license agreements. Contractors would need to obtain a written waiver from Yuba County in order to use Yuba County Road 129 for loads greater than the posted 22-ton load limit. One route with 100 feet of necessary access is included in the table, but acquisition or easements would not be required.

Cumulative Effects. A net reduction of approximately 19 miles of classified and unclassified roads in alternatives B through G would occur after proposed road decommissioning is completed. Once decommissioned, roads would be available for reforestation and conversion back to a natural landscape.

Table 3-46. Slapjack Project right-of-way needs.

Road Number	Location Township/Range Section	Miles	Access Requirements	Owners
U1463	19/7 S13	0.3	Access to group selection unit 542	Siller Bros
U1209	19/6 S3	0.1	Access to north end of DFPZ unit 61 (Heritage precludes alternate access)	Dave Dorn
20N14	20/7-B S36-31	0.2	Include with cost-share supplement Access to Big Hill/Weed point units	Soper Wheeler
Temporary	18/7/ S3	0.0	Access to DFPZ unit 12 (100 feet)	Max Doner
U1544	18/7 S11	1.2	Access to DFPZ units 11 and 525	Chy Corp
Private road	18/7 S33	0.7	Access to DFPZ units 84 and 284	Chy Corp
Temporary	19/7 S20	0.1	Access to DFPZ unit 229	Thomas Fawcett
20N22 20N53	20/6 S14.23	1.3	Include with cost-share supplement Access to DFPZ unit 78	SPI
19N04 19N22	19/7 S20	0.20 0.10	Access Unit 183A Access Unit 183B	Soper Wheeler
Classified Road Mileage		**1.8**		
Unclassified Road Mileage		**2.4**		

3.11.5 Past, Present, and Reasonably Foreseeable Future Actions

Other than ongoing routine road maintenance, past, present, and future projects in the vicinity of the Slapjack Project have not impacted nor are they expected to impact the transportation system in the project area.

3.12 Vegetation

3.12.1 Introduction

The Forest Service proposes to construct Defensible Fuel Profile Zones (DFPZs) to reduce fuel hazards, regenerate fire-resilient species using an uneven-aged management strategy (group selection treatments), area thinning (individual tree selection), and perform associated road system improvement work on approximately 5,800 acres of forested federal land east of Lake Oroville and west of the Yuba River, California. The project would be part of the Herger-Feinstein Quincy Library Group (HFQLG) Pilot Project authorized in federal law (the *Herger-Feinstein Quincy Library Group Forest Recovery Act* or "HFQLG Act").

3.12.2 Regulatory Framework

The *National Forest Management Act of 1976* (see appendix G of this EIS for the findings) provides specific management requirements that must be addressed when implementing timber harvest activities on National Forest System lands. The regulations include specific guidelines designed to ensure that timber will be harvested from National Forest System lands only where

- there is assurance that such lands can be adequately restocked within five years after harvest;
- soil, slope, or other watershed conditions will not be irreversibly damaged;
- protection is provided for streams, streambanks, shorelines, lakes, wetlands, and other bodies of water from detrimental changes in water temperatures, blockages of water courses, and deposits of sediment, where harvests are likely to seriously and adversely affect water conditions or fish habitat; and
- the harvesting system to be used is not selected primarily because it will give the greatest dollar return or the greatest unit output of timber (16 USC 1604 (g)(3)(E)).

The *National Forest Management Act* findings for the Slapjack Project are discussed in appendix G of this document and in section 5 of the "Slapjack Project Silviculture Report" (on file at the Feather River Ranger District).

The Slapjack Project is designed to fulfill the management direction specified in the 1988 *Plumas National Forest Land and Resource Management Pla*n (often referred to as the "Forest Plan"), as amended by the 1999 Record of Decision on the HFQLG Act final environmental impact statement (EIS) and the 2004 Record of Decision on the Sierra Nevada Forest Plan Amendment (SNFPA) final supplemental EIS. The standards and guidelines for fuels and vegetation management activities for the Slapjack Project area are shown in table 2 of the SNFPA Record of Decision. Table 2 includes direction for designing and implementing fuel and vegetation management activities within each of the various land allocations applied to the HFQLG Pilot Project.

Table 3-47 below summarizes the land allocations for DFPZ and group selection units analyzed for treatment. Figure A-9 (in appendix A) shows the land allocations in the Slapjack Project area, which is consistent with table 2 of the SNFPA Record of Decision, wherein no timber harvesting or DFPZ construction can be proposed within lands designated as Off Base and Deferred, California spotted owl Protected Activity Centers, or Spotted Owl Habitat Areas. Within late-successional old-growth rank 4 and 5 stands, only DFPZ construction is proposed. Consistent with the direction provided by the 1988 Forest Plan, group and individual tree selection would not be conducted in the Challenge Experimental Forest. The Rank 4 and 5 stands are consistent with the standards and guidelines in table 2 of the SNFPA 2004 Record of Decision. The DFPZs have been designed to avoid old-forest stands (California Wildlife Habitat Relationship [CWHR] size classes 5M, 5D, and 6) within this allocation.

Table 3-47. Land allocations for proposed treatment units.

Land Allocation	Acres in DFPZ Units	Acres In Group Selection Units	Acres in Individual Tree Selection Unit
Spotted Owl Protected Activity Center[a]	0	0	0
Late-succession old-growth ranks 4 and 5[a, b]	363	0	0
Challenge Experimental Forest	1,612	0	0
Lands available for vegetation and fuels management	2,444	219	148

Notes:

a. As listed in table 2 – standards and guidelines applicable to the HFQLG Pilot Project area for the life of the Pilot Project. Table 2 is in the SNFPA 2004 Record of Decision.

b. Late-successional old-growth stages of forest trees, as defined by the Sierra Nevada Ecosystem Project (volume II, appendix 21.1).

3.12.3 Methodology for Assessing Impacts on Vegetation

3.12.3.1 Scope of the Analysis

Vegetation management activities have localized effects on vegetation attributes (such as canopy cover, tree density, and tree size)—these effects are generally confined to the treated area. Therefore, the direct, indirect, and cumulative effects analyses of vegetation resources are geographically bounded to the Slapjack Project area. In addition, the 1988 Forest Plan, appendix E, requires that habitat types and seral stages be tracked and monitored by Management Areas. Seral-stage diversity can be described as the horizontal arrangement of different age groups of vegetation across the landscape. A “Management Area” is a contiguous unit of land with varying physical and biological character and management needs established by the 1988 Forest Plan. The desired conditions for maintaining various seral stages by vegetation type, size class, and canopy cover (that is, the California Wildlife Habitat Relationship) do not include lands from private property. Therefore, harvest or thinning projects on private property were not considered for seral stage diversity analysis. The analysis area for seral stage diversity is bounded by Management Areas 10 (Feather Falls) and 11 (Challenge) in which the Slapjack Project is located.

The timeframe for vegetation cumulative effects is approximately 20 to 25 years. The western slope of the Sierra Nevada in the Plumas National Forest has a high rate of vegetation establishment and growth due to high annual precipitation and highly productive forest soils. Within this timeframe, vegetation generally has sufficient opportunity to increase canopy closure, basal area, and tree density to a point where subsequent thinning would be needed again to maintain stand vigor, health, and

growth. This timeframe is also expected to encompass the time period for DFPZ effectiveness (approximately 10 to 20 years) and potential re-entry harvest interval for group selection harvests (approximately 10 to 20 years).

3.12.3.2 Analysis Methods

DFPZ Areas and Individual Tree Selection Areas. Field inventories were conducted to measure attributes of existing vegetation in order to ensure that silvicultural prescriptions are consistent with the amended Forest Plan. Data were used to determine site quality, timber volume, basal area, number of trees per acre, tree growth, species present, and tree condition. The extent of each inventory was based on the degree to which proposed activities would reduce canopy closure or basal area. Extensive inventories were conducted only in units proposed for thinning, where proposed activities would be designed to bring canopy cover and basal area closer to Forest Plan standards and guidelines. Detailed vegetation inventories were not conducted in units proposed for underburn, mastication, or other nonharvest treatments.

Thinning units were inventoried using the current Forest Inventory and Analysis User's Guide for the Pacific Southwest Region. The Forest Inventory and Analysis system was used to collect data from a series of random points located within a number of stands with a possible need for treatment. Each sample point consists of five nested plots: (1) A variable radius prism plot to gather data on large (greater than 4.9 inches diameter at breast height [dbh]) live trees; (2) a 1/100-acre fixed-radius plot for live saplings and seedlings; (3) a 1/2-acre fixed-radius plot for understory vegetation (brush species); (4) a 1/4-acre rectangular plot for large (greater than 19.9 inches dbh) snags, and (5) a 1/8-acre plot for small snags and large down logs. The following data were recorded for each live tree sampled in variable radius prism plots: species, diameter, crown position, live crown ratio, dwarf mistletoe infestation, and defect. In each stand, height and age measurements were recorded.

In the four other plots, information was collected on the number of seedlings present, the amount and height of understory brush, and the size and condition of standing snags and large down logs. The field data were loaded into the Forest Inventory and Analysis program and used as a database to generate various reports. The reports generated for each Slapjack Project treatment unit included numbers of trees per acre, volume per acre, basal area per acre, and so forth.

The Forest Inventory and Analysis data were also loaded into the Forest Vegetation Simulator, a forest growth model that predicts forest stand development. This model was used to predict stand development after alternative treatments.

Additional analyses included aerial photo interpretation and Plumas National Forest "e-veg" timber type coverages (based on year 1997 aerial photographs) in the Geographic Information System (GIS), which were used to determine timber strata, size class, and densities. The GIS coverages were also used to determine land classification and allocation.

The topography, slope, and access of a unit were used to determine the most appropriate harvest system. For all proposed treatment units in the Slapjack Project, only ground-based or cable-harvest systems would be used. Silvicultural prescriptions were based on a desired future stand condition and used stand exam data, Forest Vegetation Simulator projections, aerial photograph interpretation, and field review.

Group Selection Layout. The HFQLG Act includes expectations for treating 0.57 percent of the Pilot Project acreage annually using group selection methods. Based on that expectation, approximately 8,700 acres of the Pilot Project would be treated annually through group selection (HFQLG final EIS, appendix E). This rate of group selection harvests represents an average rotation age of 175 years. The intent is to vary the rate according to site capability—managing poorer sites for 200-year-old trees and more productive sites for 150-year-old trees. Table 3-48 displays acres available for group selection harvest in the Slapjack Project area and watersheds on an annual 10-year and 20-year reentry interval. Another environmental analysis would be completed before reentry in 10 or 20 years.

Table 3-48. Determination of group selection acres in the Slapjack Project area and watersheds based on HFQLG Act annual expectations (0.57 percent of Pilot Project acreage).

Watersheds – Slapjack Project		Total Group Selection	Annual Treatment[a]	10-Year Re-Entry[b]	20-Year Re-Entry[c]
		Acres			
Acres of National Forest System and Private lands in watersheds	Ponderosa Reservoir	8,866	—	—	—
	Frey Creek	3,282	—	—	—
	McCabe Creek	469	—	—	—
	New Bullard's Bar Reservoir	16,622	—	—	—
	Dobbins Creek	417	—	—	—
	Lower Dry Creek	3,966	—	—	—
Total Acres in Project Watersheds		**33,622**	**192**	**1,916**	**3,833**
Total acres of Private Land within Project Area	Private and Commercial Land	**5,883**			
Net National Forest System lands in Project Area		**27,739**	—	—	—
Acres not available for group selection	Challenge Experimental Forest	4,126	—	—	—
Unsuitable	PACs and SOHAs[d]	3,726	—	—	—
Unsuitable	LSOG[d] 4 and 5	8,606	—	—	—
Not capable	Urban, barren, water, and grass	506	—	—	—
Total net capable and suitable		**10,775**	61	614	1,228
Other areas eliminated from group selections	Size class 0-2	2,487	—	—	—
	Shrub fields	187	—	—	—
	Hardwoods	3,731	—	—	—
	Cultural resources, TES[d] plant species, and uneconomical	—	—	—	—
Total other areas eliminated from group selections		**6,405**	—	—	—
Possible acres available for group selection	CWHR[d] size class 5 stand acres in DFPZs	894	5	51	102
	CWHR size class 4 stand acres in DFPZs[d]	1,466	8	84	167
	Stand acres outside DFPZs	1,173	7	67	133
Total Possible Available Acres		**3,533**	**20**	**201**	**402**

Notes:

a. Calculated by multiplying total watershed acres or project area × 0.0057 (accomplishment yearly expectation rate).

b. Calculated by multiplying 2,380 (total possible available acres) × 0.0057 × 10 (years of the treatment cycle).

c. Same as for the 10-year cycle except using 20 years.

d. PAC = Protected Activity Center; SOHA = Spotted Owl Habitat Area; LSOG = late-successional old-growth; TEPS = Threatened, Endangered, and Sensitive; CWHR = California Wildlife Habitat Relationship

As shown above in table 3-48, there are approximately 3,533 acres available for group selection in the Slapjack Project area. However, this total does not take certain land allocations into account, meaning that implementation of group selection may not be possible on all 3,533 acres. Group selection harvest units would not be located in

- HFQLG Act Off Base and Deferred Lands
- Protected Activity Centers for the California spotted owl and northern goshawk
- Spotted Owl Habitat Areas
- recreation sites
- Challenge Experimental Forest
- California Wildlife Habitat Relationship size class 2 stands
- Riparian Habitat Conservation Areas
- rocky outcrops
- shrubfields
- cultural resources
- Threatened, Endangered, or Sensitive plant populations (flag and avoid)
- late-successional old-growth size ranks 4 and 5

The SNFPA 2004 Record of Decision includes additional requirements that may affect the number of groups implemented under the Slapjack Project. The standards and guidelines in table 2 (SNFPA 2004 Record of Decision) specify that maintaining specific basal area and canopy cover requirements for CWHR 5M, 5D, and 6 size class stands in DFPZs and area thinning (individual tree selection) treatment units would have the greatest effect on group layout.

Supplemental criteria that may be considered during the layout of group selection units are listed below.

- Harvest no more than 20 percent of any individual stand or 2 acres, whichever is larger.
- Disperse groups throughout the stand.
- Leave enough space between groups to allow creation of future groups.
- Avoid placing groups in black oak areas where possible.
- Avoid placing groups in areas that contain more than 20 trees per acre of trees with a diameter at breast height of 30 inches.

3.12.3.3 Indicator Measures

Seven environmental measures, or indicators, were analyzed in this vegetation section: species composition, forest health, canopy cover, stand structure and tree size, basal area and tree density, harvest volume, and effectiveness of DFPZ maintenance treatments. The following sections provide a

description of the existing condition for each indicator, followed by a summary of the potential direct, indirect, and cumulative effects of the alternatives.

3.12.3.4 Design Criteria

For alternatives B, C, D, E, F, and G (the action alternatives), effects are discussed in terms of the prescriptions proposed for each treatment type.

The four prescriptions for group selection treatment units would incur similar effects and are thus grouped together for the purposes of this analysis—those four prescriptions are harvest, site preparation, reforestation, and release.

The prescriptions for DFPZ treatments are broken down into three groups for the effects analysis:

- Mechanical thinning and biomass removal
- Mastication and grapple piling
- Underburning and pile burning

The prescriptions for the various treatment types are detailed in chapter 2, section 2.2.2 of this document.

3.12.4 Affected Environment (Existing Conditions): Species Composition

The elevation in the project area ranges from 1,100 feet near Ponderosa Reservoir to 3,800 feet near Pike County Lookout and Big Hill. Elevation affects the forest types that are present. The forest types in the analysis area range from montane hardwood and Sierra mixed conifers-ponderosa pine at lower elevations, to Sierra mixed conifer-Douglas-fir at mid elevations (see table 3-49).

Table 3-49. Description of forest types found in the Slapjack Project area.

Forest Type	Major Species	Other Species Present
Mixed conifer	Ponderosa pine (*Pinus ponderosa*) or Douglas-fir (*Pseudotsuga menziesii)*	Incense-cedar (*Caloocedrus decurrens*), white fir (*Abies concolor*), tanoak (*Lithocarpus densiflorus*), and sugar pine (*Pinus lambertiana*)
Ponderosa pine	Ponderosa pine	Incense-cedar, Douglas-fir, sugar pine, white fir, and tanoak
Montane hardwoods	Tanoak, madrone (*Arbutus menziesii*), and California black oak (*Quercus kelloggi*)	Ponderosa pine, incense cedar, and scattered Douglas-fir, sugar pine, and white fir

There are fewer large (greater than 30 inches dbh) ponderosa pine, sugar pine, and Douglas-fir trees as a result of past harvesting. Mortality of sugar pine from white pine blister rust (*Cronartium ribicola*) has also contributed to reduced numbers of these species, especially the smaller trees. Past disturbance has favored germination of new shrub, hardwood, and conifer seedlings and, along with fire exclusion, a higher density of small, mostly shade-tolerant trees (tanoak, incense-cedar, and white fir) in the understory.

The typical mixed conifer type includes shade-tolerant species (like incense-cedar, tanoak, and white fir) that can germinate and grow in the shade of the overstory trees. Without any disturbance, these shade-tolerant species can develop into multiple layers of vegetation or ladder fuels. When low-severity fires are allowed to burn through these stands at frequent intervals (every 5 to 15 years), shade-tolerant vegetation can be kept below the lower reaches of the overstory foliage, preventing the development of a fuel ladder.

3.12.5 Environmental Consequences: Species Composition

3.12.5.1 Alternative A (No Action)

Historically, stands in the Slapjack Project area had a higher component of shade-intolerant species such as ponderosa, Douglas-fir, and sugar pine in the overstory. Maintaining the existing stand structure would favor shade-tolerant species such as white fir, tanoak, and incense-cedar. There would be little opportunity for the naturally dominant pine species to reestablish and regenerate themselves, except what may occur through natural large-scale disturbance events such as wildfire.

Alternative A (No Action)
- No treatments would be implemented.

Alternative B (Proposed Action)
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds with herbicides (up to 31 acres), mechanical and manual methods, and prescribed burning

Alternative C
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs without herbicides
- Control noxious weeds without herbicides

Alternative D
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs without herbicides
- Control noxious weeds with herbicides (up to 31 acres)

Alternative E
- Construct DFPZs
- Implement group selection (219 acres)
- Implement individual tree selection (148 acres)
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds without herbicides

Alternative F
- Construct DFPZs
- Implement group selection (190 acres), except in watersheds over the Threshold of Concern
- Implement individual tree selection (148 acres); no proposed ITS units are located in watersheds over the Threshold of Concern
- Maintain DFPZs with herbicides (1,954 acres)
- Control noxious weeds with herbicides (up to 31 acres)

Alternative G
- Construct DFPZs
- Implement group selection (190 acres), except in watersheds over the Threshold of Concern
- Implement individual tree selection (148 acres); no proposed ITS units are located in watersheds over the Threshold of Concern
- Maintain DFPZs without herbicides
- Control noxious weeds without herbicides

3.12.5.2 All Action Alternatives: Direct and Indirect Effects of DFPZ Treatments

Mechanical Thinning and Biomass Removal. White fir, tanoak, and incense-cedar would be the primary species removed, but some ponderosa pine and Douglas-fir and a very limited number of sugar pine may also be removed. Preference for residual trees would be based on the relative shade intolerance of the species, forest health (insect and disease damage), and structure class (suppressed, intermediate, or codominant trees). As for tree species, ponderosa pine would be given primary preference, followed by black oak, sugar pine, Douglas-fir, incense-cedar, and white fir. Tanoak would only be left if needed to meet canopy cover standards.

Mastication. The thinning proposed under all action alternatives would favor the retention of under-represented conifers (sugar pine and Douglas-fir), as well as oaks in those plantations dominated by ponderosa pine. Thinning would also favor

retention of the most vigorous individuals, rather than simply to achieve desired spacing. This would result in less homogenous (containing the same species) stands of trees than what currently exists. Mastication would be limited to trees less than 9 inches dbh and would only affect the species composition of understory trees.

Grapple Piling. Grapple piling would only be used in conjunction with mastication or harvest of dead trees killed by the Pendola fire. Approximately 225 acres of small and medium trees would be piled and burned to reduce the fuel loading.

Underburning and Pile Burning. The effects of the action alternatives are expected to be the same. Underburning is nonselective, and compared to mechanical treatments, it is not as likely that favored species would be retained. Implementation of any of the action alternative may not change the percent composition of pine species in underburn units. According to the HFQLG Act final supplemental EIS (page 19), the overstory canopy is usually not affected by underburning, although torching of individual or small groups of trees can occur on up to 10 percent of the burn area where high surface fuel concentrations and ladder fuels occur together. Torching may result in 0.25- to 0.5-acre gaps in the canopy. According to the HFQLG final supplemental EIS (page 19), the overstory canopy is usually not affected by underburning, although torching of individual or small groups of trees can occur on up to 10 percent of the burn area where high surface fuel concentrations and ladder fuels occur together. Torching may result in 0.25- to 0.5-acre gaps in the canopy. Localized torching from underburning would provide some small openings in the overstory where shade-intolerant species may become established and grow, depending upon the opening size.

3.12.5.3 All Action Alternatives: Direct and Indirect Effects of Group Selection Treatments

Harvesting, Site Preparation, Reforestation, and Release. Group selections within the true fir type may be naturally regenerated. In all other forest types, a combination of natural and artificial regeneration would be used to achieve desired stocking levels, with an emphasis on regenerating shade-intolerant species. Ponderosa pine, Douglas-fir, and rust-resistant sugar pine would be planted. Black oak sprouts would be tended by cutting back all but 2 to 4 of the best sprouts.

The openings created by group selection would mimic fine-scale disturbances such as small fires, localized insect damage, windthrow, and snow events. This would allow sunlight to reach the forest floor, creating favorable conditions for the establishment and growth of planted shade-intolerant, fire-adapted species. Some natural regeneration from seeds of surrounding Douglas-fir, white fir, pines, cedars, and shrub species is also expected to occur in these openings.

After planting, proposed release treatments (grubbing and mastication) in group selection openings would favor pine retention. Without post-planting release treatments, it is expected that shade-tolerant firs and cedars would compete with pine seedlings along group selection edges, under residual trees, and in other low light areas (such as south slopes) within patches (York et al. 2003, 2004).

Although there has been little research on seedling survival in group selections in the forests of the northern Sierra Nevada, a few experiments have been completed on the Plumas National Forest. For example, McDonald and Abbott (1994) found that growth of ponderosa pine in 30-, 60- and

90-foot radius (approximately 0.1–0.6 acre) group selection units was poor (for example, many seedlings were only 5 inches tall at 9 years old), even though ponderosa pine seed dispersal and seedling germination were extremely high. This shows that edge tree competition—both above ground for light and below ground for nutrients and water—limits growth for species like ponderosa pine that are unable to adapt to low light levels. At the Blodgett Experimental Forest in California, York et al. (2004) found significant increases in seedling/sapling height as opening size increased; effects of opening size on seedling/sapling height leveled off after approximately 1.5 acres.

There is no research on the effect of leaving residual trees within group selection cut patches. The silvicultural intent of the traditional group selection harvest system is to remove all trees within the patch. However, because the 2004 Record of Decision (table 2) on the SNFPA final EIS established the retention of trees greater than 30 inches dbh, there would be residual trees within the Slapjack Project group selection units.

3.12.5.4 All Action Alternatives: Direct and Indirect Effects of Individual Tree Selection (Thinning) Treatments

Individual tree selection units would resemble a DFPZ thinning unit, however 50 percent canopy cover would be maintained. White fir, tanoak, and incense-cedar would be the primary species removed, but some ponderosa pine and Douglas-fir and a very limited number of sugar pine may also be removed. Preference for residual trees would be based on the relative shade intolerance, under representation of the species for large trees on the landscape level, and resistance to fire of the species. Ponderosa pine would be given primary preference, followed by black oak, sugar pine, Douglas-fir, incense-cedar, and white fir. Tanoak would only be left if needed to meet canopy cover standards. In order to meet HFQLG desired conditions and standards, the activity-generated slash, and some existing downed fuel, would be piled and burned after thinning to reduce fuel loading.

3.12.6 Affected Environment (Existing Conditions): Forest Health

Insects and disease have contributed to vegetation composition in the analysis area. Insects will remain at endemic levels as long as precipitation levels are near or above normal. However, when precipitation is below normal for several consecutive years, trees become moisture-stressed and susceptible to insect attacks. As past logging history indicates, there have been numerous salvage sales over the years that generally coincide with drought conditions or, in one case, a Tussock moth infestation. Maintaining trees in good health and vigor reduces the risk of high levels of mortality during years of low water supply.

Insect top kill and whole-tree mortality are found throughout the analysis area. This damage is related to attacks by the fir engraver beetle (*Scolytus ventralis*) in white fir; *Ips* spp. in ponderosa and sugar pine; *Dendroctonus ponderosae* in ponderosa and sugar pine; and *Dendroctonus brevicomis* in ponderosa pine.

Although diseased trees are found throughout the project area, they are most common in overcrowded stands. Overcrowded stands containing a large percentage of white fir almost always contain some amount of *annosum* (*Heterobasicion annosum*) root disease, which decays tree roots (evidence of the disease has not been verified). When the roots die faster than they can regenerate, the

tree will fall over or die. Incense-cedar, ponderosa pine, and sugar pine are resistant to the strain that infects white and red fir. Historically, the forest contained more of these resistant species.

White pine blister rust (*Cronartium ribicola*) is present in the project area. This disease is specific to the five-needle pines: sugar and western white pine. Infections are scattered throughout the area and occur in all tree sizes. This disease has killed some younger trees, and older infected trees show reduced growth and vigor.

Dwarf mistletoe (*Arceuthobium* spp.) is also present in these forest types. Tree growth and vigor are reduced on infected trees with moderate to high dwarf mistletoe ratings.

3.12.7 Environmental Consequences: Forest Health

3.12.7.1 Alternative A (No Action): Direct and Indirect Effects

Problems with diseases (dwarf mistletoe, stem rot, blister rusts), insects (bark beetles), and damage (broken tops, basal wounds) have been observed in ponderosa pine, sugar pine, incense-cedar, and white fir trees within stands in the Slapjack Project area. Under alternative A, these areas would continue to be at a high risk for insect and disease infestations as stand growth and vigor continue to decline. As Ferrell (SNEP 1996, volume II, chapter 45, pages 1177–1192) summarizes: "Currently, Sierra Nevada forests have high levels of mortality caused by bark beetles infesting trees stressed by drought, fire, overly dense stands, and pathogens. Fuel loads and fire hazard are high . . . . Mitigative restoration requires thinning overly dense stands, primarily by controlled burning in parks and wilderness areas, combined with mechanical thinning and other selective tree-cutting practices elsewhere."

Dwarf mistletoe-infested trees in the overstory would continue to infect understory trees and adjacent stands. The rate of spread of dwarf mistletoe would be more rapid through a multistoried stand with many horizontal layers of foliage than through a single-storied stand (Parmeter 1978; Hadfield and Russell 1978). Stand health would continue to decline in overstocked aggregations of trees within moderately stocked and densely stocked stands, eventually resulting in individual tree mortality. Mortality would increase the fuel loading, but endemic mortality would keep a continuous supply of dead trees for wildlife foraging and nesting.

3.12.7.2 All Action Alternatives: Direct and Indirect Effects of DFPZ Treatments

Mechanical Thinning and Biomass Removal. It is expected that implementation of any of the action alternatives would result in the same effects. Thinning from below would remove poor vigor, diseased, and damaged trees. In addition, thinning some of the suppressed, intermediate, and codominant tree classes would help maintain the growth and vigor of codominant and dominant conifers—that is, the older, mature, larger trees would be retained longer in the overstory. Stand health would be maintained or improved, and individual tree mortality would be reduced. The overstocked stands or aggregations within stands would be thinned in order to reduce stress due to inter-tree competition. Stand growth and vigor would be maintained or improved, making stands and aggregations less susceptible to insect attacks (Koehler, Wood, and Scarlett 1978; DeMars and Roettgering 1982).

Mastication and Grapple Piling. The effects of each of the action alternatives are expected to be the same. The removal of competing conifers and brush through mastication would result in better individual tree growth and vigor of remaining conifers. There may also be an opportunity to selectively remove dwarf mistletoe infected trees, which would limit the spread of dwarf mistletoe to adjacent uninfected trees.

Thinning (mastication) would reduce the risk of bark beetle mortality in each stand. When periodic droughts and their associated bark beetle epidemics occur, there is a low probability of extensive pine mortality in the thinned stands. Maintaining good stand growth and vigor would reduce the risk of beetle populations increasing and attacking adjacent stands. Because the conifer stands are currently in the most vigorous growth period of their lifespan, stand densities could again approach undesirable densities within 10 to 15 years after treatment.

Underburning and Pile Burning. The effects of each of the action alternatives are expected to be the same. Prescribed burning is nonselective and may not remove diseased or dwarf mistletoe infected trees. Within the DFPZs, dwarf mistletoe trees in the overstory would continue to infect the understory trees and adjacent stands.

3.12.7.3 All Action Alternatives: Direct and Indirect Effects of Group Selection Treatments

Harvesting, Site Preparation, Reforestation, and Release. The effects of the actions alternatives are expected to be the same, except for alternatives F and G—these two alternatives would reduce the total number of group acres from 219 to 190 acres. Most of the dying, damaged, insect-ridden, and diseased trees up to 30 inches dbh would be removed in the group selection harvests. If some of the residual overstory trees or trees in the adjacent stands are infected with dwarf mistletoe, then other species types can be planted in the understory, since dwarf mistletoes are host specific.

3.12.8 Affected Environment (Existing Conditions): Stand Attributes (Canopy Cover, Stand Structure and Tree Size, and Density)

This section describes the existing condition for the following indicators: Canopy Cover, Stand Structure and Tree Size, and Density.

Table 3-50 displays the stand attributes of canopy cover, average tree size or quadratic mean diameter, basal area, and trees per acre for the various treatment groups (CWHR size classes 3, 4, and 5; thinning units; masticate only; and underburn). Stand structure is a description of the distribution of tree size classes (saplings, poles, small trees, etc.) within a stand. Understory and overstory are some other terms that are used in referring to stand structure. The distribution of the various size classes or “stories” determines if a stand is classified as an even-aged, uneven-aged, or multistoried stand. Quadratic mean diameter of the upper story is the diameter of a tree of mean basal area within dominant or codominant positions in the stand. In other words, instead of being an arithmetic average of tree diameters, it is a weighted average based on the basal area of each tree in the upper story within the stand.

Table 3-50. Stand attributes by treatment group.

Treatment Group	Percent Canopy			Quadratic Mean Diameter Upper Story	Basal Area	Trees/Acre Greater Than 1 inch DBH
	Lower Limit	Upper Limit	Average			
CWHR[a] size class 5 - thin	47	90	61.6	27.7	220	370
CWHR size class 4 - thin	47	83	62.7	16.9	189	390
CWHR size class 3 - thin	22	60	63.9	9.9	185	721
Masticate	20	58	46.5	17.4	128	354
Hand cut, pile, and burn	57	57	57	31.2	231	629
Underburn	40	82	56.9	17.7	129	330

Note:

a. The California Wildlife Habitat Relationship (CWHR) system was developed jointly by Forest Service Region 5 and the California Department of Fish and Game. The system classifies forest stands by dominant species types, tree sizes, and tree densities and rates that result in classes of habitat value for various wildlife species or plant guilds.

Table 3-51 displays the stand structure for the CWHR size class 4 and 5 natural stands for the thinning treatment group. Mastication and underburning units are not shown since neither treatment would result in much change to overstory stand structure.

Table 3-51. Trees per acre by size class.

Treatment Group	Sampling (1–6 inch dbh)	Poles (6–11 inch dbh)	Small Trees (11–24 inch dbh)	Medium Trees (24–30 inch dbh)	Large Trees (> 30 inch dbh)	Total
CWHR 5	231	36	43	8	11	330
CWHR 4	236	84	62	5	4	392

The number of trees over 1 inch dbh per acre in the CWHR size class 5 natural stands ranges from 160 to 805 per acre, with an average of 330 trees per acre. The average trees per acre of trees over 1 inch dbh for CWHR size class 4 stands is 392 per acre, and ranges from 183 to 787 trees per acre.

Most of the trees in CWHR size class 4 and 5 stands are in the smaller diameter groups (less than 11 inches dbh). The number of trees greater than 30 inches dbh account for only a small fraction of the total number of trees: 4 trees per acre for CWHR size class 4 stands and 1 tree per acre for CWHR size class 5 stands.

The basal area for CWHR size class 5 stands ranges from 70 to 391 square feet per acre, with an average of 194 square feet per acre. Basal area for CWHR size class 4 stands is slightly lower, averaging 165 square feet per acre and ranging from 49 to 330 square feet per acre. The average stand tree age in CWHR size class 4 and 5 stands varies, but natural stands are approximately 75 to 150 years old with older trees in clumps or scattered individually. Tree canopy cover, not including cover from trees that are less than 6 inches dbh, is generally moderate to dense for CWHR size class 5 stands, ranging from 32 to 90 percent, with an average of 56 percent. Canopy cover in CWHR size class 4 stands averages 60 percent. Within both CWHR size class 4 and 5 stands, there are small aggregations or clumps of trees with denser canopy cover.

For both CWHR size class 4 and 5 stands, the high number of trees in the smaller diameter groups and the dense canopy indicates high fuel ladder potential and interlocking crowns capable of sustaining crown fires.

There are 1,174 acres of plantations, primarily stocked with pine, within the proposed DFPZ units. Of those, only about 5 percent (53 acres) are younger plantations that were established 5 to 15 years ago. The remaining 1,121 acres are older plantations established approximately 20 to 40 years ago. During the regeneration harvests that established these plantations, pine and other mixed conifer species were planted—this helped restore some of the pine species diversity. The plantations also contribute to horizontal diversity—the horizontal arrangement of different age groups of vegetation across the landscape. Currently, plantations in the Slapjack Project area range from 210 to 800 trees that are 1 inch dbh or more, with a 7- to 13-foot spacing between trees. Without thinning, plantations at such high densities are more susceptible to bark beetle attack, increased mortality from inter-tree competition, and increased high fire hazard risk potential.

More specific information about stand attributes of natural stands and plantations is contained in the “Slapjack Silviculture Report” in the project record.

On a landscape scale, table 3-52 shows existing vegetation type, size class distribution, and canopy cover distribution for the Ponderosa Reservoir, Frey Creek, McCabe Creek, New Bullard’s Bar Reservoir, Dobbins Creek, and Lower Dry Creek watersheds (Slapjack Challenge Rapid Landscape Assessment, 2005). Over 80 percent of the acres in each watershed are in the moderate to dense canopy cover classes, which indicates multiple canopy layers and interlocking crowns.

The Slapjack Rapid Landscape Assessment pointed out several differences between existing condition and desired condition for age group and size classes. As shown in table 3-53 below, existing conditions for the large tree class is under represented, the seedling and small tree classes are slightly above desired, and the pole size class is also over represented. The proposed fuel treatments and group selection harvests of the Slapjack Project would move some of these classes toward desired conditions. Implementation of the HFQLG group selection harvests over 175 years would move the current tree size classes towards the desired size class distribution.

3.12.9 Environmental Consequences: Canopy Cover

3.12.9.1 Alternative A (No Action): Direct and Indirect Effects

With fire exclusion, an understory of fir, tanoak, incense-cedar, and Douglas-fir has developed beneath the overstory, creating multistoried stands with moderate to dense canopy closure. The stands currently range from 47 to 87 percent in CWHR size class 4 and 5 stands (see table 3-54). The canopy closure for the CWHR size class 3 (thin group), plantations (masticate group), and other stands (underburn group) range from 20 to 82 percent. Without treatment, the canopy closure in these stands, especially in the plantations, would continue to increase. The increased canopy closure would shade out brush and smaller trees, which would die and increase the ladder fuels and fire hazard.

Table 3-52. Forest vegetation data for the Ponderosa Reservoir, Frey Creek, McCabe Creek, New Bullard's Bar Reservoir, Dobbins Creek, and Lower Dry Creek watersheds.

Vegetation Data within the Plumas National Forest	Ponderosa Reservoir 123 06 03		Frey Creek 123 07 01		McCabe Creek 123 07 02		New Bullard's Bar Reservoir 125 02 03		Dobbins Creek 125 05 01		Lower Dry Creek 125 07 01	
	Acres[a]	Percent	Acres[a]	Percent	Acres[a]	Percent	Acres[a]	Percent	Acres[a]	Percent	Acre[a]s	Percent
Vegetation Type												
Urban	0.1	0.0	0	0.00	0	0.0	23.1	0.1	0	0.0	2.4	0.1
Barren	61.9	0.7	0	0.0	0	0.0	107.8	0.6	0	0.0	11.4	0.3
Water	65.4	0.7	148.8	4.5	0	0.0	430.4	2.6	0	0.0	0	0.0
Annual grassland	54.0	0.6	0	0.0	0	0.0	0	0.0	0	0.0	6.4	0.2
Shrub types (mixed chaparral, montane chaparral)	184.9	2.1	54.1	1.6	0	0.0	111.0	0.7	0	0.0	18	0.5
Lower westside hardwoods	0.7	0.0	43.2	1.3	0	0.0	0	0.0	0	0.0	1.7	0.0
Montane hardwoods	3,456.6	39	1,263.2	38.5	99.5	21.2	3,241.6	19.5	29.1	7.0	691.3	17.4
Pine (eastside and ponderosa pine)	1,405.4	15.9	883.5	26.9	272.0	58.0	146.8	0.9	116.6	27.9	349.2	8.8
Sierra mixed conifer (including Douglas-fir)	3,637.2	41.0	889.4	27.1	97.4	20.8	12,561.0	75.6	271.7	65.1	2,885.3	72.8
True fir (white fir and red fir)	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
Total	**8,866.2**	**100.0**	**3,282.2**	**100.0**	**468.9**	**100.0**	**16,621.7**	**100.0**	**417.4**	**100.0**	**3,965.7**	**100.0**
Size Class Distribution												
0 Miscellaneous (barren, water, grassland, shrubs)	383.60	4.3	202.90	6.2	0.00	0.0	693.40	4.2	0.00	0.0	38.20	1.0
1 Seedling (<1 inch dbh)	0.00	0.0	32.30	1.0	0.00	0.0	22.10	0.1	0.00	0.0	2.50	0.1
2 Sapling (1–6 inches dbh)	30.80	0.3	15.20	0.5	0.00	0.0	486.40	2.9	0.00	0.0	154.60	3.9
3 Pole (6–11 inches dbh)	1,826.80	20.6	635.00	19.3	9.30	2.0	2,205.90	13.3	33.48	8.0	375.70	9.5
4 Small tree (11–24 inches dbh)	2,874.00	32.4	1,192.60	36.3	254.45	54.3	4,582.60	27.6	73.15	17.5	1,113.50	28.1
5 Large tree (>24 inches dbh)	3,751.00	42.3	1,204.20	36.7	205.15	43.8	8,631.20	51.9	310.81	74.5	2,277.00	57.4
6 Two story	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0	0.00	0.0	4.20	0.1
Total	**8,866.2(**	**100.0**	**2,729.3(**	**100.0**	**468.90**	**100.0**	**16,621.6(**	**100.0**	**417.44**	**100.0**	**3,965.7(**	**100.0**

Table 3-52. Forest vegetation data for the Ponderosa Reservoir, Frey Creek, McCabe Creek, New Bullard's Bar Reservoir, Dobbins Creek, and Lower Dry Creek watersheds (continued).

Vegetation Data within the Plumas National Forest	Ponderosa Reservoir 123 06 03		Frey Creek 123 07 01		McCabe Creek 123 07 02		New Bullard's Bar Reservoir 125 02 03		Dobbins Creek 125 05 01		Lower Dry Creek 125 07 01	
	Acres[a]	Percent	Acres[a]	Percent	Acres[a]	Percent	Acres[a]	Percent	Acres[a]	Percent	Acres[a]	Percent
Canopy Cover Distribution												
NA (0-9 percent) (barren, water, grassland, shrubs)	383.57	4.3	235.19	7.2	0.00	0.0	715.55	4.3	0.00	0.0	40.69	1.0
S – Sparse (10-24 percent)	18.19	0.2	0.00	0.0	0.00	0.0	25.85	0.2	0.00	0.0	0.79	0.0
P – Open (25-39 percent)	196.86	2.2	160.49	4.9	10.68	2.3	365.65	2.2	0.00	0.0	134.43	3.4
M – Moderate (40-59 percent)	1,289.60	14.5	616.45	18.8	42.21	9.0	928.82	5.6	31.40	7.5	233.61	5.9
D – Dense (60-100 percent)	6,977.96	78.7	2,270.05	69.2	416.01	88.7	14,585.72	87.8	386.04	92.5	3,556.17	89.7
Total	**8866.18**	**100.0**	**3,282.18**	**100.0**	**468.9**	**100.0**	**16,621.59**	**100.0**	**417.44**	**100.0**	**3,965.69**	**100.0**

Note: a. Acreage is for National Forest System land only and does not include private property.

Table 3-53. Existing condition and desired condition for tree size class distribution for Ponderosa Reservoir, Frey Creek, McCabe Creek, New Bullard's Bar Reservoir, Dobbins Creek, and Lower Dry Creek watersheds.

Size Class	Size (dbh)	Approximate Group Age	Estimated Prior to European Settlement	Ponderosa Reservoir Existing Condition	Frey Creek Existing Condition	McCabe Creek Existing Condition	New Bullard's Bar Reservoir Existing Condition	Dobbins Creek Existing Condition	Lower Dry Creek Existing Condition	Desired Condition Under Regulation[a]
0	Nonforest	NA	Unknown[a]	4.3%	7.4%	0%	4.2%	0%	1.0%	
1–2	<6 inches	0–20	15%	0.3%	1.8%	0%	3.0%	0%	4.0%	10%
3	6–11 inches	20–40	13%	20.6%	3.0%	2.0%	13.3%	8.0%	9.5%	10%
4	11–24 inches	40–100	18%	32.4%	43.7%	54.3%	27.6%	17.5%	28.1%	30%
5	>24 inches	100–200	53%	42.3%	44.1%	43.8%	51.9%	74.5%	57.4%	50%

Source: The "Existing Conditions" are from the Plumas National Forest "e-veg" 97-5 Forest Vegetation Typing. The "Estimated Prior to European Settlement Conditions" are from averages for the ponderosa pine, Douglas-fir, and white fir ecological groups in the Challenge Rapid Landscape Assessment.

Note: a. While the percent of the nonforest types in each watershed is not known, it is probably close to existing conditions except for the "water" type from reservoirs. This includes 0.7 percent of Ponderosa Reservoir, 2.9 percent of Frey Creek, and 1.6 percent of Bullard's Bar watersheds. This is based on the HFQLG desired condition for uneven-aged management with a regulation period of approximately 175 years.

Table 3-54. Canopy cover summary by treatment group for each alternative.

Treatment Group	Alternative A Lower Limit Canopy Cover	Alternative A Upper Limit Canopy Cover	Average Percent of Canopy Cover (by Alternative)						
			A	B	C	D	E	F	G
CWHR size class 5 - thin	47	87	62	40	40	40	40	40	40
CWHR size class 4 - thin	47	83	63	40	40	40	40	40	40
CWHR size class 3 - thin	22	60	64	NA	NA	NA	NA	NA	NA
Masticate	20	58	47	NA	NA	NA	NA	NA	NA
Hand cut, pile, and burn	57	57	57	NA	NA	NA	NA	NA	NA
Underburn	40	82	66	NA	NA	NA	NA	NA	NA

Note:

NA = The canopy cover requirements are not applicable to these treatment groups.

3.12.9.2 All Action Alternatives: Direct and Indirect Effects

DFPZ Treatments: Mechanical Thinning and Biomass Removal. The most effective strategies for reducing crown fire occurrence and severity are to (1) reduce surface fuels, (2) increase height to live crown, (3) reduce canopy bulk density, and (4) reduce continuity or density of the forest canopy (Graham et al. 2004; Peterson et al. 2005).

The treatments in the DFPZs should result in fairly open stands, dominated by larger, fire-tolerant tree species. Post-treatment canopy closure generally should not exceed 40 percent, although adjustments in stand density based on local conditions may be appropriate (Weatherspoon and Skinner 1996).

Canopy cover in CWHR size class 5 treatment group in the project area currently ranges from 47 to 87 percent, with an average of 62 percent. Canopy cover in CWHR size class 4 treatment group is quite similar, ranging from 47 to 83 percent and averaging 63 percent.

For alternative B, post-treatment canopy cover would average 40 percent in CWHR size class 4 and 5 stands (“Slapjack Project Silviculture Report,” appendix A). The effects of alternatives C, D, E, F, and G are expected to be the same as alternative B, since the desired canopy cover is 40 percent after thinning for each stand (“Slapjack Project Silviculture Report,” appendix A). All actions alternatives would meet the canopy requirements for CWHR size class 4 and class 5 stands listed in table 2 of the SFNPA Record of Decision.

DFPZ Treatments: Mastication. Mastication would change the canopy cover of the plantations with interlocking and overlapping crowns to a more open condition with gaps between tree crowns. For all action alternatives, canopy cover would generally average from 15 to 30 percent in plantations. The effects of each action alternative on density are expected to be the same. Plantations would be thinned to approximately 90 to 135 trees per acre, or an 18- to 22-foot spacing between trees, depending on the size of trees. The post-treatment canopy cover in stands of larger trees would average 40 percent in both CWHR size class 4 and 5 stands (“Slapjack Project Silviculture Report,” appendix A.) Mastication in these stands would be limited to primarily understory trees.

DFPZ Treatments: Underburning and Pile Burning. Prescribed burning would remove most of the understory vegetation and some overstory trees through localized torching. Depending on prescribed burning conditions (low intensity versus high intensity), localized torching would be low, and the change to canopy cover would be minimal. All action alternatives are expected to have the same effects.

Group Selection Treatments: Harvesting, Site Preparation, Reforestation, and Release. The residual canopy cover of trees greater than 30 inches dbh would range from 0 to 34 percent for all stands. CWHR size class 4 and 5 stands would have an average of 11 and 22 percent canopy cover, respectively.

Individual Tree Selection Treatments: Harvesting and Fuel Treatment. The residual canopy cover of trees would be 50 percent for all stands. All actions alternatives would meet the canopy requirements for CWHR size class 4 and 5 stands listed in table 2 of the SFNPA Record of Decision.

3.12.10 Environmental Consequences: Stand Structure and Tree Size

3.12.10.1 Alternative A (No Action): Direct and Indirect Effects

Under alternative A, trees in the suppressed and intermediate crown classes would continue to provide ladder fuels into the overstory crown canopy. Currently, all treatment groups have relatively low quadratic mean diameters, meaning that there is a high proportion of smaller tree size classes. Existing conditions across the project area, including multiple size classes, low quadratic mean diameters, and dense canopy, indicate high fuel ladder potential and interlocking crowns capable of sustaining crown fires (see tables 3-55 and 3-56 below). Tables A-15 and A-16 in appendix A of the "Slapjack Project Silviculture Report" list the stand structure for each stand.

Table 3-55. Canopy cover by tree size class for CWHR size class 4 and class 5 stands.

	Canopy Cover Percent by Tree Size Class[a]					
	Sapling 1–6 inches dbh	Poles 6–11 inches dbh	Small Trees 11–24 inches dbh	Medium Trees 24–30 inches dbh	Large Trees 30 inches dbh or greater	Total Cover
CWHR Size Class 4						
Before Treatment	19	19	30	7	11	60
After Treatment (Alternatives B – G)	0	2	22	7	11	40
CWHR Size Class 5						
Before Treatment	20	12	30	11	22	56
After Treatment (Alternatives B – G)	0	1	11	9	22	40

Note:

a. Sums of canopy cover by size do not sum to "Total Cover" because of overlapping.

Table 3-56. Trees per acre by size class for CWHR size class 4 and 5 stands.

	Trees per Acre by Tree Size Class					
	Sapling 1–6 inches dbh	Poles 6–11 inches dbh	Small Trees 11–24 inches dbh	Medium Trees 24–30 inches dbh	Large Trees 30 inches dbh or greater	Total Trees per Acre
CWHR Size Class 4						
Before Treatment	191	97	52	5	5	320
After Treatment (Alternatives B – G)	2	6	35	5	5	53
CWHR Size Class 5						
Before Treatment	241	39	47	9	12	348
After Treatment (Alternatives B – G)	5	3	14	7	12	41

3.12.10.2 All Action Alternatives: Direct and Indirect Effects

DFPZ Treatments: Mechanical Thinning and Biomass Removal. Under all action alternatives, thinning would occur from below to remove ladder and canopy fuels. This would increase ground-to-crown height, spacing between trees, and spacing between tree crowns. Removal of suppressed, intermediate, and some codominant trees with crowns beneath and adjacent to healthy larger trees would be emphasized. It is estimated that about two trees per acre that are between 24 and 30 inches dbh would be removed due to poor crowns, defects, disease, insect damage, or because their crowns are beneath those of larger trees (those greater than 30 inches dbh).

Tables 3-55 and 3-56 above display existing stand structure attributes (average canopy cover percent and trees per acre by tree size class) for CWHR class 4 and class 5 stands in the project area. Canopy cover in the smaller tree size classes (saplings, poles, and small trees) would be reduced substantially after thinning, thus reducing the fuel ladder and canopy fuels.

The 2004 Record of Decision on the SNFPA final supplemental EIS requires that projects be designed to retain, where available, at least 5 percent of total treatment area in lower layers comprised of trees 6 to 24 inches dbh. For the Slapjack Project, this requirement would be met in all treated stands, as displayed in table 3-56 above. Tables A-15 through A-19 of the “Slapjack Project Silviculture Report” display the canopy cover and trees per acre by size class for each treatment unit. The effects of all action alternatives would be the same as the effects to reduce canopy to about 40 percent. Fuel ladder would be reduced under the action alternatives, and tree crowns would be spaced farther apart. Since the lowest layer of the canopy would be almost eliminated, horizontal diversity would be reduced.

Some trees greater than 30 inches dbh would be removed for operability during new temporary road construction (3.2 miles), reconstruction of existing system and nonsystem roads (20.9 miles), new landing construction (160 landings), and existing landing reconstruction (40 landings). Approximately 80 acres would be affected by these activities. Since most of the work would use existing facilities, and almost 70 percent of the harvesting would be in CWHR size classes 3 and 4, an

estimated 6 trees per acre, or a total of 480 trees (less than 2 percent for the project area) greater than 30 inches dbh, may be removed.

All action alternatives would increase the quadratic mean diameters for each treatment group (see table 3-57 below). This indicates that there would be a higher proportion of medium to large size trees in the stand, which would reduce the ladder fuels and fire hazard. Tree growth and vigor would also improve (refer to the "Environmental Consequences: Forest Health" section 3.12.7 above).

Table 3-57. Quadratic mean diameters for each treatment group.

Treatment Group	Quadratic Mean Diameter (inches dbh)	
	Alternative A (No Action)	Alternatives B – G (Action Alternatives)
CWHR size class 5 – thin	12	29
CWHR size class 4 – thin	11	22
CWHR size class 3 – thin	10	15
Masticate	9	17
Underburn	11	21
Hand cut, pile, and burn	8	32

The most substantial change in the quadratic mean diameters of trees over 1 inch dbh would be seen in the CWHR size class 4 and 5 stands. Under all action alternatives, the quadratic mean diameters in units in CWHR size classes 4 and 5 would increase considerably from between 11 and 12 inches dbh to between 22 and 29 inches dbh.

DFPZ Treatments: Mastication. All action alternatives are expected to have the same effects. Mechanical mastication would change the structure (by reducing ladder fuels), density, and size of fuels in the stand but would not necessarily change the total fuel loading. The quadratic mean diameters or tree size of the residual stand would increase (refer to table 3-57 above).

DFPZ Treatments: Underburning and Pile Burning. The effects of each of the action alternatives are expected to be the same. Prescribed burning would change stand structure by burning the understory vegetation and the suppressed and intermediate tree sizes. However, larger vegetation that is not consumed by the prescribed burn would be left standing after treatment. Some stands would still experience some stress after treatment due to competition with brush species that were not consumed in the underburn treatments.

Group Selection Treatments: Harvesting, Site Preparation, Reforestation, and Release. Group selection treatments would create small patches of young regeneration, changing the stand structure in and near the treatment unit. Trees greater than 30 inches dbh in group selection openings, as well as all trees bordering group selection openings, are expected to respond to the reduced competition by increasing growth. This would cause further diversification of canopy layers through the development of large dominant overstory trees. York et al. (2004) found a 30 percent increase in growth in trees along group selection borders compared to trees growing within the group selection matrix.

Alternatives B through E call for 219 acres of group selection harvest. Implementation of group selection treatments would create two distinct structures: (1) the overstory comprised of residual trees greater than 30 inches dbh and (2) planted and natural conifer seedlings. The effects of alternative F are expected to be the same as alternative B, except that in order to reduce impacts on watersheds over the Threshold of Concern, the group acres were reduced to 190.

Individual Tree Selection Treatments: Harvesting and Release. The effects on the 148 acres proposed for individual tree selection would be similar to the effects from thinning for DFPZ construction. The major difference is that 50 percent canopy would be retained. On average, the quadratic mean diameter of trees over 1 inch dbh would be raised from 11 inches to about 27 inches. Canopy cover would be decreased from an existing average of about 78 percent to 50 percent, while trees per acre would be reduced from about 466 to about 47 trees per acre.

3.12.11 Environmental Consequences: Density (Basal Area and Trees per Acre)

3.12.11.1 Alternative A (No Action): Direct and Indirect Effects

Table 3-58 shows basal area and trees per acre for the various treatment groups in the DFPZs. Alternative A represents the existing condition. The high number of trees per acre across all treatment groups indicates overstocked conditions, compared with the Dunning and Reineke (1933) data from natural stands. Their data indicates that the trees per acre range from 71 to 165 in well-stocked, second-growth 100- to 150-year-old mixed conifer stands. However, the desired trees per acre in DFPZ units would be lower in order to ensure effectiveness of the treatments. For plantations, the desired trees per acre for the second decade would lower tree density to between 100 and 150 well-distributed trees per acre, and shrub cover would be maintained between 10 and 20 percent (SNFPA final EIS, volume 1, chapter 2, page 57).

Table 3-58. Basal area and trees per acre in proposed DFPZs.

Treatment Group	Alternative A (No Action)		Alternatives B – G (Action Alternatives)	
	Basal Area (in square feet)	Trees Per Acre	Basal Area (in square feet)	Trees Per Acre
CWHR size class 5 – thin	220	370	149	93
CWHR size class 4 – thin	189	390	127	70
CWHR size class 3 – thin	185	721	106	134
Masticate	128	354	110	134
Underburn	128	329	103	164
Hand cut, pile, and burn	231	629	165	29

Stands, and aggregations within stands, that are currently overstocked or understocked with dense brush cover would continue to experience stress due to high levels of inter-tree or brush competition (refer to the “Environmental Consequences: Forest Health” section 3.12.7 above). Basal area standards in table 2 of the SNFPA Record of Decision only apply to treatment group CWHR size class 4 and 5 stands.

3.12.11.2 All Action Alternatives: Direct and Indirect Effects

DFPZ Treatments: Mechanical Thinning and Biomass Removal. Thinning the understory would reduce the stocking density of the trees in the suppressed and intermediate crown classes, which would reduce the amount of ladder fuels growing underneath the overstory crown canopy (see Stand Structure Indicator). Reducing tree density would improve tree growth and vigor, reduce susceptibility to drought and bark beetle attacks (see Forest Health Indicator), and reduce fire hazard (see Fire and Fuels Indicator). For all action alternatives, approximately 67 percent of the existing basal area would be retained for CWHR size class 4 and 5 stands. All action alternatives would meet the requirements of retaining 30 percent of the existing basal area for CWHR 4 stands and 40 percent of existing basal area for CWHR 5 stands.

DFPZ Treatments: Mastication. The effects of each of the action alternatives are expected to be the same. Plantations would be thinned to approximately 90 to 135 trees per acre, or 18 to 22 foot spacing between trees, depending upon the size of trees. Reducing tree density would improve tree growth and vigor, reduce susceptibility to drought and bark beetle attack (see Forest Health Indicator), and reduce fire hazard (see Fire and Fuels Indicator)

DFPZ Treatments: Underburning and Pile Burning. The effects of each of the action alternatives are expected to be the same. Prescribed burning would change the basal area and trees per acre by consuming or killing the suppressed (seedlings, saplings), intermediate (poles, small trees) and some codominant (small trees, medium trees) size classes.

Group Selection Treatments: Harvesting, Site Preparation, Reforestation, and Release. The effects of each of the action alternatives are expected to be the same, except alternatives F and G propose less group acres. The number of trees per acre of the residual trees greater than 30 inches dbh within the group selection areas averages 5 to 12 trees per acre for CWHR size classes 4 and 5, respectively. The group selection openings would probably be planted with shade-intolerant species on 10- to 12-foot spacing or 300 to 435 trees per acre.

Individual Tree Selection Treatments: Harvesting and Release. The effects on the 148 acres proposed for individual tree selection would be similar to the effects from thinning for DFPZ construction. The major difference is that 50 percent canopy would be retained. Canopy cover would be decreased from an existing average of about 78 percent to 50 percent, while trees per acre would be reduced from about 466 to about 47 trees per acre.

3.12.12 Affected Environment (Existing Conditions): Harvest Volume

Existing Condition. Potential harvest volumes for DFPZ and individual tree selection units would range from 1,500 to 10,000 board feet per acre. Potential harvest volumes for groups would range from 10,000 to 30,000 board feet per acre.

3.12.13 Environmental Consequences: Harvest Volume

3.12.13.1 Alternative A (No Action): Direct and Indirect Effects

No timber products (commercial firewood, biomass chips, or sawlogs) would be provided to the local economy.

3.12.13.2 All Action Alternatives: Direct and Indirect Effects

DFPZ Treatments: Mechanical Thinning and Biomass Removal. DFPZ thinning under alternatives B through E would provide approximately 9.8 million board feet of sawlogs and 34,000 tons of biomass to the local community (see the "Slapjack Project Silviculture Report," appendix A). Under alternatives F and G, sawlog and biomass volume would be the same and the DFPZs would be treated in the same way.

DFPZ Treatments: Mastication. No sawlogs or biomass would be generated from mastication, grapple pulling, hand cutting, and piling treatments in alternatives B through G.

DFPZ Treatments: Underburning and Pile Burning. No sawlogs or biomass would be generated from underburning or pile burning treatments in alternatives B through G.

Group Selection Treatments: Harvesting, Site Preparation, Reforestation, and Release. Under alternatives B through E, approximately 3.3 million board feet of sawlogs would be generated through the harvest of 219 acres of group selection units. Alternatives F and G would harvest 190 acres of group selection and generate approximately 2.9 million board feet of sawlogs.

Individual Tree Selection Treatments: Harvesting and Release. Under alternatives B through E, approximately 0.9 million board feet of sawlogs would be generated through the harvest of 148 acres of individual tree selection units. Alternatives F and G would harvest the same 148 acres of group selection units and generate approximately 0.9 million board feet of sawlogs.

3.12.14 Affected Environment (Existing Conditions): Effectiveness of DFPZ Maintenance with Herbicides

The only recent use of herbicides on the Plumas National Forest is associated with ongoing studies in the Challenge Experimental Forest. The only recent use of herbicides on the Plumas National Forest is associated with a Fuel Reduction Study on the Challenge Experimental Forest. As part of this study, four 0.5-acre plots were treated with Velpar L (hexazinone) in 2004, followed several months later with Accord Concentrate (glyphosate) and Arsenal (imazapyr). Soil solution samples are being analyzed at the University of California, Davis.

3.12.15 Environmental Consequences: Effectiveness of DFPZ Maintenance with Herbicides

3.12.15.1 Alternative A (No Action): Direct and Indirect Effects

No DFPZs would be created, so no maintenance would be needed.

3.12.15.2 Alternatives B, E, and F: Direct and Indirect Effects Herbicide Treatments

Areas to be Treated. Approximately 1,954 acres in DFPZs (where tanoak comprises more than 10 percent of the stand) would be sprayed with imazapyr after construction of the DFPZs. Within the DFPZ units, about 737 acres are in CWHR size class 5 stands; about 1,030 acres are in size class 4 stands, and about 187 acres are in size class 3 stands.

Effects of Herbicide Treatment. Imazapyr is a broad-spectrum, nonselective herbicide used to control broadleaf weeds, grasses, brush, and trees. The effects of herbicide use were analyzed in the HFQLG Act final supplemental EIS (USDA Forest Service 2003a). Alternative E, the selected alternative in the Record of Decision on that EIS, includes the use of this herbicide as the selected maintenance strategy. The analysis in the HFQLG final supplemental EIS includes effects on "Old Forest Associated Species" (pages 3-47 to 3-60); "Watershed and Aquatic/Riparian Protection" (pages 3-61 to 3-244); Socio-Economic Well-being, including Human Health and Safety (pages 3-249 to 3-273); and "Wildfire Hazard Reduction and Fuel Management," including "Air Quality and Fire Behavior" (pages 3-274 to 3-296). The HFQLG Act final supplemental EIS and Record of Decision found no significant adverse effects on human health, ecosystem health, or any other environmental resource from herbicide use. It also found that particular vegetation types were identified for maintenance treatment with herbicides "because hardwoods, in particular tanoak, and sprouting shrubs are easily eradicated with herbicides, and show little or no regrowth after application, but are difficult or expensive to control with mechanical or hand methods."

Length of Time That Treatment Would be Effective. The HFQLG final supplemental EIS estimated that initial treatment of DFPZs would generally be effective for 10 years, except in the brush and plantation types where the estimate was 5 years, in mixed conifer and tanoak type the estimate was 10 years, and in the red fir type the estimate was 30 years. Subsequent maintenance was estimated to be needed at the same intervals (HFQLG final supplemental EIS pages 2-22 and 2-23). No applicable studies have been completed on shrub treatment under a canopy. The recently initiated "Alternatives to Fire for Fuel Reduction at California's Forest Urban Interface" (Powers et al. 2005) does give some indication about the effectiveness of different treatments, including both manual and chemical treatment. Second-growing-season results indicate that biomass from understory rebuild is much lower after the use of herbicides. Studies done in open-sky conditions, in clearcut, or in converted shrubfields indicate chemical treatment is 90–95 percent effective in reducing shrub cover after 10 to 12 years. These same studies indicate manual or mechanical treatment is about 80 percent effective in reducing shrub cover after the same period.

Cost of Treatment. The HFQLG final supplemental EIS treatment regime for maintenance of DFPZs was used to find the discounted costs for the treatment over the 50- to 52-year period that was used in the final supplemental EIS. This cost was compared to the discounted costs for the alternative maintenance treatments of mechanical (mastication) or underburning. Herbicides would be applied 2, 12, 22, 32, 42, and 52 years after construction. The cost per acre used for the analysis was $250 per acre for herbicide treatment (HFQLG final supplemental EIS page 2-32). The costs per acre for mechanical treatment and underburning are locally experienced costs, which have been increased to account for increased fuel costs. These costs are $600 per acre for mechanical treatment and $250 per acre for underburning. These treatments would be done 2, 10, 20, 30, 40, and 50 years after construction. The Forest Service standard discount rate of 4 percent per year was used to discount future costs to present values. This analysis indicates underburning is the least costly method of maintenance at a current net value of about $447 per acre. Herbicide application is the second least costly method at $645 per acre. Mechanical treatment was the most expensive, with a discounted cost of $1,074 per acre.

3.12.15.3 Alternatives C and G: Direct and Indirect Effects of No Herbicide Treatments

No herbicide use is proposed for alternatives C and G—all 4,419 acres of DFPZs would be maintained by using a combination of mechanical, underburning, and, possibly manual, methods. The treatment units would be monitored to determine if they are still effective over time. By not including the use of herbicides at this time for the Slapjack Project, their future use for DFPZ maintenance is essentially precluded. If harvest or mastication does not achieve DFPZ objectives in all treatment units, an underburn would be used as a follow-up treatment to meet short-term objectives. Harvested units could also receive a follow-up mastication treatment. In the long-term, the foreseeable maintenance of DFPZs would consist of prescribed fire, mechanical (mastication and grapple pulling), and hand treatments. Specific maintenance treatments would be determined based on site-specific analysis of land allocations, slopes, vegetation types, and previous underburning treatments

3.12.16 Cumulative Effects

3.12.16.1 Alternative A (No Action)

Historically, stands in the Slapjack Project area had a higher component of shade-intolerant species such as ponderosa pine, Douglas-fir, and sugar pine in the overstory. Under the no-action alternative, the understory would be composed primarily of shade-tolerant species such as white fir, tanoak, and incense-cedar, with very few shade-intolerant species. The survival of shade-intolerant seedlings would not be assured because not enough sunlight would reach the ground. Unless fire or some other disturbance creates some openings, the cumulative effect of maintaining the existing stand structure would be a gradual decline of shade-intolerant species in the overstory.

Overstocked areas and stressed trees, such as those currently found across the Slapjack Project area, are more susceptible to disease and insect infestations. If left untreated, adjacent trees, and eventually adjacent stands, would become infected as the outbreak spreads. Stand growth and vigor would continue to decline. Suppressed and intermediate tree mortality would increase. The cumulative result would be an increase of dead and dying trees that would contribute to fuel ladder buildup.

CWHR Size Class Analysis—Alternative A would not change the current CWHR size classes, unless a major disturbance such as wildfire, bark beetle infestation, or disease were to occur in the project area.

3.12.16.2 All Action Alternatives

DFPZ Treatments. The removal of trees that are diseased or invested with insects, especially around stand boundaries, would prevent the spread of dwarf mistletoe to the understory or adjacent stands. If some dwarf mistletoe-infected trees larger than the lower diameter limit (30 inches dbh for alternatives B and C and 20 inches dbh for alternative D) were retained in the stand, thinning would maintain or improve the vigor of the infected tree, allowing it to outgrow and/or better tolerate the infestation (Scharpf and Parmeter 1976, 1982). With improved vigor, the infected trees would be less susceptible to bark beetle attack. Furthermore, since dwarf mistletoe is host-specific, thinning operations would be able to selectively leave nonhost tree species in the understory.

CWHR Size Class Analysis—Under alternatives B through G, DFPZ thinning would convert stands with dense (greater than 60 percent) canopy cover into stands with open (25–39 percent) or moderate (40–59 percent) canopy cover. In addition, removal of the smaller trees would increase the quadratic mean diameter of the residual stand, moving stands to the next crown size or dbh size class (that is, from CWHR size class 3 to class 4). Removing the smaller trees would also increase the quadratic mean diameter of the residual stand.

Overall, there would be little difference in size and canopy cover classes between the alternatives since the only difference is that alternatives F and G propose 29 acres less of group selection.

Group Selection Treatments. Group selection timber harvest would be used to enhance the health and vigor of stands and to achieve or maintain desired stocking levels. Group selection harvest would not immediately change the forest structure of a stand from a high fire risk into a fire-resilient stand, but it would initiate changes in forest structure which would occur over an approximately 150- to 200-year rotation. The Slapjack Project would begin the process of converting high-fire-risk stands into more fire-resilient stands. Over time, implementation of group selection on a landscape scale would enhance the health and vigor of stands, maintain a wide range of tree ages and size classes from seedlings to large-diameter trees, and achieve or maintain desired stocking levels. Uneven-aged management, and group selection in particular, would result in vertical and horizontal structure more closely associated with pre-settlement forest conditions by breaking up canopy continuity and reducing ladder fuels. This would help change the structure of the forests from even-aged (same-aged), with a high risk fire ladder potential, to the desired condition of an uneven-aged, multistory, fire-resilient forest structure. Long-term fire resilience of forested landscapes would be maintained by small group selections conducive to regeneration of fire-resistant and shade-intolerant species such as ponderosa pine. Group selections would permit the maintenance of single canopy layers in any given location, thereby discouraging crown fires (Weatherspoon 1996; Weatherspoon and Skinner 1996).

Because fewer acres of group selection would be implemented under alternatives F and G (190 acres) compared to alternatives B through E (219 acres), there would be fewer 1- to 2-acre openings for the regeneration and establishment of shade-intolerant species. Therefore, there would be less long-term change in species composition than under alternatives B through E.

The HFQLG Act includes expectations for treating 0.57 percent of the Pilot Project acreage annually—or approximately 8,700 acres—using group selection methods (HFQLG final EIS, appendix E). The contribution of the Watdog Project to the annual target for group selection harvest was initially determined to be approximately 20 acres every year or 402 acres every 20 years. However, due to various constraints and land suitability, alternatives B, C, D, and E propose group selection harvests of 219 acres. Alternatives F and G propose 190 acres of group selection harvests. Alternatives B, C, D, and E would provide 54 percent of the HFQLG expectations for group selection harvests, compared to 47 percent for alternatives F and G. For each 20-year reentry interval, group selection harvests would occur in different portions of a stand to create a mosaic of different age and size classes within a stand.

CWHR Size Class Analysis—Group selection harvest under alternative B would convert stands with open (25–39 percent), moderate (40–59 percent), or dense (greater than 60 percent) canopy cover into stands with 0–9 percent or 10–24 percent (sparse) canopy cover. Group selection units with residual large conifers (greater than 30 inches dbh) would develop into multilayered

CWHR size class 6 stands once the planted and natural conifer seedlings become established and contribute to canopy cover. On a management area basis, group selection harvests would result in minimal changes in overall seral stage diversity.

3.12.17 Summary of Cumulative Effects

See the "Scope of Analysis" section above for the determination of the geographic and timeframe boundaries for the cumulative effects analysis.

Much of the Slapjack Project area has been impacted by mining and logging over the past 150 years. Past natural and human disturbances are inherently reflected in the condition of the current landscape. For example, pole-sized trees likely developed due to disturbance within the last half century, whereas small- to medium-sized trees most likely grew from disturbances 50 to 150 years ago. Since many of these changes were not recorded or were limited to second-hand or unreliable sources, effects of the relevant historic actions are described qualitatively rather than quantitatively.

Table 3-59 lists the past actions in the Slapjack Project area for the past 25 years. These activities have contributed to the forming of existing conditions in the Slapjack Project area. Clearcuts created the current younger stands, while thinning and group selection cutting reduced stocking and canopy and allowed for faster growth of residual trees. The salvage cutting removed dead trees from areas of fire or insect activity. The cumulative effects related to past natural events (such as fires and insect and disease outbreaks) and the lingering effects of past projects were taken into account for the GIS analysis of timber type, which was based on year 1997 aerial photograph interpretation. Aerial photograph interpretation analyzed all size classes (from saplings, poles, and small trees to large-diameter trees) and canopy cover (open, sparse, moderate, and dense) for each of the timber or vegetation types within the "e-veg" coverage area. This analysis is on file at the Feather River Ranger District in Oroville, California. There are no foreseeable DFPZ thinning or group and individual tree selection harvests in the Slapjack Project area.

Table 3-59. Past activities in the Slapjack Project area by decade.

Activity by Decade	Acres	Activity by Decade	Acres
Clearcut 1980s	1,166	Selection 1980s	120
Clearcut 1990s	254	Salvage 1980s	33
Clearcut 2000s	81	Salvage 1990s	16
Thinning 1980s	45	Salvage 2000s	128
Thinning 1990s	481	**Total**	**2,324**

The majority of projects listed in the "Slapjack Project Silviculture Report," appendix A, would have no cumulative effects on vegetation attributes (such as species composition, forest health, canopy cover, and seral stage diversity) since they are outside the Slapjack Project area, the Feather Falls and Challenge Management Areas, or they are projects with limited impact on vegetation, such as mining claims and special use permits. The desired conditions for maintaining various seral stages or timber strata by vegetation type, size class, and canopy cover (CWHR) do not include lands on private property. Therefore, harvest or thinning projects on private property would have no

cumulative effects on vegetation attributes for the Slapjack Project. Furthermore, the one known project, the Noxious Weed Treatments, would have no cumulative effects because the treatments would not change vegetation attributes.

Seral Stage Diversity. Two projects, Watdog and Sugarberry, would have minimal cumulative effects on seral stage diversity. The Watdog and Sugarberry Projects are outside the Slapjack Project area. The Watdog DFPZ Project would affect less than 4 percent of the Feather Falls Management Area 10 (Slapjack Project Silviculture Report, appendix A). The proposed mastication (98 acres or 0.4 percent of management area) and underburning (614 acres or 2.3 percent of management area) treatments would not change seral stage diversity. The thinning from below treatments would have minimal effects on seral stage diversity. The thinning from below (287 acres or 1.1 percent of management area) would slightly decrease stands with dense (greater than 60 percent) canopy cover (totaling 225 acres) into stands with moderate (4–59 percent) canopy cover.

The Sugarberry Project proposes approximately 1,500 acres of group selection and 500 acres of individual tree selection treatments. About 1,490 acres of land available and suitable for group and individual tree selection is the Sugarberry Project area are within the Challenge Management Area. Group selection harvest (150 acres or 0.3 percent of the management area and 0.7 percent of National Forest System land in the management area) would change stands with open (25–39 percent), moderate (40–59 percent), or dense (greater than 60 percent) canopy cover into portions of stands that would be nonstocked (0–9 percent) or sparse (10–24 percent) canopy cover ("Slapjack Project Silviculture Report," appendix A). The individual tree selection treatments (150 acres or 0.3 percent of the management area) would slightly decrease stands with dense (greater than 60 percent) canopy cover into stands with moderate (40–59 percent) canopy cover ("Slapjack Project Silviculture Report," appendix A).

In conclusion, treatments under the Slapjack Project, along with the Watdog and Sugarberry Projects would result in minimal changes in seral stage diversity from existing conditions for the Feather Falls and Challenge Management Areas. Seral stage analysis for the Slapjack Project indicates that thinning from below in the DFPZs, individual tree selection, and group selection harvests would result in minimal changes in overall seral stage diversity. The effects would likely be comparable for the other projects considered in this analysis because the treatments would be similar. In order to reach the desired targets for each of the seral stages, more thinning would have to occur in the small to large sawtimber, with canopy cover greater than 40 percent seral stages. However, this may be unattainable due to the current amendments to the 1988 Forest Plan that are related to canopy cover and basal area requirements as listed in the SNFPA final supplemental EIS and Record of Decision.

DFPZ Maintenance. The Record of Decision for the HFQLG final supplemental EIS was signed in July 2003. The EIS documented the results of the effects of alternative management strategies for maintenance of DFPZs in the HFQLG Pilot Project area. The final supplemental EIS and Record of Decision, in combination with the original HFQLG Act final EIS and Record of Decision, provide programmatic guidance for DFPZ construction and maintenance in the HFQLG Pilot Project area. DFPZ maintenance methods were developed from criteria in the final supplement EIS involving land allocations, slope classes, and vegetation characteristics (see appendix D in this Slapjack Project EIS).

The final supplemental EIS and Record of Decision call for consideration of all practicable methods of vegetation control for site-specific projects, including the use of herbicides. As pointed out in the final supplemental EIS, herbicides have to be used within about two years of the initial treatment in order to be effective.

Alternatives B, E, and F propose the use of herbicides to treat approximately 1,954 acres of DFPZs where tanoak comprises more than 10 percent of the stand. By not including the use of herbicides at this time for other units in the Slapjack Project, their use for DFPZ maintenance is essentially precluded. Under alternatives C and G, no herbicide use is proposed. If mastication does not achieve DFPZ objectives in all treatment units, an underburn would be used as a follow-up treatment to meet short-term objectives. In the long term, the foreseeable maintenance of the DFPZs would consist of prescribed fire, mechanical (mastication, grapple pulling), and hand treatments. Specific maintenance treatments would be determined based on site-specific analysis of land allocations, slopes, vegetation types, and previous underburning treatments.

About 25 percent of the proposed Slapjack DFPZ is in plantations. After the completion of the mastication proposed for these areas, manzanita, *Ceanothus*, and other shrub species could re-sprout and begin reducing DFPZ effectiveness within five years of the initial treatment. However, young shrubs, especially the *Ceanothus* species common in the area, have a high percentage of live material that maintains high fuel moisture content throughout the year. Younger shrubs are less flammable than older shrubs since younger shrubs have a lower proportion of dead to live branches than older shrubs.

Ceanothus and other shrub species with high fuel moisture content can act as heat sinks by absorbing some of the heat produced by adjacent burning fuels without igniting, thereby retarding fire spread. For example, the Mosquito fire in August 1999 started from a lightning strike adjacent to a nine-year-old plantation of primarily ponderosa pine with a high component of *Ceanothus* shrubs, much like many of the plantations in the Slapjack Project area. A fireline was quickly constructed through the middle of the plantation, and the fire was controlled at about 30 acres by one engine crew and a dozer. If the *Ceanothus* shrubs were older and contained more dead branches, the fire may not have been contained so easily or extinguished at 30 acres.

The remaining 80 percent of the project area is made up of more natural stands of larger-sized trees, where the vegetation has not been as intensively treated. After completion of proposed thinning, biomass removal, mastication, and burning activities, some slow to moderate development of manzanita, *Ceanothus*, and other shrubs could occur, and in some areas, grasses would become more vigorous and dense. Sprouting hardwoods (such as tanoak, black oak, and live oaks) would also resprout. As the overstory canopy cover increases, suppression of shrub growth would begin and overall shrub cover would decrease. Increasing overstory shade would slowly decrease the growth of the sprouting hardwoods. Since mastication would not change canopy cover levels, or only change them slightly, understory growth is expected to be least in these units. There would also be some natural regeneration of conifers over time. Conifer regeneration could reduce DFPZ effectiveness by creating fuel ladders within 10 to 20 years after the initial treatment, depending on the site.

Even if no maintenance is conducted in the DFPZs in the future, they should be effective for many years. In the natural stands, the DFPZs' effectiveness may not be seriously reduced for 10 to 20 years. In the plantations, the DFPZs' effectiveness may not be appreciably reduced for approximately 10 years. Even after that time, the DFPZs would retain many beneficial characteristics

(such as increased overstory crown spacing and reduced ladder fuels) that would aid in fighting fire and reducing fire intensity. For example, the proposed action would remove a significant amount of ladder fuel, so even if significant amounts of understory vegetation (shrubs, brush, and resprouting hardwoods) grow in the treated stands over the next several years, the result would be a net loss in accumulated fuels. Additionally, Forest Service staff could conduct emergency maintenance and rapidly restore full effectiveness to the DFPZ in the event of an oncoming wildfire.

3.13 Wildlife and Fish

3.13.1 Introduction

This section presents a summary of the Biological Assessment / Biological Evaluation (BA/BE) for the Slapjack Project and includes complete discussions of possible effects of the proposed project and alternatives on federal Threatened and Endangered species, Proposed Candidate species, Species of Concern, and Forest Service Sensitive species. Management Indicator Species (MIS), Neotropical migratory birds (NTMB), woodpecker group, western gray squirrel, and willow alder are also discussed. Reports are on file at the Feather River Ranger District office in Oroville, California, and are available upon request.

Threatened and Endangered Species — those species listed under the federal *Endangered Species Act*. Threatened species are likely to become Endangered throughout all or a significant portion of their range (16 United States Code [USC] 1532).

Proposed and Candidate Species — a Proposed species is any species that is proposed in the *Federal Register* to be listed as a Threatened or Endangered species under the *Endangered Species Act* (50 Code of Federal Regulations [CFR] 402.03). A Candidate species is a candidate for listing as a Proposed species. The U.S. Fish and Wildlife Service recently changed its policy on Candidate species—the term “Candidate” now strictly refers to species for which the service has enough information on file to warrant or propose listing as Endangered or Threatened.

Federal Species of Concern — formerly referred to as “Candidate Category 2” species for which listing is possibly appropriate but for which the U.S. Fish and Wildlife Service lacks sufficient information to support a listing proposal. These are now called “Species of Concern” and are only analyzed if they are also listed as Forest Service Sensitive species.

Forest Service Sensitive Species — those species, generally federal Candidates for listing or Species of Concern, that have been designated by the Forest Service as needing special management attention because of viability concerns. The Forest Service manages for these species to ensure they will not require listing as Threatened or Endangered.

Management Indicator Species — are used in project analysis because their population changes are believed to indicate whether management activities are having an effect on the viability and diversity of animal and plant communities.

Table 3-60 lists MIS and NTMB species that potentially occur on the Plumas National Forest—the table does not include Threatened, Endangered, and Sensitive species. There is no known habitat for, and there have been no observations of, the prairie falcon or largemouth bass; therefore, these species are not discussed further in this document. The proposed activities in the Slapjack Project area may affect the habitat for MIS and NTMB species.

The reports for MIS and NTMBs discuss the possible effects on habitat for these species. Any effects on MIS species are expected to be minimal and are therefore not discussed in detail in this section.

Table 3-60. MIS and NTMB bird species that potentially occur on the Plumas National Forest and could be affected by the project.

Species	Category
Swainson's thrush (*Catharus ustulatus*)	Neotropical Migratory Bird
Canada goose (*Branta canadensis*)	Management Indicator Species
Golden eagle (*Aquila chrysaetos*)	Management Indicator Species
Deer group	Management Indicator Species
Trout (rainbow, brook and brown)	Management Indicator Species

Table 3-61 lists the Threatened, Endangered, and Sensitive species for which habitat availability and suitability were considered for this project. The table includes determinations based on the analysis for the Slapjack Project as disclosed in the BA/BE, available data, and on the assumption that full implementation of identified mitigations would be in complete compliance with the 1988 *Plumas National Forest Land and Resource Management Plan* (commonly called the "Forest Plan"), as amended. The determinations are discussed in more detail below in the "Determinations" section (3.13.6).

Table 3-61. Status of federal Threatened, Endangered, and Candidate species and Species of Concern and Forest Service Sensitive species that potentially occur on the Plumas National Forest.

Species	Scientific Name	Category[a]	Summary of Effects[b]	
			No-Action Alternative	Action Alternatives
Invertebrates				
Carson wandering skipper	*Pseudocopaeodes eunus obscurus*	Endangered	WNA	WNA
Valley elderberry longhorn beetle	*Desmocerus californicus dimorphus*	Threatened	WNA	WNA
Fish				
Winter-run Chinook salmon	*Oncorhynchus tshawytscha*	Endangered	WNA	WNA
Central Valley steelhead	*Oncorhynchus mykiss*	Threatened	WNA	WNA
Delta smelt	*Hypomesus transpacificus*	Threatened	WNA	WNA
Lahontan cutthroat trout	*Oncorhynchus clarki henshawi*	Threatened	WNA	WNA
Central Valley spring-run Chinook salmon	*Oncorhynchus tshawytscha*	Threatened	WNA	WNA
Hardhead minnow	*Mylopharodon conocephalus*	Sensitive	WNA	MAI
Amphibians				
California red-legged frog	*Rana aurora draytonii*	Threatened	WNA	MAI
Foothill yellow-legged frog	*Rana boylii*	SOC/Sensitive	WNA	MAI

Table 3-61. Status of federal Threatened, Endangered, and Candidate species and Species of Concern and Forest Service Sensitive species that potentially occur on the Plumas National Forest (continued).

Species	Scientific Name	Category[a]	Summary of Effects[b]	
			No-Action Alternative	Action Alternatives
Amphibians (continued)				
Mountain yellow-legged frog	*Rana muscosa*	Candidate/ Sensitive	WNA	WNA
Northern leopard frog	*Rana pipiens*	Sensitive	WNA	WNA
Reptiles				
Western pond turtle	*Clemmys marmorata marmorata*	SOC/Sensitive	WNA	MAI
Birds				
Bald eagle	*Haliaeetus leucocephalus*	Threatened/ MIS	WNA	WNA
American peregrine falcon	*Falco peregrinus anatum*	SOC/Sensitive/ MIS	WNA	WNA
Northern goshawk	*Accipiter gentilis*	SOC/Sensitive/ MIS	WNA	MAI
California spotted owl	*Strix occidentalis occidentalis*	SOC/Sensitive/ MIS	WNA	MAI
Great gray owl	*Strix nebulosa*	Sensitive	WNA	WNA
Little willow flycatcher	*Empidonax trailii brewsteri*	SOC/Sensitive	WNA	WNA
Greater sandhill crane	*Grus canadensis tabida*	SOC/Sensitive	WNA	WNA
Swainson's hawk	*Buteo swainsoni*	SOC/Sensitive	WNA	WNA
Mammals				
Sierra Nevada red fox	*Vulpes vulpes necator*	SOC/Sensitive	WNA	WNA
Pacific fisher	*Martes pennant pacifica*	Candidate/ Sensitive	WNA	MAI
American Marten	*Martes americana*	Candidate/ Sensitive	WNA	WNA
California wolverine	*Gulo gulo luteus*	SOC/Sensitive	WNA	WNA
Pallid bat	*Antrozous pallidus*	Sensitive	WNA	MAI
Townsend's big-eared bat	*Corynorhinus townsendii*	Sensitive	WNA	MAI
Western red bat	*Lasiurus blossevillii*	Sensitive	WNA	MAI

Notes:

a. SOC = Federal "Species of Concern"
MIS = Management Indicator Species

b. MAI = may affect individuals but not likely to result in a trend toward federal listing or loss of viability
WNA = will not affect

The "Environmental Consequences" section below summarizes the potential effects of the proposed action and alternatives on those species listed above in table 3-61 (see the Wildlife and Fish BA/BE for additional discussion of effects on these species).

Of the species listed in table 3-61, several were eliminated from detailed study in the BA/BE on the basis that (1) they are known to be found at much lower or higher elevations, or much further north or south of the project area; (2) suitable habitat is not found in the project area; and (3) surveys in or near the project area did not locate any individuals. The following species were not analyzed in detail for the Slapjack Project BA/BE: Winter-run Chinook salmon, Central Valley spring-run Chinook salmon, Delta smelt, Central Valley steelhead, Lahontan cutthroat trout, Sierra Nevada red fox, Carson wandering skipper, Valley elderberry longhorn beetle, Mountain yellow-legged frog, California wolverine, American marten, northern leopard frog, greater sandhill crane, American peregrine falcon, and Swainson's hawk.

3.13.2 Regulatory Framework

The 1988 Forest Plan provides specific information on the management of Threatened, Endangered, Proposed, and Sensitive species on the Plumas National Forest. These include forestwide goals and policies for wildlife, fish, and sensitive plants (page 4-4); riparian areas (page 4-7); wildlife objectives (pages 4-14, 4-15, and 4-19); and forestwide direction and standards and guidelines for wildlife, fish, and sensitive plants (pages 4-29 through 4-35). Direction is also found under other areas (for example, timber management) that directly or indirectly affect animal species and/or their habitats. The management guidelines incorporate regional direction for each species.

The Forest Plan was amended by the 1999 *Herger-Feinstein Quincy Library Group Forest Recovery Act* (HFQLG Act) and the *Sierra Nevada Forest Plan Amendment Final Supplemental Environmental Impact Statement* (SNFPA final supplemental EIS) and Record of Decision. The guidelines required for compliance with the HFQLG Act EIS are listed in the BA/BE. The SNFPA Record of Decision provides implementation direction for the National Forests in the HFQLG Pilot Project area, consistent with the HFQLG Act and alternative B of the HFQLG Act final EIS. All action alternatives considered in this EIS for the Slapjack Project would comply with the SNFPA Record of Decision standards and guidelines (pages 68–69) and species-specific management direction.

Best Management Practices. As explained in the "Hydrology" section (3.8), the Forest Service, in consultation with the California State Water Resources Control Board, has developed Best Management Practices (BMPs) for control of water pollution on National Forest System lands. The BMPs are described in the *Water Quality Management for Forest System Lands in California – Best Management Practices* (USDA Forest Service 2000b) as they apply to DFPZ maintenance. All BMPs for timber management, vegetation manipulation, fire suppression and fuels management, roads, and watershed management apply at the site-specific project level (the watershed management BMPs include the use of herbicides). In addition, all site-specific DFPZ maintenance activities must meet the Forest Service Region 5's soil productivity standards (*FSH 2509.18 – Soil Management Handbook, R5 Supplement No. 2509.18-95-1*, effective June 11, 1995, as cited in the HFQLG Act final EIS).

Scientific Analysis Team Stream Protection Zone. The Scientific Analysis Team developed viability assessments and management considerations, including stream protection zones, for species associated with late-successional old-growth forests in the Pacific Northwest (USDA 1993, as cited in the HFQLG Act final EIS). To protect riparian systems, Scientific Analysis Team guidelines establish Riparian Habitat Conservation Areas (RHCAs) with "interim widths" buffers to all perennial and intermittent streams—the stream protection zone "interim widths" would be applied under all action alternatives. These interim widths and the Riparian Management Objective analyses are described in the "Hydrology Report" and the "Biological Assessment / Biological Evaluation for Wildlife and Fish."

3.13.3 Methodology for Assessing Impacts on Wildlife and Fish

3.13.3.1 Scope of the Analysis

The *analysis area for determining direct and indirect effects on terrestrial wildlife* is the proposed Slapjack Project boundary and is referred to in this EIS as the "Wildlife Analysis Area." The project area includes 22,939 acres of National Forest System land and 11,786 acres of private land, for a total of 34,725 acres. The Slapjack Project is surrounded by private lands and/or other HFQLG Pilot Projects. Private lands account for approximately 75 percent of the surrounding area, which includes a high degree of commercial timber production and harvest.

The analysis area for wildlife was chosen based on the project treatment locations and natural topography. These areas adequately meet survey requirements for the species considered in this document. The Slapjack Project area is situated west of New Bullard's Bar Reservoir, southeast of Lake Oroville, and south of Feather Falls. New Bullard's Bar Reservoir borders the Tahoe National Forest to the east. The Forest Service Region 5 protocol surveys for all Threatened, Endangered, and Sensitive (TES) Species of Concern were conducted in potentially suitable habitat for TES species. The terrestrial Wildlife Analysis Area was based on Forest Service lands surveyed to protocol for California spotted owls, northern goshawks, and other target species. In addition, the Wildlife Analysis Area includes lands as much as 0.5 mile from the outer boundaries of the proposed treatment units (see the maps in appendix A of this document). Several of the 0.5-mile buffers around proposed treatments go slightly beyond the project boundary onto private lands; however, these private lands were not included as part of the survey.

The size of the *analysis area for cumulative effects* varies by species based on habitat needs and species demographics. The broadest analysis area for determining cumulative effects on terrestrial wildlife included: (1) public and private lands within the Slapjack Project area (the analysis area for direct and indirect effects); (2) adjacent HFQLG projects (including their associated terrestrial and aquatic wildlife analyses); and (3) activities on private lands within the 66,247-acre hydrology analysis area that surrounds the Slapjack Project area in order to establish larger trends or patterns in vegetation management. Limitations of the analysis include future activities on private land.

The cumulative effects analysis area includes past, present, and reasonably foreseeable future projects occurring in and adjacent to the Slapjack Project analysis area. Past activities are considered part of the existing condition and are discussed in the "Affected Environment (Existing Conditions)" section for each resource. In order to understand how the effects of past actions would contribute to the cumulative effects of the proposed action and alternatives, the analysis relies primarily on current

environmental conditions as a proxy for the impacts of past actions. This is because the existing condition reflects the aggregated impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

Past activities in the area include timber harvest, planting, pre-commercial thinning, herbicide use in plantations, recreation, mining, and grazing (see table 3-62). This table does not represent an all-inclusive list of activities and events considered in the analyses. Depending on habitat requirements, range, and other factors, the analysis for specific species may consider additional activities not listed in this table. The conditions of the vegetation, streams, wildlife habitat, riparian areas, soils, and meadows in the Slapjack Project landscape today are the product of both natural occurrences, as well as post Euro-American settlement activities dating from the California Gold Rush.

Table 3-62. Past, present, and foreseeable future actions in and adjacent to the Slapjack Project area.

Project	Location	Activity	Time Period
Watson Ridge Underburn	Western most portion of Watson Ridge	500 acres of underburn	Past
Watson Thinning	Watson Ridge	100 acres commercial thin; 90 acres biomass thin; mastication; and 25 acres pre-commercial thin	Past
Steward Thinning	Steward Ravine	188 acres of intermediate cut thinning	Past
Brush Creek Fuel Reduction Project	Between French Creek Basin, Bald Rock, and the Middle Fork of the Feather River	690 acres of conifer removal, fencing streambank stabilization	Past
Watershed Improvement Projects	Head of Fall River and Table Mountain Meadow Complexes, Daley Cow Camp and Watson Cabin Meadows	22 acres of conifer removal, fencing, streambank stabilization	Past
Upper Slate DFPZ	Slate Creek Watershed	1,774 acres	Past
Lower Slate DFPZ	Slate Creek Watershed	3,510 acres	Past
South Fork DFPZ	Mooreville Ridge	31 acres mechanical removal of fire-killed trees; 840 acres mechanical thin and biomass removal; 400 acres mastication; and 1,410 acres underburn	Current
Feather Falls Salvage	Private land near Feather Falls	525 acres of salvage (harvest of dead, dying, or diseased trees of any size in amounts less than 10 percent of average volume per acre)	Current
Bald Onion DFPZ	North of Little Grass Valley reservoir	3,175 acres	Current
Bald Mountain	Near Little Grass Valley Reservoir and South Fork Feather River	90 acres group selection; 100 acres individual tree selection	Foreseeable future
Chimney Rock Tie	Chimney Rock: Forest Service and private lands	20 acres of roadway clearing; construction 2.5 miles of new road and decommission 0.5 mile existing road on National Forest land	Foreseeable future
Basin	Granite Basin area	1,215 acres of group selection and 80 acres of individual tree selection	Foreseeable future
Watdog	Watson Ridge area	4,021 acres of DFPZs (depending on the action alternative selected 105.3 to 231.4 groups)	Foreseeable future
Range/Grazing	Project area	One active range permit in Fall River grazing allotment	Ongoing

Table 3-62. Past, present, and foreseeable future actions in and adjacent to the Slapjack Project area (continued).

Project	Location	Activity	Time Period
Noxious Weed Treatments	Forest wide	Roadside weed treatments	Foreseeable future
Recreation Projects	N/A	No known recreation projects in recent past or foreseeable future	N/A
Mining Projects	Forest-wide	Multiple	Foreseeable future
Special Use Permits	Forest-wide	Multiple	Foreseeable future

The *aquatic wildlife and hydrologic analysis area* (referred to in this section as the "Hydrologic Analysis Area") includes 42 subwatersheds ranging from 503 acres to 4,793 acres, with a total hydrologic analysis area of 66,247 acres of private and federal lands. The amphibian, reptile, and fish species surveys were performed at various levels based on potential effects. The locations of the watersheds with respect to the proposed treatment units are depicted on figure 1 of the "Hydrology Report" in the project file. The major watersheds in the hydrologic analysis area include McCabe Creek, Frey Creek, Lower Dry Creek, New Bullard's Bar Reservoir, Ponderosa Reservoir, and Dobbins Creek. The major rivers in the analysis area include the Middle Fork Feather River, South Fork Feather River, and North Yuba River. The Middle Fork Feather River and South Fork Feather River drain into Lake Oroville, the Feather River, and the various conveyances of the State Water Project. The North Yuba River drains into New Bullard's Bar Reservoir, and Dry Creek drains into Lake Collins and Dry Creek. For a detailed description of the watersheds in the Hydrologic Analysis Area, refer to table 1 of the "Hydrology Report."

Timeframe. The timeframe for determining cumulative effects depends on the length of time past effects continue into the future. This will vary widely between species because some wildlife, such as the California spotted owl, require large home range areas with mature, multi-canopy forests and diverse habitat components such as snags and large woody material, while other species, such as the Townsend's big-eared bat, require smaller home range areas and simpler habitats such as caves with riparian foraging habitat. Consequently, the analysis timeframe varies for each species and is dependant in part on past actions where species are located or there is suitable habitat. However, from the broadest perspective, the timeframe for past cumulative effects is approximately 20 to 25 years. Potential future projects have only been identified for the next 3 years (for the life of the HFQLG Act final EIS). The western slope of the Sierra Nevada in the Plumas National Forest has a high rate of vegetation establishment and growth due to high annual precipitation and highly productive forest soils. Within this timeframe, vegetation generally has sufficient opportunity to increase canopy closure, basal area, tree density, and understory regrowth to develop into mature, multi-canopy forests with diverse habitat components.

3.13.3.2 Analysis Methods for Management Indicator Species and Neotropical Migratory Birds

Management Indicator Species (MIS) are used because their population changes are believed to indicate whether management activities are having an effect on the viability and diversity of animal and plant communities. A listing of MIS species can be found in the Record of Decision on the 1988

Forest Plan, page 4 and appendix G (refer to the letter dated May 30, 2006, "Clarification on Plumas National Forest MIS List"). A listing of MIS species (not including those species that are TES as well) and habitat rating can be found in table 3-40 (page 3-98) of the HFQLG Act final EIS (USDA Forest Service 1999a). That document indicates which MIS species could benefit from Pilot Project treatment activities, which species could experience a loss of habitat values, and which species' habitat value would remain the same. In the HFQLG Act final EIS (refer to table AA-3.25 in appendix AA of that document), numerical California Wildlife Habitat Relationship (CWHR) values that existed prior to group selection harvest were compared to expected changes in habitat following group selection harvest. The comparison generated two sets of information when compared to current conditions: the comparative trend in habitat value (expressed here as the percent change in habitat value) and whether there are any changes in the habitat rating (low, moderate, or high). This information is also given for pre- and post-DFPZ construction. The Plumas National Forest MIS that are not federal TES species are addressed individually in the Slapjack BA/BE appendices. The mule deer analysis resulted in a positive habitat value trend and an increase from moderate to high habitat rating. The golden eagle analyses resulted in a positive habitat value trend, and the habitat rating remains moderate to high. The trout group (rainbow trout) and Canada goose were not rated.

The golden eagle and mule deer MIS are broad ranging, have a large forage base, can more easily escape disturbance, are more common, or are tree canopy foragers.

The 2001 SNFPA final EIS, appendix E, and associated biological evaluations provide additional discussion concerning effects on the habitat for these species.

Neotropical migratory birds (NTMB) are of special concern because their breeding area includes the North American temperate zones, and in many cases, they will migrate south of the continental United States during nonbreeding seasons (Hunter et al. 1993). Due to their sensitivity to environmental change, NTMB species serve as an "early warning" system for alteration of ecosystem structure and function. By closely monitoring NTMB habitat associations and population trends within California habitats, the Forest Service can track the integrity and resilience of California ecosystems. These species are protected under the *Migratory Bird Treaty Act* (1918) based on their international importance. The list of NTMBs within the California region is large and includes a broad number of habitat associations. The Breeding Bird Survey, coordinated by the U.S. Fish and Wildlife Service, indicates that certain populations of NTMB species in California have been declining over the past 26 years (1996 data). Habitat fragmentation and decreases in habitat quantity and quality, caused by changes in land use, seem to be largely responsible for the declines (Sherry and Holmes 1993; Terborgh 1992).

Saab and Rich (1997, as cited in the HFQLG Act final EIS) found that the NTMB species with decreasing population trends are likely those species that nest in shrub layers, and the species with increasing population trends tend to nest in tree canopies. There are 32 species of NTMBs that show population declines, and these species are associated with grassland, shrubland, open forest, or riparian habitat types.

In 1996 the Forest Service Region 5's "Partners in Flight Program" group developed a list of "High-Priority Land Bird Species for Monitoring Efforts" for the Sierra Nevada bioregion. This list identified three species that are in the HFQLG Pilot Project area: great gray owl, willow flycatcher,

and Swainson's thrush. The great gray owl and willow flycatcher are Forest Service Sensitive species for the Plumas National Forest.

The overall effect of management activities on NTMB species populations has not been specifically studied, unless a species falls within the category of federal Threatened and Endangered or Forest Service Sensitive or MIS. The Forest Service has a legal mandate to provide habitat for viable populations of NTMBs. However, if any NTMBs were not well distributed or had viability concerns, they were included on the 1998 Forest Service Sensitive Species List, which was amended in March 2001 and May 2003. Although current management guidelines ensure that habitat will be protected for these species, the presence of suitable habitat does not necessarily mean these species are present in that habitat.

In certain cases, habitat modification would be expected to affect habitat for some NTMB species more than others. The effects of timber harvest, road construction, hand treatments, and pile burning would 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; and (2) loss of nesting, roosting, or foraging habitat.

3.13.3.3 Analysis Methods for Threatened, Endangered, and Sensitive Species that Occur in the Project Area

The wildlife surveys were based on habitat typed as suitable and followed Region 5 survey protocols for California spotted owls, Pacific fisher, amphibians, and other target species. Surveys for species varied in scale; for example, the California spotted owl surveys for suitable habitat, (nesting and foraging) extended as much as 0.5 mile from the outer boundaries of the treatment units, whereas surveys for amphibians targeted typical habitat conditions found along streams. Survey status and protocol are described below for those species with a "may affect individuals" determination.

California Red-Legged and Foothill Yellow-Legged Frogs. There are numerous observations of foothill yellow-legged frogs distributed across the Feather River Ranger District. Reproductive success of these populations is unknown; however, sightings have been noticeably concentrated along the lower portion of the South Fork Feather River, Onion Creek, Slate Creek, and Flea Valley Creek, suggesting localized breeding success.

Currently, the only known red-legged frog population in the Slapjack Project area is in the Dobbins Creek watershed. The two frog species were not located during 1997 surveys conducted as part of a proposed land exchange project in Little Oregon, Burnt Bridge, Cottage, and Dobbins Creeks (USDA Forest Service 1999b). Following the 1999 Pendola fire, surveys were conducted in 2000 by the Forest Service in the same creeks, and populations of California red-legged frogs were found at two different ponds in the Slapjack Project area. Every year since the initial detections in 2000, surveys have been conducted, and frogs have been consistently observed in the two ponds. Habitat assessments and species surveys were completed in 2001 and 2003 at the Dobbins Creek watershed, and California red-legged frogs were found. More ponds were discovered north of Dobbins Creek, and most of those ponds are suitable for the frogs. The ponds were surveyed several times in August 2003, but no California red-legged frogs were observed during the visits. Other potential suitable habitat in the project area was identified in Cottage Creek. Klamath Wildlife Resources completed amphibian surveys in the Slapjack Project area in 2004 using "A Standard

Protocol for Surveying Aquatic Amphibians" (Fellers and Freel 1995), as well as "Field Surveys for California Red-legged Frog" (a guide issued by the U.S. Fish and Wildlife Service) as the guiding protocols for their surveys. The U.S. Fish and Wildlife Service updated the California red-legged frog Field Survey Protocol in 2005. Based on past surveys and ongoing monitoring and surveys, the U.S. Fish and Wildlife Service agreed that protocol was met (Kathy Brown, USFWS, personal communication). There were no observations of California red-legged or foothill yellow-legged frogs during the Klamath Wildlife Resource surveys. The four survey sites with potential suitable habitat for the California red-legged frog (*Rana aurora*) were surveyed to protocol. No California red-legged frog (*Rana aurora* or *Rana draytonii*) individuals were found at the sites (KWR 2004), and none were found in part of a survey area that is less than a mile from the known site to the north.

Bald Eagle. In cooperation with the California Department of Fish and Game, the Plumas National Forest currently monitors all known bald eagle territories annually to determine occupancy and breeding status. Surveys follow the "Bald Eagle Monitoring Protocol" (Pacific Southwest Region, U.S. Forest Service Region 5, May 18, 1994).

Bald eagle habitat, both nesting and wintering, occurs in many areas around New Bullard's Bar Reservoir, although the extent of the bald eagles are found on the Tahoe National Forest east. There are two routes in the Tahoe National Forest that are part of the nationwide annual mid-winter bald eagle surveys, which have been conducted since 1990. One route is along the North Fork Yuba River for a 14-mile stretch west of the town Downieville; and the second route is around the perimeter of Bullard's Bar Reservoir—this survey is conducted by boat. It is most critical to avoid disturbances during nest building, courtship, egg-laying, and incubation (Dietrich 1990). Past protection measures for the bald eagle included annual monitoring of eagle use of the reservoir, campground closure, traffic restrictions, road and trail closures, watercraft traffic restrictions, posting of closure signs, and public awareness.

California Spotted Owl. The Forest Service has conducted project-related surveys at various levels for the California spotted owl since the 1989 field season. Protocol-level surveys for the owl were completed in 2003, 2004, and 2005 for the Slapjack Project analysis area. Most owl observations were associated with established Protected Activity Centers. The surveys followed the "Protocol for Surveying for Spotted Owls in Proposed Management Activity Areas and Habitat Conservation Areas" (Forest Service Region 5, March 12, 1991; revised February 1993). There are currently eight Protected Activity Centers. There have been up to seven pairs and seven successfully fledged young over the past three years. There are 13,317 acres classified as suitable nesting and 7,886 acres classified as suitable foraging habitat in the project boundary.

Northern Goshawk. Surveys followed the "Survey Methodology for Northern Goshawks in the Pacific Southwest Region" (Forest Service Region 5, May 14, 2002). Northern goshawks were not sighted in the Slapjack Project boundary during surveys conducted between 2004 and 2005. The lack of detections is possibly due to factors such as a low productivity years and a dense understory. The contractors conducting the surveys stated, "Although the habitat in the project boundary was in general excellent condition, it did not appear extensive enough (very patchy) to sustain nesting pairs of northern goshawk." According to the surveyors, much of the private land bordering the project area had been either heavily harvested or at least thinned, with the old-growth component removed. There are no activity centers and, therefore, no established northern goshawk Protected Activity Centers in

the Slapjack Project analysis area. There are 8,503 acres classified as suitable nesting and 11,753 acres classified as suitable foraging habitat in the project boundary.

Great Gray Owl. Great gray owl surveys were completed in the analysis area in 2005. Surveys followed the "Survey Protocol for the Great Gray Owl in the Sierra Nevada of California" (Beck and Winter 2000). There have been no observations of this species reported in the Slapjack Project analysis area, but the contract surveyor reported that some of the meadows surveyed in the analysis area provide potential habitat. The closest recent observation (2004) of a great gray owl occurred approximately 6 miles north of the analysis area boundary around Pinkard Creek.

Western Pond Turtle. Western pond turtles were found in a pond near the town of Feather Falls during surveys completed in 2004. The surveys followed "Western Pond Turtle Survey Methods" as the guiding protocol. Ponds were surveyed to protocol based on the best available habitat. Forest Service personnel located western pond turtles at Hampshire Creek during surveys in 2003, but the turtles were not found during the 2004 surveys. Forest Service personnel have reported additional sightings during 2004 and 2005 within the Nutmeg Creek area.

Pallid, Western Red, and Townsend's Big-eared Bat. Surveys followed an interim protocol approved by Forest Service Region 5. Bat surveys were conducted in 2001 and 2002 for several HFQLG Act Pilot Projects, including Upper Slate DFPZ, Lower Slate DFPZ, South Fork DFPZ, Bald Onion DFPZ, Brush Creek DFPZ, and Watdog DFPZ. No surveys have been conducted in the Slapjack Project area. See the "Environmental Consequences" section below for potential effects on habitat for the pallid, western red, and Townsend's big-eared bats. If bats were found at a later date, appropriate protection measures would be applied before implementation of DFPZ treatments or group selection in the Slapjack Project area. There are 19,904 acres classified as suitable nesting and 4,549 acres classified as suitable foraging habitat in the project boundary.

Little Willow Flycatcher. Surveys followed "A Little Willow Flycatcher Survey Protocol for California" (Bombay, Benson, and Valentine 2003). Surveys from 2004 through 2005 were limited to areas with historical observations and potentially suitable habitat. Although no little willow flycatchers have been observed in the Slapjack Project area, potential habitat could occur in the Riparian Habitat Conservation Areas. Appropriate protection measures would be applied before implementation of proposed project treatments if nesting little willow flycatchers are found at a later date.

Pacific Fisher. The Pacific fisher has the potential to occur on the Plumas National Forest, although it was not detected during surveys completed in the winter of 2004. Potential sites were assessed using on-the-ground habitat typing or topographical maps and aerial photos. Some of the proposed treatment units do contain suitable habitat. Surveys follow the "American Marten, Fisher, Lynx, and Wolverine: Survey Methods for their Detection" (Zielinski/Kucera; PSW-GTR-157; August 1995).

Hardhead Minnow. Surveys have not been conducted for hardhead minnows for the Slapjack Project. Known and suspected distributions of hardhead minnows are found in the Forest Fisheries GIS layer, atlases, and stream files. Hardhead minnows are known to occur in the analysis area in subwatersheds 1, 2, 4, 6, 8, 10, 11, 23, 27, 30, 33, 34, 40, 41, and 42. Hardhead minnow populations

are suspected in subwatersheds 5, 7, 29, 31, 32, 36, 38, and 39. Subwatershed locations are shown on figure 3-4 in the "Hydrology" section (3.8).

In addition, fish population studies have been conducted by the California Department of Fish and Game and Department of Water Resources. The project is within the boundaries of the South Fork Feather Project area (FERC project no. 2088), and numerous consultants have completed studies for the relicensing and monitoring of waters within the hydroelectric project (South Fork Feather Water and Power Agency 2005). Habitat suitability was determined by knowledge of the stream drainage characteristics and review of these FERC relicensing habitat mapping studies. The Cumulative Watershed Effects Analysis for the Slapjack Project was used extensively to determine those watersheds with Sensitive species in the hydrological analysis area that were at the Threshold of Concern or would be impacted by the proposed actions. In addition, the analysis conducted for the 2003 HFQLG Act final supplemental EIS and BA/BE was also used to analyze the effects of the use of herbicides on aquatic species.

3.13.3.4 Herbicide Hazard Analysis

A summary of the herbicide hazard analysis is provided below; for a detailed explanation of the herbicide hazard analysis, refer to appendix K of the Slapjack Project BA/BE.

The use of herbicides, their breakdown products, and harmful effects that could occur to wildlife are addressed as follows:

> The Slapjack analysis was designed to comply with the Record of Decision (ROD) for the 2004 SNFPA Final Supplemental Environmental Impact Statement (FSEIS) and the 1988 Plumas National Forest Land and Resource Management Plan as amended by HFQLGFRA 1999 FEIS and ROD and 2003 FSEIS and ROD. Decisions were made to meet the legal requirements of the Herger-Feinstein Quincy Library Group (HFQLG) Forest Recovery Act Pilot Project (1998).
>
> HFQLG FSEIS and ROD (2003) acknowledges potential affects to wildlife species as a result of herbicide use.

Wildlife may be exposed to herbicides if they are in the vicinity of contaminated surface waters and terrestrial habitats. The routes of exposure include oral, dermal, and inhalation. Oral exposures might occur through ingestion of contaminated food or water or incidental ingestion of contaminated media during foraging or other activities. Dermal exposures are likely to be most important for burrowing mammals (through contact with contaminated soils) and animals that spend considerable amounts of time submerged in surface waters. The effects of inhalation exposures are limited to three studies performed on rats. The results of the studies have been submitted to the U.S. Environmental Protection Agency (EPA) as part of the herbicide registration process. No toxic effects were observed in a four-hour exposure to either imazapyr or imazapyr formulations in aerosol concentrations of 75 mg/L (milligrams per liter) (People 1984).

The appendices and the project file for the HFQLG Act final supplemental EIS contain detailed information about herbicide exposure factors and the methodology for calculating potential exposures in animals. The major factors used in that EIS are displayed in table 3-63.

Table 3-63. Wildlife herbicide exposure factors.

Parameter Type	Exposure Route / Factor Category	Factor
Normalizing Factors	Oral	Body weight
		Metabolic rate
		Food ingestion rate
		Dietary composition
		Water ingestion rate
Contact Rates	Dermal	Surface area

Source: EPA/600/R-93/187; December 1993.

Oral Exposure. Three environmental media are the primary contributors to oral exposure to wildlife: food, water, and soils and sediments. The four contact rate exposure parameters related to these three exposure media are metabolic rate, food ingestion rate, dietary composition, and water ingestion. For a complete discussion of contact rates and exposure parameters, refer to appendix K in the Slapjack Project BA/BE. The body weight of animals is used to calculate the "potential dose to animal." Appendix F in the HFQLG Act final EIS provides a more detailed discussion of how animal body weight factors into these calculations. For dermal exposure rate calculations refer to appendix K in the BA/BE.

Dermal Exposure. Dermal contact with contaminated soil, vegetation, sediment, or water can be an exposure pathway for some wildlife species. An animal's surface area may be used to estimate the potential for uptake of contaminants through the skin. For some exposures (such as dust bathing), the entire surface area of the animal may be important. For other types of exposures (such as swimming), only the non-insulated portions (portions of the body's surface with no fur or feathers that create a trapped air layer) of the animal may contact the contaminated medium. The skin does provide a certain degree of protection from external chemicals, and the relative absorption of chemicals must be considered to determine realistic dose levels. In this analysis, several of the exposure scenarios assume that the skin affords no protection at all, equaling 100 percent absorption.

Inhalation Exposure. As stated above, the results of the studies on rats have been submitted to the U.S. Environmental Protection Agency (EPA) as part of the herbicide registration process. No toxic effects where observed in a four-hour exposure to either imazapyr or imazapyr formulations of aerosol concentrations (People 1984).

Effects on Surrogate Species. A common technique in assessing the effects of herbicide use is by surrogate species. In the context of testing various chemicals, surrogate species are typically organisms that are easily tested using standardized methods. However, these species may not represent populations of federally listed Endangered and Threatened species. The wide use of pesticides and other commercial chemicals potentially pose a risk to Endangered and Threatened species since, by definition, the distribution of listed species is limited, and further adverse effects on these populations could lead to extinction (Dwyer 1997).

Herbicides and surfactant and surrogate species — It is important to note that a certain amount of caution should to be taken when addressing ecological risk and the use of surrogates when

analyzing risk. The use of an interspecies extrapolation factor in ecological risk assessment has been discussed by a variety of authors (Calabrese et al. 1993). Numerous attempts have been made to assess the occurrence and magnitude of interspecies variation in response to ecological toxicants, especially within the aquatic environment (Calabrese et al. 1993). Slooff et al. (1986) found a positive correlation in interspecies relationships in response to toxic agents, with somewhat higher correlations being observed for species within the same phylogenetic (based on natural evolutionary relationships) groupings compared to taxonomically distant species. Barnthouse et al. (1990) recognized that [toxicity] data indicated the extent of taxonomic variation is similar for the "species within genus" and the "genera within family" categories. However, the phylogenetic relatedness diminishes when one considers "families within orders" and "orders within class," with the size of uncertainty factors increasing appreciably. Additional intraspecies and interspecies extrapolation assessments (Abt. Associates 1995; Kooijman 1987; Dourson et al. 1983) showed similar phylogenetic relationships. For example, it is best to compare toxicological effects on bat surrogates to bats; less comparable to compare bats to mice, and even less comparable to compare bats to birds.

Sappington et al. (2001) actually tested specific federally listed species for contaminate sensitivity compared to standard surrogate species. The resulting data appears to be contradictory and unclear. Sappington et al. (2001) did infer that in some cases, certain listed species were more sensitive than the representative surrogate species. Again, much of the testing and findings have been within the aquatic environment. Although the level of uncertainty in the terrestrial environment may be highly variable, it is being assumed in this document that these phylogenetic relationships are valid. In a *Critical Evaluation of Safety (Uncertainty) Factors for Ecological Risk Assessment*, Chapman et al. (1998) noted that "some extrapolations appear to work better than others, but none are perfect." Refer to the "Human Health" section in appendix C of the HFQLG Act final EIS BA/BE for discussions on the effects of inert ingredients.

Adjuvants — These are additives that are mixed with herbicide spray solutions to improve performance of the spray mixture. Adjuvants can either enhance the activity of an herbicide's active ingredient (activator adjuvant) or offset any problems associated with spray application, such as adverse water quality or wind conditions. Activator adjuvants include surfactants, wetting agents, sticker-spreaders, and penetrates.

Adjuvants are not under the same registration guidelines as are pesticides. The EPA does not register or approve the labeling of spray adjuvants, although the California Department of Pesticide Regulation does require the registration of adjuvants that are considered to increase the action of the pesticide it is used with. The manufacturers generally field test all adjuvants with several different herbicides against many weeds and under different environments.

Active Ingredient and Surrogate Species. The following describes the current information on the effects of the two proposed herbicides (imazapyr and triclopyr) and surfactants on a variety of species considered as surrogates in this document. As with any assessment, risk must be qualified by the general reservations for the risk assessment: the absolute safety cannot be proven, and the absence of risk can never be demonstrated. The herbicides and surfactant ingredients have been tested in only a limited number of species and under conditions that may not well-represent populations of free-ranging nontarget animals or some populations of nontarget plants. The far majority of information available was on experiments conducted on particular animals in laboratory environments. While

laboratory experiments can be used to determine such factors as acute toxicity, reproductive risk, neurotoxic risk, and immunotoxic risk that must be considered, laboratory experiments do not account for wildlife in their natural environments. Those factors can adversely affect wildlife health by causing lethargy, weight loss, nausea, and fluid loss due to diarrhea or vomiting. These health issues affect the animal's ability to compete for food, locate and/or capture food, avoid or fight off predators, or reproduce, which may potentially lead to mortality.

The BA/BE for the HFQLG Act final supplemental EIS (pages 112 and 173) illustrates a wide range of exposure scenarios for avian, mammal, and fish test species and looks at only the typical application rates at the highest exposure levels for each of the two herbicides and surfactants. An assumption was made that the exposure scenario would be representative of the effects on wildlife species considered in the BA/BE.

The effects of herbicides as they relate to individual species are discussed in this "Wildlife" section under direct and indirect effects.

3.13.4 Affected Environment (Existing Conditions)

3.13.4.1 Introduction

The analysis for the Slapjack Project was designed to comply with the Record of Decision for the 2004 SNFPA final supplemental EIS and the 1988 Forest Plan, as amended by 1999 Record of Decision on the HFQLG Act final EIS and the 2003 Record of Decision on the HFQLG Act final supplemental EIS. Decisions were made to meet the legal requirements of the HFQLG Act Pilot Project (1998).

This analysis considers the effects of the six alternatives on mature/old-forest and aquatic habitats. It includes discussions of how changes in habitat components can reduce habitat suitability of mature/old-forest and aquatic and black oak habitat in general, as well as for specific dependent species. It also discusses the potential effects of road density and wildfire for all habitats. This EIS only analyzes those species that would be affected by the Slapjack Project (see sections 3.13.5.3 and 3.13.5.9 below).

The alternatives considered but eliminated from detailed study were presented in section 2.3 of the draft EIS and this final EIS. These eliminated alternatives include (1) Use of Alternative Herbicides; (2) Alternative with 50 Percent Canopy Cover Retention and a Removal Limit of 20 Inches DBH and Below; (3) Alternative that Considers Different Treatments in DFPZs to Address Watershed Effects; (4) Alternative Consistent with the 2001 Sierra Nevada Forest Plan Amendment; and (5) Alternative that Reduces Canopy Cover to 30 Percent in Treatment Units within the Wildland Urban Interfaces." The consideration of these alternatives was included in the draft EIS, and they are included in this final EIS as part of the reasonable range of alternatives required by the *National Environmental Policy Act* (NEPA), as defined in 36 CFR 1502.14. The alternatives considered and studied in detail met the purpose and need for action and responded to significant issues. The existing condition of plants in the Slapjack Project area can be found in this EIS in the "Botanical Resources and Noxious Weeds" section 3.3.4, "Heritage Resources" section 3.6.3.3, and "Fire and Fuels" sections 3.5.4. The following sections discuss the existing conditions for wildlife.

The existing conditions in the Slapjack Project area are highly related to natural events (fire, insects, and disease) and past clear-cut (thinning and salvage) projects. Presently (overall), the larger trees are under represented, and the seedlings and smaller tree classes are slightly above the desired condition. The number of trees greater than 30 inches diameter at breast height (dbh) account for only a small fraction in the total number of trees in the project area. Most of the trees in California Wildlife Habitat Relationship (CWHR) size class 4 and 5 stands are in the smaller diameter groups (11 inches dbh). The total number of trees 30 inches dbh and greater that are proposed for removal would account for 1.7 percent of the project area. Much of the canopy layers (from the small diameter 11 inch trees) are dense multiple-canopy layers with interlocking crowns. These forests have become so dense with smaller trees and brush that fire cannot safely or successfully be reintroduced without first reducing fuel loads.

Species associated with mature/old-forest structure and composition occupy home ranges of widely varying sizes, from small areas occupied by small mammals to landscape areas occupied by wide-ranging raptors (such as the California spotted owl) or carnivores (such as the Pacific fisher) (SNFPA final EIS 1999, chapter 3, page 111). This applies to aquatic and black oak habitats as well. Aquatic habitat has been shown to have an overall high wildlife diversity and density when compared to the general forest matrix. The 2004 Record of Decision (on the SNFPA final supplemental EIS, page 10) goal of protecting and restoring desired conditions of aquatic, riparian, and meadow ecosystems and providing for the viability of species associated with those ecosystems remains unchanged. Black oaks provide habitat for species dependent on hardwood habitat as well as forest diversity.

The CWHR system was developed to describe wildlife habitat based on vegetation codes. The CWHR codes for the Slapjack Project are Sierra mixed conifer and montane hardwood. The forest stands are then classified based on dominant tree species, tree size, and tree densities. Resulting classes are then rated with regard to habitat value for various wildlife species. The CWHR classes with the highest habitat value for mature and old-forest-dependent species considered in this document are

- Size class 4 (11–24 inches dbh)
- Size class 5 (greater than 24 inches dbh)
- Size class 6 (multilayered stand with a size class 5 over a distinct layer of size class 3 or 4, total tree canopy greater than 60 percent closure)
- Density of M (moderate canopy closure with 40–59 percent cover)
- Density of D (dense canopy closure with 60–100 percent cover)

The analysis of general effects on wildlife habitat focuses on changes to CWHR size class 4 and 5 stands as a result of proposed treatments because of the importance of these size classes to a wide variety of wildlife species. No treatments are proposed in CWHR size class 6 stands, although group selection harvest with residual large conifers (greater than 30 inches dbh) would develop into multilayered CWHR size class 6 stands once the planted and natural conifer seedlings become established and contribute to canopy cover (see the “Vegetation” section 3.12). Removing smaller

trees in CWHR size class 3 stands would increase the mean diameter of the residual stand, moving stands to the next crown size or dbh size class (that is, from CWHR size class 3 to CWHR size class 4) (see the "Vegetation" section 3.12).

3.13.4.2 Habitat Components and Structure

Although habitat requirements vary widely by species, there are forest components and structures that, when altered, can have a measurable effect on species (refer to the Wildlife and Fish BA/BE appendix E for habitat requirement discussions for each species). The HFQLG final EIS and Record of Decision and the SNFPA final EIS and final supplemental EIS Records of Decision and associated Wildlife and Fish BAs/BEs each identify and discuss the importance of the following habitat:

Canopy cover. There is a direct relationship between suitable habitat for mature and old-forest-dependent wildlife and canopy cover. Many federally listed and Forest Service sensitive species are associated with these habitats. A moderate to dense canopy cover is important for many wildlife species because it maintains the microclimate within forest stands, and it provides cover from harsh weather (snow, rain), well-shaded environments with cooler temperatures, cover and escape from predators, and higher nutrient soils. The wildlife associated with denser canopy covered forests are also dependent on prey associated with these same forest types.

Large Trees. Mature and older forests typically have more large-diameter trees, which many wildlife species depend on for survival. Large trees provide protection from adverse weather, protection from the sun, cavities for nesting, limbs for resting and perching, bark for roosting bats, and vegetation and insects as food. In addition, the number of large trees that will be available as recruitments for future large snags (dead trees) and large woody material (logs) is dependent on the number of large trees currently present.

Snags. The following is from the Forest Service Animal Inn program website. Snags are an important structural component in forest communities. Wildlife species that use cavities in partially live or dead trees for various life functions are referred to as cavity users or nesters and include representatives from all classes of terrestrial animals. The dependency of these species on dead trees ranges from absolute to incidental, but for some species, the presence of dead trees can spell the difference between local extinction and the perpetuation of existing populations. In forests, cavity-nesting birds may account for 30–45 percent of the total bird population (Jackman 1974a; Raphael and White 1984; Scott et al. 1980). Woodpeckers are dependent on snags and other dead wood for nesting, roosting, foraging, and other functions. Woodpecker nest cavities, when abandoned, are used by other animals (secondary cavity users) for nest sites. Some researchers believe that the use of cavities has allowed birds to become polygamous, nest earlier, have larger clutches, and fledge more young per nesting effort than birds that do not nest in cavities (Nice 1957; Steinhart 1981).

The absence of suitable snags can be the major limiting factor for some snag-dependent wildlife populations (Haapanen 1965; Balda 1975). The abundance and diversity of hole-nesting birds are directly related to the dead and dying wood characteristics and general vegetation features of a forest.

Large Woody Material. The following is from the Forest Service Animal Inn program website. Natural tree mortality, which includes trees killed by insects, disease, or injury, provides snags to the forest environment. Snags eventually deteriorate, collapse, and become logs. Living trees that fall as a

result of severe winds, landslides, and floods also are a source of logs. These logs, if not harvested, become the most significant element of the dead and down component of the forest.

Dead and down woody material (in the form of stumps, root wads, bark, limbs, and logs that are in various stages of decay) occurs in most forest ecosystems. This is especially true of the temperate and high temperate conifer forests where highly productive forest sites are capable of producing large volumes of wood fiber. These dead and down materials have long been viewed as potential wood products that should be salvaged, as fuels that create fire hazards, and as physical barriers to tree planting, which may impede forest regeneration. All of these are valid concerns; however, dead and down woody materials serve many important functions that should be recognized, such as serving as havens for small mammals. Not only is this material important in mineral cycling, nutrient mobilization, and natural forest regeneration, but it also creates a structure and diversity of habitats that are valuable to a great many wildlife species, both terrestrial and aquatic.

Dead and down woody materials are important components of wildlife habitats in western forests. These materials furnish cover and serve as sites for feeding, reproducing, and resting for many wildlife species (Maser et al. 1979). Wildlife species are known to use dead and down woody materials as either a primary or a secondary component of their habitat requirements. Although many more species are casual users of this material, it is not considered an important enough element to be listed as a habitat requirement. Down logs and large woody debris are also important components of aquatic habitats in forested areas (Swanson et al. 1976).

The persistence of large logs has special importance in providing wildlife with habitat continuity over long periods of time and through major disturbances (Franklin et al. 1981). Logs may contribute significantly to re-establishment of animal populations by providing pathways along which small mammals, such as red-backed voles and chipmunks, can venture into clearcuts and other forest openings. Large logs or scattered piles of debris can be important as cover on a site during early stages of succession, enabling wildlife to use forage areas.

Dead and down woody material, and the wildlife inhabiting this material, play an important role in the cycling of nutrients within the forest ecosystem. Large proportions of some nutrients in the forest are contained in trees and leaf litter. This is especially true for phosphorous and nitrogen and, to a lesser extent, for various other mineral elements. Large amounts of nutrients are stored in branches, twigs, and foliage; smaller amounts are in the main trunk (Zinke et al. 1979).

Logs in an unmanaged stand are recruited to the forest floor by the fall of either living or dead trees (Maser et al. 1979). Large volumes of coarse woody debris are characteristic of unmanaged forest ecosystems. Large down logs can be the dominant feature of old-growth forests, and in numbers, volume, and weight of organic matter, they are an important component (Franklin et al. 1981).

3.13.4.3 Black Oak Habitat

California black oak is a critical species for wildlife. Oaks (*Quercus* spp.) may be the single most important genus used by wildlife for food and cover in California forests and rangelands, and California black oak occupies more total area in California than any other hardwood species.

Tree cavities provide den or nest sites for owls, various woodpeckers, tree squirrels, and American black bears. Trees provide valuable shade for wildlife during the hot summer months, and California black oak forest types are heavily used for spring, summer, and fall cover by black bear. Acorns constitute an average of 50 percent of the fall and winter diets of western gray squirrel and black-tailed deer during good mast years. Fawn survival rates increase or decrease with the size of the acorn crop (http://www.wikipedia.com).

Bird and animal species characteristic of the montane hardwood habitat include disseminators of acorns (scrub and Steller's jays, acorn woodpecker, and western gray squirrel), plus those species (wild turkey, mountain quail, band-tailed pigeon, California ground squirrel, dusky-footed woodrat, black bear, and mule deer) that use acorns as a major food source. Deer also use the foliage of several hardwoods to a moderate extent. Many amphibians and reptiles are found on the forest floor in the montane hardwood habitat. Among them are ensatina, relictual slender salamander, western fence lizard, and sagebrush lizard. The snakes include rubber boa, western rattlesnake, California mountain king snake, and sharp-tailed snake (CWHR 1988).

Individual oaks and oak communities profoundly affect the variety and abundance of wildlife. Oak leaves, twigs, roots, pollen, wood, and sap are sustenance for numerous insects, birds, and mammals. Insects (such as aphids, whiteflies, mites, and leafhoppers) suck sap from leaves and tender shoots. Reptiles, amphibians, and bats do not consume oaks but prey heavily on the insects that do. Acorns from oaks and berries from Pacific madrone serve as valuable food because of the large amounts produced and their high nutrient content and also because they are available at critical times of the year (McDonald et al. 1995). Some vertebrates (such as bear, deer, squirrels, and woodrats) depend on the nutritious acorn crop for food.

While food is a primary resource produced by oaks, of greater overall significance is the fact that oaks contain nooks, crannies, perches, and passages where animals live, breed, and rest. They also provide nest sites for the arboreal species, such as the northern flying squirrel, that use tree cavities. The physical structure of oak communities determines the availability of shelter, nesting sites, and corridors for travel. Wildlife use oaks as places to hide, shade, and escape from predators and from fires (Pavlik et al. 1991).

3.13.4.4 Road Density

In August 1999, the HFQLG Pilot Project area contained approximately 13,200 miles of public and private roads. Approximately 8,512 miles are Forest Service “system roads, created for the management, protection, and use of the National Forest lands.” Approximately 520 miles of unclassified roads are known to be in the Pilot Project area. New roads are added to the road “system” each year, either through new construction or classification of previously unclassified roads (HFQLG final EIS, page 3-7).

Roads are the largest single human-caused source of sedimentation and habitat degradation in the Pilot Project area. Roads that are improperly constructed or maintained are responsible for transporting sediment to streams and riparian areas, thus degrading water quality and aquatic habitat. Inadequate or failed culverts block fish movement and migrations. Roads contribute to the direct

destruction of habitat by increasing the size and rate of human-caused disturbance (HFQLG final EIS, page 3-7).

The network of roads across the forest has altered, and continues to alter, vegetative communities and habitat for wildlife species. Human use of the forest, facilitated by the road network, has also influenced habitat use by wildlife species. Direct and indirect effects of the road network include habitat loss, fragmentation and degradation, reduced effectiveness of near-road habitats, mortality due to vehicular collisions, and mortality and disturbance due to recreation use, such as hunting. Roads may also act as a barrier to wildlife movements. Roads also impact habitat by allowing access for personal use fuel wood harvests, resulting in the loss of snags and downed logs. On a positive side, roads provide access to a wide range of habitat improvement projects and wildfire suppression activities. Roads also provide opportunities to the public to enjoy nonconsumptive activities associated with a wildlife resource, such as birding or viewing of other wildlife species (Lassen National Forest LRMP EIS 1992).

3.13.4.5 Wildfires

The policy of active fire suppression in California during much of the 20th century has altered historic fire frequency, fuel loads, and fire dynamics. This significant reduction of fire as an ecosystem process has had important consequences, allowing an accumulation of fuels that had previously been consumed during regular low-intensity fires. In addition to causing a build-up of woody vegetation in the understory, fire suppression has also promoted an increase in tree density, and some open forests converted to vegetative communities with a greater shrub component. In some locations, there have also been significant increases in small-sized dead and down woody material and an increase in “ladder” fuels that connect ground vegetation to the tree canopies. This has resulted in forests that are more susceptible to severe crown-consuming fires (University of California Cooperative Extension).

One of the most obvious consequences of fire in forests is the impact on wildlife habitat. Fire has the immediate effect of changing the structural and compositional features of wildlife habitat, but this does not mean the habitat has been “destroyed.” The wide range of fire types dictated by fuel loads, fuel moisture, and weather conditions produce a wide range of post-burn results. Many low- to moderate-intensity fires can actually have a net positive effect on wildlife habitat. Large destructive fires (conflagrations), on the other hand, can seriously impact habitats and require years for recovery. Bigger, hotter fires destroy more of the seed base and cause a greater loss of topsoil, both of which make habitat recovery slower and more difficult, whereas low-intensity fires generally have a positive impact on habitats by creating mosaics of differing successional stages that promote plant and animal diversity. Low-intensity fires also thin out dense understories, improve vegetation heath, and allow for easier wildlife movement (University of California Cooperative Extension).

Each species has specific habitat requirements, so changes in habitat brought about by proposed treatments may affect species in different ways. Species-specific effects are discussed below in sections 3.13.5.3 and 3.13.5.9.

3.13.4.6 Terrestrial Habitat

The forest types in the low reaches of the project area include montane hardwoods (incense-cedar) [*Calocedrus decurrens*], California black oak [*Quercus kelloggii*], tanoak [*Lithocarpus densiflorus*], and Pacific madrone [*Arbutus menziesii*]. The forest types at the highest elevation of the project area include Sierra mixed conifers, ponderosa pine [*Pinus ponderosa*], Douglas-fir [*Pseudotsuga menziesii*], and sugar pine [*Pinus lambertiana*]. The understory vegetation includes poison oak, blackberry, whitethorn, tanoak, and manzanita.

There are some wet meadows scattered throughout the project area that contain a large amount of structural diversity, with conifers, manzanita, and *Ceanothus* in or near wet areas. The existing condition of the meadows ranges from good to adversely affected, depending on meadow location and past restoration activities that have been accomplished. The types of adverse effects include invasion of meadows by conifers due to lack of natural fire regime and/or disturbance from past logging practices, soil erosion from roads, season-long cattle grazing, and vehicles being driven into meadows. These disturbances have contributed to stream destabilization in the meadows. Several meadows have been identified (refer to chapter 2) as enhancement opportunities, which would encourage desired conditions.

Terrestrial habitat elements that are of particular importance for wildlife include large trees, snags, hardwoods, and large woody debris. Large trees, and the snags they produce, have been found to be critically important for the California spotted owl, northern goshawk, Pacific fisher, and American marten. Snags, particularly large ones (greater than 24 inches dbh), are an important wildlife habitat component of forested stands. The snags provide habitat for primary cavity nesters (such as woodpeckers), secondary cavity nesters (such as flying squirrels), and some Neotropical migratory birds (including the mountain bluebird, violet-green swallow, Vaux's swift, and American kestrel). American martin and Pacific fisher use snags for cover and rest sites. Bats use snags as maternity and day roosts. Snags are also the main source of large woody debris. Past management practices, including logging, firewood cutting, road construction, and other activities (see section 3.13.7 for activities on federal and private lands), have probably led to a decline in the number of large-diameter trees and snags in the project area (with a detrimental effect on associated wildlife species), which is an essential habitat component for several old-forest-associated species such as the California spotted owl, northern goshawk, and Pacific fisher.

3.13.4.7 Riparian Habitat

Riparian habitats support a greater diversity and abundance of wildlife than most other cover types. These areas function as habitat for vertebrate wildlife and provide corridors for wildlife movement and migration. They act as wildlife refuges during wildfires, and stream sides are often the first areas that wildlife will re-occupy after stand-replacing fire events. Dense and diverse riparian vegetation provides a large variety and quantity of nest and perch sites, along with food from seeds, fruits, and insects. This habitat supports many bird, mammal, reptile, and amphibian species. There are 549 miles of streams in the analysis area for aquatic species. The watersheds include McCabe, Frey, Lower Dry Creek, New Bullard's Bar Reservoir, Ponderosa Reservoir, and Dobbins. Hampshire and Nutmeg Creeks are unique riparian habitat—the two ponds in this meadow provide habitat for aquatic-dependent species such as the western pond turtle, a Forest Service Sensitive species.

3.13.4.8 Specific Species

The BA/BE, MIS, NTMB, and other wildlife reports for the Slapjack Project provide a detailed discussion of the affected environment and specific wildlife species.

3.13.5 Environmental Consequences

3.13.5.1 Introduction

The treatments proposed for the Slapjack Project would avoid California spotted owl Protected Activity Centers (PACs) and Spotted Owl Habitat Areas (SOHAs) and occupied California red-legged frog and western pond turtle habitat. Currently, there are no known northern goshawk and great gray owl PACs or American marten and Pacific fisher den sites. Treatments in the Riparian Habitat Conservation Areas (RHCAs) would be limited. In DFPZ units, treatment in the RHCAs would be limited to underburning, hand piling, and hand thinning, except in some plantations where mechanical treatment (mastication) is prescribed near ephemeral streams. In addition, 50-foot buffers would be applied to 136 miles of ephemeral streams, and treatments in the ephemeral stream would be limited primarily to brush removal. Group selection would avoid RHCAs. Refer to the “Hydrology” section (3.8) in this EIS for more discussion about the proposed treatments in RHCAs.

All action alternatives propose DFPZ, individual tree selection, and group selection treatment methods as described for alternative B in “Chapter 2: Alternatives.” The action alternatives differ by the method of DFPZ maintenance (herbicide use versus nonherbicide use), treatment of 31 acres of noxious weed control, and a potential reduction of 29 acres of subwatershed treatments. The canopy cover and diameter limits are the same for all action alternatives, as are the wildlife, aquatic, and riparian ecosystem restoration activities. All acreages are derived from a Geographic Information System, and acreages have been rounded and are subject to change based on data collection using a Global Positioning System.

3.13.5.2 Alternative A (No Action)

The effects of alternative A apply to all species considered in this document. As required by Council on Environmental Quality regulations (40 CFR 1502.14(d)), the effects of alternative A are described in this document because, as the no-action alternative, it serves as a baseline for comparison of the effects of the action alternatives.

No DFPZs would be constructed, and no group selection or individual tree selection would be implemented under the no-action alternative. The activities that would have the potential to improve fisheries habitat (such as aquatic species passage, streambank stabilization, meadow restoration, and road decommissioning) would not be conducted under alternative A.

Under this alternative, forest conditions would continue to change in response to natural and human factors. Due to past fire exclusion, an understory of ground vegetation (which includes poison oak, blackberry, whitethorn, tanoak, and manzanita) has developed beneath the overstory. This has created a multistoried stand with moderate to dense canopy closure that currently ranges from 31 to 90 percent in California Wildlife Habitat Relationship (CWHR) size class 4 and 5 stands. The cover from trees less than 6 inches dbh does not count toward canopy for CWHR. The encroachment of conifers on riparian areas and meadows would gradually increase. Conifers are overtopping black oak

in some areas. More so than under the proposed action alternatives, wildfire could cause substantial losses of forest cover, resulting in degraded watersheds and wildlife habitat. Insect attack could cause tree mortality, thereby increasing fire hazard. No fuel-reduction or restoration opportunities would be implemented.

General Habitat Effects. The following discussion focuses on the effects of alternative A on the mature / old-forest habitat components. This discussion applies to all species considered in this document. Subsequent sections (for example, effects of alternative A on such species as the northern goshawk and California spotted owl) refer to this discussion rather than repeat the information for each species.

In addition, proposed activities that have the potential to improve wildlife habitat, such as black oak enhancement, streambank stabilization, meadow restoration, and road decommissioning, would not be conducted under alternative A.

Habitat Components and Structure

Canopy cover—canopy cover averages 61.8 percent for CWHR size class 5 stands and 62.7 percent for CWHR size class 4 stands. Treatments that reduce canopy cover, such as DFPZ thinning and, to some degree, group selection, would not occur. As a result, canopy cover would continue to become denser, and tree sizes would grow at a slower rate, which could prevent or slow down the potential for stands to move to the next size class. However, the potential effects on mature/old-forest-associated wildlife species of reducing the canopy cover to 40 percent and lower would not occur. In addition, the understory layer would be retained.

Large trees—under alternative A, no project activities (permanent and temporary roads construction, reconstruction of temporary roads, and construction and reconstruction of landings) would occur, so no trees, particularly those greater than 30 inches dbh, would need to be cut for operability. Depending on each stand's density and tree sizes, tree growth could be affected at varying rates due to competition for nutrients and space. However, there would be no effects on mature / old-forest-associated wildlife species because no large trees would be removed, and large trees that could serve as future recruitment of snags and large woody material would be retained.

Snags and large woody material—under alternative A, no snags or large woody material would be removed. Also, no potential snag recruitment trees (30 inches dbh or otherwise) and future recruitment of large wood material would be lost. However, depending on each stand's density and tree sizes, tree growth could be affected at varying rates due to competition for nutrients and space. While maintaining the stand densities and existing large woody material in the short term, this competition could reduce tree growth and the recruitment of large trees, future snags, and large woody material for the long term.

Black Oak Habitat

Under Alternative A, proposed black oak enhancement would not be implemented, and the oaks retained within DFPZs would not be released. However, under the no-action alternative, black oaks in group selection units would not be removed. The no-action alternative would retain existing oaks but

could also negatively affect the overall quality of black oaks for the long term as a result of shade and competition from conifers and dense understory.

Road Density

New roads would not be constructed and existing roads would not be reconstructed, so alternative A would not result in additional disturbance from these activities. Proposed road closures and decommissioning would also not occur, so there would be no permanent reduction in road density or disturbance levels from current conditions. There are 200 roads in the project area, and the average road density is approximately 5.7 miles per square mile in the Aquatic/Hydrological Analysis Area (refer to section 3.13.4.2 “Habitat Components and Structure” above). In addition, the potential effects on habitat components and habitat loss to wildfire could also be affected in the long term as a result of the no-action alternative. By not implementing the Slapjack Project, the main transportation roads in the area would remain in a less-than-satisfactory condition, allowing poor road access for the public and fire management to persist in some areas. Roads in good condition provide access for emergency response, woodcutting, mining, sightseeing, and other recreational activities. Roads that are not closed or decommissioned would continue to contribute to accelerating erosion processes, which would alter water quality and aquatic habitat and increase cumulative watershed effects.

Wildfires

Historical fire regimes are described by a five-tiered system that ranks fire regimes by frequency and severity. Historically, the Slapjack Project area is considered to be a Fire Regime 1, Condition Class 1. Through the absence of fire, this has changed to a Fire Regime 1, Condition Class 2 or 3 (see “Fire and Fuels” section 3.5 in this EIS). These long-term changes in forest structure and composition could lead to increases in fuel hazards and the probability of stand-replacing fires.

The fire history records for the period 1917 to 2003 show that a total of 58 fires have occurred in and near the proposed Slapjack Project area, so it is likely that National Forest System lands would burn again and threaten the recovered upland and aquatic habitats. The existing fuel loads would make potential wildfires in the area difficult to suppress and would create a more intense burn, which could lead to increased rates of spread and result in additional acres burned. Any additional acres burned at high intensity could contribute to habitat loss and increased sedimentation, which would adversely affect the habitat required by Threatened, Endangered, Proposed, and Sensitive species and MIS. In the event of a wildfire, the potential for a stand-replacing fire is at a 24 percent tree mortality rate of mixed conifer trees between 10 and 29 inches dbh on a 40 percent slope and 19 percent mortality rate on a 20 percent slope. Predictions were calculated for a subset of trees approximately 10 percent of DFPZ treatments in 20 or 40 percent slope (refer to the “Fire and Fuels” section 3.5.4.2).

The loss of mature and late-successional forests could eliminate habitat for species associated with those forests in the event of a severe wildfire. Wildfires also increase the potential for sedimentation into streams, increase stream temperatures, and contribute to loss of fish prey species, which could adversely affect the habitat required by amphibian, reptile, and fish species. Low to moderate burns could reduce habitat suitability in the short term. However, high-intensity burns could

contribute to habitat loss, as well as critical habitat components such as large trees, snags and large woody material well into the future.

3.13.5.3 Alternative A (No Action): Effects on Specific Species

California Red-legged Frog

Direct Effects. There would be no direct effects on California red-legged frogs because no activities would occur to create disturbance to individual California red-legged frogs or result in any impacts on existing habitat conditions.

Indirect Effects. The indirect effects of the no-action alternative include the potential for future wildfire and its impact on habitat development and recovery. The fuel loads that would be left by this alternative would make potential wildfires in the area difficult to suppress and create a more intense burn. This could lead to increased rates of spread, resulting in potential loss of Riparian Habitat Conservation Areas (RHCAs) and suitable California red-legged frog habitat. Any acres burnt at high intensity could contribute to increased sedimentation, which would adversely affect aquatic habitats and potential breeding habitat for the California red-legged frog. Herbicide application, which could affect breeding or disperse frogs and/or their prey base, would not occur.

Cumulative Effects. The no-action alternative for the Slapjack Project would not protect California red-legged frog habitat. There would be no actions designed to reduce the risk of high-intensity wildfire. There is the potential for the RHCAs to act like chimneys and carry fire up and down the watershed. There would be no fuel reduction projects; hence, watershed restoration to protect watersheds from catastrophic wildfire would not occur. Threats that require special management concerns for ponds containing California red-legged frog populations include necessary wildland fire suppression, which may dewater aquatic habitats and cause egg masses to dry up (*Federal Register* 2006). Cumulative effects from private land use (gravel extraction, livestock grazing, and urbanization) would continue to create water quality problems, including sedimentation and bank cutting.

Western Pond Turtle

Direct Effects. There would be no direct effects on western pond turtles or their habitat because no activities would occur that could cause disturbance to individual turtles or impact existing habitat conditions.

Indirect Effects. The indirect effects of no action would include the potential for future wildfire and its impact on habitat development and recovery. The fuel loads that would be left by this alternative would make potential wildfires in the area difficult to suppress, creating a more intense burn and leading to increased rates of spread. This could result in potential loss of RHCAs and suitable western pond turtle habitat. Any acres burnt at high intensity could contribute to increased sedimentation, which would adversely affect aquatic habitats and potential breeding habitat for the western pond turtle. Herbicide application, which could affect breeding or dispersing turtles and/or their prey base, would not occur.

Cumulative Effects. The no-action alternative for the Slapjack Project would not offer any protection or enhancement of western pond turtle habitat. There would be no treatments to reduce the risk of high-intensity wildfire. Watershed restoration would not occur to protect the sensitive watersheds from catastrophic wildfire.

Bald Eagle

Direct Effects. The no-action alternative would not create direct effects on individuals because there are no bald eagle territories or bald eagle management areas in the Slapjack Project area or Wildlife Analysis Area.

Indirect Effects. There would be no changes in the fishery production in Bullard's Bar Reservoir because there would be no fuel treatments, group selection, or individual tree selection. The implementation of Best Management Practices (BMPs) and the meeting of all Riparian Management Objectives (the RMO analysis is located in project record) would ensure that there would be no indirect effects on fisheries or fisheries habitat. Herbicide application would not occur under alternative A, so there would be no effects on eagles and/or their prey base.

Cumulative Effects. Under the no-action alternative, no treatment activities would occur, so there would be no direct or indirect effects on known bald eagle territories or bald eagle management areas. There would be no direct or indirect effects on the known winter roost or foraging habitat; therefore, the Slapjack Project would not contribute to cumulative effects on bald eagles or bald eagle habitat. None of the 21 bald eagle territories on the Plumas National Forest would be affected by this project.

California Spotted Owl

Direct Effects. The no-action alternative would allow succession to continue because there would be no fuel treatments. This would result in denser stand conditions, with a reduced amount of fragmentation in the area of connectivity for the California spotted owl. As succession continues, natural stand processes would enhance the complexity of the untreated forest stands and potentially improve both roosting and nesting characteristics. In addition, it would enhance foraging habitat by providing denser, more diverse stand conditions conducive to California spotted owl and/or their prey species. This could lead to an increase in the number of Home Core Range Areas that have greater than 50 percent suitable habitat.

The closed-canopy old-growth stands are favored by California spotted owls and are less flammable because the dense canopies maintain higher relative humidity within the stands and reduce heating and drying on surface fuels by solar radiation and wind.

Over the long term, forest vegetation would continue to grow, thus increasing canopy cover of dominant and codominant trees. There would be increased mortality in intermediate and suppressed trees, resulting in more snags and dead and down logs. These changes would benefit species (such as the California spotted owl, northern goshawk, and forest carnivores) that are associated with late-successional forests. However, these long-term changes in forest structure could lead to an increase in fuel hazards and increase the probability of a stand-replacing fire in the future. The loss of late-

successional forests to fire could eliminate habitat for species associated with these forest types. The high-elevation, abnormally dry forest types, such as in the immediate project area, have been altered as a result of past logging, livestock grazing, and fire suppression. These forests have become so dense with smaller trees and brush that fire cannot safely or successfully be reintroduced without first reducing fuel loads. The dense understory makes it difficult for owls to hunt; on the other hand, the dense components provide a diversity of prey for the owl.

Indirect Effects. There would be no maintenance activities occurring under alternative A, so there would be no behavioral disturbances to the roosting nest. There would be no herbicide applications occurring that could affect owls and/or their prey base. Snags and down woody material, including large logs, would continue to accumulate, contributing to habitat diversity. Conversely, the threat of wildlife habitat loss from potential wildfires would continue.

Cumulative Effects. The no-action alternative would not provide for the long-term protection of California spotted owl habitat from catastrophic fire. There would be no actions designed to reduce the risk of high-intensity wildfire. Total wildfire acres and high-intensity wildfire acres are anticipated to increase from current levels under this alternative (based on the analysis conducted for the SNFPA final EIS (2001). There would be no thinning that could enhance the growth of dominant and codominant trees that may provide future habitat availability.

Northern Goshawk

Direct Effects. There would be no direct effects on goshawk or goshawk habitat because no activities would occur that could cause disturbance to nesting or foraging birds or impact existing habitat conditions.

Indirect Effects. The indirect effects of no action include the potential for future wildfire and its impact on habitat development and recovery. The fuel loads that would be left by this alternative would make potential wildfires in the area difficult to suppress and create a more intense burn, which could lead to increased rates of spread. This would result in potential loss of suitable goshawk nesting habitat and other important prey habitat attributes such as large trees, large snags, and down woody material. The proposed treatments to thin the understory could create or improve habitat available for nesting and foraging.

Cumulative Effects. The no-action alternative would not provide for the long-term protection of goshawk habitat because there would be no action taken to reduce the risk of catastrophic wildfire. The total wildfire acres and high-intensity wildfire acres are anticipated to increase from current levels under this alternative (based on the analysis conducted for the 2001 SNFPA final EIS). There would be no thinning to enhance the growth of dominant and codominant trees that may provide future habitat availability.

Pacific Fisher

Direct Effects. There would be no direct effects on forest carnivore habitat because no activities would occur that could cause disturbance to denning, resting, dispersing, or foraging animals or impact existing habitat conditions.

Indirect Effects. The indirect effects of taking no action would include the potential for future wildfire and its impact on habitat development and recovery. The fuel loads that would be left by this alternative would make potential wildfires in the area difficult to suppress and create a more intense burn, which could lead to increased rates of spread. This would result in potential loss of suitable forest carnivore habitat and other important prey habitat attributes such as large trees, large snags, and down woody material.

Under the current Plumas National Forest woodcutting program, the entire project area would be open to public woodcutting 12 months a year, limited only by available access. Uncontrolled public use in areas used by marten, especially during the denning season, may cause disturbance that could disrupt and preclude successful denning. Herbicide application, which could affect fishers and/or their prey base, would not occur.

Cumulative Effects. The no-action alternative would not provide for the long-term protection of forest carnivore habitat from catastrophic fire, and there would be no actions taken to reduce the risk of high-intensity wildfire. The total wildfire acres and high-intensity wildfire acres are anticipated to increase from current levels under this alternative (based on the analysis conducted for the 2001 SNFPA final EIS). There would be no thinning to enhance the growth of dominant and codominant trees that may provide future habitat availability.

Pallid, Western Red, and Townsend's Big-Eared Bat

Direct Effects. There would be no direct effects on bats or bat habitat because no activities would occur that could cause disturbance to denning bats or impact existing habitat conditions.

Indirect Effects. The indirect effects of taking no action include the potential for future wildfire and its impact on habitat development and recovery. The fuel loads that would be left by this alternative would make potential wildfires in the area difficult to suppress and create a more intense burn, which could lead to increased rates of spread. This could result in potential modification of suitable bat habitat, including the loss of large trees, large snags, and down woody material.

Uncontrolled public use in the areas used by bats, especially during the breeding season, may cause disturbance that could disrupt and preclude successful recruitment of young. Herbicide application, which could affect bats and/or their prey base, would not occur.

Cumulative Effects. The no-action alternative would not provide for the long-term management of bat habitat from being greatly altered by a catastrophic fire. There would be no actions designed to reduce the risk of high-intensity wildfire. There would be no thinning to enhance the growth of dominant and codominant trees, which would provide future habitat availability.

Little Willow Flycatcher

Direct Effects. There would be no direct effects on little willow flycatcher or little willow flycatcher habitat because no activities would occur that could cause disturbance to nesting or foraging birds or impact existing habitat conditions.

Indirect Effects. The indirect effects of taking no action include the potential for future wildfire and its impact on habitat development and recovery. The fuel loads that would be left by this alternative would make potential wildfires in the area difficult to suppress and create a more intense burn, which could lead to increased rates of spread. This could result in potential loss of suitable little willow flycatcher nesting habitat and other important prey habitat attributes. Herbicide application, which could affect little willow flycatchers and/or their prey base, would not occur.

Uncontrolled public use in the areas used by the little willow flycatcher, especially during the nesting season, may cause disturbance that could disrupt and preclude successful nesting.

Cumulative Effects. The no-action alternative would not provide for the long-term protection of little willow flycatcher habitat from catastrophic fire. There would be no actions designed to reduce the risk of high-intensity wildfire. Total wildfire acres and high-intensity wildfire acres are anticipated to increase from current levels under this alternative (based on the analysis presented in the 2001 SNFPA final EIS). There would be no thinning to enhance the growth of dominant and codominant trees that may provide future habitat availability.

Great Gray Owl

Direct Effects. There would be no direct effects on great gray owl or great gray owl habitat because no activities would occur that could cause disturbance to nesting or foraging birds or impact existing habitat conditions.

Indirect Effects. The indirect effects of taking no action include the potential for future wildfire and its impact on habitat development and recovery. The fuel loads that would be left by this alternative would make potential wildfires in the area difficult to suppress and create a more intense burn, which could lead to increased rates of spread. This could result in potential loss of suitable great gray owl nesting habitat and other important prey habitat attributes such as large trees, large snags, and down woody material. Herbicide application, which could affect owls and/or their prey base, would not occur.

Cumulative Effects. The no-action alternative would not provide for the long-term protection of great gray owl habitat from catastrophic fire. There would be no actions designed to reduce the risk of high-intensity wildfire. Total wildfire acres and high-intensity wildfire acres are anticipated to increase from current levels under this alternative (based on the analysis conducted for the SNFPA final EIS (2001). There would be no thinning to enhance the growth of dominant and codominant trees that may provide future habitat availability.

Hardhead Minnow

Direct Effects. There would be no direct effects on hardhead minnow or their habitat because there would be no activities to cause disturbance to individual hardhead minnows or impact existing habitat conditions. There would be no direct effects on hardhead minnows and MIS fish species habitat because no activities would occur that could cause disturbance to these species.

Indirect Effects. No roads would be closed or decommissioned under the no-action alternative; therefore, the roads would continue to contribute to accelerating erosion processes, affecting hardhead minnow and MIS trout species by altering water quality and aquatic habitat and increasing cumulative watershed effects.

The potential increase in catastrophic fire, loss of upland and riparian vegetation, and increase in hill slope runoff could lead to increased sedimentation and decreased water quality. This could adversely affect downstream hardhead minnow and MIS trout rearing, holding, and spawning habitat. There is potential for minimal indirect effects on hardhead minnow and MIS fish species habitat.

Cumulative Effects. The no-action alternative would not protect riparian corridors and adjacent stream channels; thus, hardhead minnow and MIS trout species habitat would not be protected. There would be no actions taken to reduce the risk of high-intensity wildfire. There is the potential for Riparian Habitat Conservation Areas to act like chimneys and carry fire up and down the watershed. Cumulative effects are expected as a result of private land uses (gravel extraction, livestock grazing, and urbanization), which would continue to create water quality problems, including sedimentation and bank cutting.

Mule Deer

Direct, Indirect, and Cumulative Effects. Under the no-action alternative, deer foraging habitat would remain as is or possibly be lost due to wildfires. There would be no reduction in the open road density in the Wildlife Analysis Area.

Under the no-action alternative, not treating existing fuels through thinning, fuels treatment, and DFPZ implementation would make potential wildfires in the area difficult to suppress and create a more intense burn, which could lead to increased rates of spread and result in additional acres burnt. The existing fuel loads in the area could produce a very hot fire, which could kill re-sprouting species of shrubs, potentially create monocultures, provide a medium for noxious weeds, and burn minerals from the soil, leading to soil erosion and lower productivity. Based on the past fire patterns in the project area, wildfires would burn intensively, creating larger, monotypic foraging habitat with little mosaic forested cover.

The no-action alternative would do nothing to reduce the identified possible limiting habitat factors for California deer herds (loss of brush fields, lack of prescribed fire, overstocked conifer stands, increased road densities (CDFG 1998). The cumulative effects of no action could fall in line with the analysis conducted for the SNFPA (described above) and contribute to the decline of mule deer in the project area, the Plumas National Forest, and the Sierra Nevada range. In the short term, forested stands would not be opened up through thinning and underburning, thus very little regeneration of foraging habitat would occur. On the other hand, no action could result in potentially larger and more intense wildfires, which, depending on weather conditions and fuel loadings, could either increase or decrease the productivity of foraging habitat.

Based on the direct, indirect, and cumulative effects of the no-action alternative, it is suspected that deer numbers would respond slightly to the habitat changes created on private land, such that there would be some upward trend in the deer herd population for the next 10–20 years. The carrying

capacity on National Forest lands would not be improved, but may lead to a stable to downward trend in deer numbers on National Forest. This would not contribute to the Forest Plan goal of 24,000 deer on Plumas National Forest land. With the increased potential for a stand-destroying wildfire, (1) a high-intensity wildfire could reduce productivity of deer range for a long period of time, resulting in a long-term reduction in carrying capacity; or (2) depending on fire intensity, decadent brush and closed forest could be converted to potentially improved deer habitat and carrying capacity could be improved above current levels.

Golden Eagle

Direct, Indirect, and Cumulative Effects. Under the no-action alternative, fires would be increasingly larger and more intense, which would create large habitat parcels of early successional foraging habitat for golden eagle than what currently exists or would be created by the action alternatives. Wildfires would create more open foraging habitat than any of the action alternatives. The direct, indirect, and cumulative effects of the no-action alternative would not result in any change in population trends to meet the identified Forest Plan goal of attaining 20 nesting pairs.

Troup Group

Direct, Indirect, and Cumulative Effects. Under the no-action alternative, wildfire size and intensity would continue to increase, which could cause substantial increases in runoff from hydrophobic soils and increased sedimentation and introduction of ash into streams inhabited by trout. Proposed road reductions, streamback stabilization, and riparian restorations would not occur under the no-action alternative.

Neotropical Migratory Birds

Direct, Indirect, and Cumulative Effects. There would be no direct effect on Neotropical migratory birds under this alternative.

Logically, it could be inferred that, with the no-action alternative, shrub communities and plantations would continue to trend towards conifer communities, and the conifer communities would trend towards denser canopy cover with a declining shrub understory. These trends would favor closed canopy bird species and not favor open canopy and shrub species. In reality, the effects of the no-action alternative include the potential for future wildfire and its impact on habitat maintenance and development. The high fuel loads that would be left by this alternative would make potential wildfires in the area difficult to suppress and create a more intense burn, which could lead to increased rates of spread and result in additional acres burned. Given the fire-return interval for this area (“Fire and Fuels Report” 2006), it is likely that National Forest System lands would burn again, resulting in the loss of the largest trees and snags, an increase in large-scale fragmentation of forested landscapes, loss of large riparian structures, and simplification of habitat diversity.

Some Neotropical migratory birds use early successional habitats that develop after a wildfire (SNFPA final supplemental EIS 2004). These early successional habitats would be at a much larger, homogenous (same species) pattern across landscapes as a result of wildfire. The cumulative effect of recent regeneration harvest on private lands, together with no fuel treatments (no action), would overall increase the amount, as well as improve habitat conditions for birds that prefer early

successional and open-canopied habitat across the landscape, primarily due to increased habitat as a result of wildfire. Birds preferring closed canopy conifer habitats would most likely incur more acres of habitat loss, including reduced size of habitat patches.

3.13.5.4 All Action Alternatives: General Management Requirements

Structural complexity, which is comprised of late-successional growth, multilayered vegetation, and woody material, is an important component for many wildlife and fish species. Defensible Fuel Profile Zone (DFPZ), group selection, and individual tree selection treatments would result in the loss of late-successional growth and could introduce additional fragmentation of habitat and wildlife travel corridors. In addition, activities on private lands have been adding to the fragmentation and decline of suitable habitat through urbanization, damming of rivers, construction of roads, and private timber management.

The tradeoff of not implementing DFPZs, however, would be the potential for a high-severity wildfire that could destroy large tracts of habitat. In addition, the short-term effects would be outweighed by the long-term benefits of maintaining or restoring open stands of large trees. Furthermore, reducing tree density would improve tree growth and vigor, reduce susceptibility to drought and bark beetle attack, and reduce fire hazard.

The following discussion presents the key factors that would limit treatments and describes why areas with potentially suitable habitat for wildlife would not be entered.

- The DFPZs would be situated to avoid California spotted owl Protected Activity Centers (PACs), Spotted Owl Habitat Areas (SOHAs), federally listed Threatened and Endangered species, and old-forest stands (CWHR size classes 5M, 5D, and 6D within late-successional old-growth rank 4 and 5 stands).
- There are no activity centers (and therefore no PACs) for northern goshawk or great gray owl PACs.
- Approximately 85 percent of the treatments proposed for the Slapjack Project would be on ridgetops, and California spotted owl or northern goshawk typically do not use ridgetops for nesting habitat.
- There are no fisher den sites in the Slapjack Project area. The proposed treatments are not in the draft forest carnivore network.
- The Pacific fisher and American marten use ridgetop saddles to cross from one watershed to another but do not typically use ridgetops for den or rest sites.
- Treatment in RHCAs would be limited.
- In DFPZ units, treatment in 230 miles of RHCAs would be limited to underburning, hand piling, and hand thinning, except in some plantation where mechanical treatment (mastication) is prescribed.

- In addition to RHCA buffers, 50-foot buffers would be applied to 136 miles of ephemerals. Treatments within the ephemerals would be limited primarily to brush removal.
- Group selection would avoid RHCAs.
- Management direction includes the retention of large trees (30 inches dbh or greater).
- Management direction includes the retention of snags (four per acre of 15 inches dbh or greater)
- Management direction includes the retention of large woody material (10–15 tons per acre of the largest diameter).
- Where oak is present within DFPZs and individual tree selection, a minimum of 25 to 35 square feet basal area per acre of oaks over 15 inches dbh would be retained.
- Hardwoods 30 inches dbh and greater would be retained within group selections.

3.13.5.5 All Action Alternatives: General Cumulative Effects

All of the projects discussed in this paragraph are HFQLG Pilot Projects. DFPZ, group selection, and individual tree selection projects are scheduled for areas adjacent to the Slapjack Project area and at other locations within the Feather River Ranger District. The Upper and Lower Slate DFPZs are currently being implemented. The Upper Slate DFPZ is approximately 1,774 acres and the Lower Slate DFPZ is approximately 3,510 acres. The analyses for the Upper and Lower Slate projects concluded that impacts on California spotted owls and other Forest Service Sensitive species would be minimal. The South Fork DFPZ (1,803 acres) and Bald Onion DFPZ (3,175 acres) projects are also being implemented now, and the impacts are expected to be similar to the Slate DFPZ projects. Implementation of the 2,044-acre Brush Creek DFPZ project started in 2005. The Basin project includes 1,215 acres of group selection and 80 acres of individual tree selection and is scheduled for implementation in 2006. The Bald Mountain project is scheduled for implementation in 2006, with 88 acres of group selection and 96 acres of individual tree selection. All of the above projects may have some effects on Threatened, Endangered, and Sensitive species, but no project would result in effects that would lead to a “trend toward listing” for sensitive species or “adverse effects” on listed species. There would be no adverse effects on habitat for MIS and NTMB species. The majority of effects were determined to be short term with long-term benefits. All of the projects discussed in this paragraph are part of the HFQLG Pilot Project.

The Sugarberry Project is scheduled for implementation in 2007 and, at this initial stage of development, is proposing approximately 2,200 acres of DFPZs; 1,300 acres of group selection; and 300 acres of individual tree selection. The Flea Project is scheduled for implementation in 2007 and, at this initial stage of development, is proposing approximately 910 acres of DFPZs, 400 acres of group selection, and 319 acres of individual tree selection. All of the projects discussed in this paragraph are HFQLG Pilot Projects.

3.13.5.6 All Action Alternatives: General Habitat Effects

The following discussion focuses on the effects of the action alternatives on the mature/old-forest habitat components and black oak habitat, plus the effects of road density and the potential for habitat loss due to wildfires. This discussion applies to all wildlife species considered in this document. Subsequent sections (for example, effects of the action alternatives on the California spotted owl) refer to this discussion rather than repeat the information for each species.

Direct and Indirect Effects. Over 85 percent of Slapjack Project treatment units would be located on ridgetops, which would minimize potential effects on the habitat used by old-forest-dependent species because ridgetops are not typically selected for nesting habitat by the California spotted owl or northern goshawk. The Pacific fisher and American marten use ridgetop saddles to cross from one watershed to another but do not typically use ridgetops for den or rest sites. Headwaters for streams are located on ridgetops and do not typically provide suitable breeding habitat for amphibians and western pond turtles.

All action alternatives would meet the direction of the SNFPA Record of Decision and Record of Decision on the HFQLG Act final EIS (with additional standards and guidelines). The areas proposed for treatment represent 12.7 percent of the terrestrial wildlife analysis area (including private acres); 7 percent of the aquatic/hydrologic analysis area (including private acres), and only 0.3 percent of the total acres proposed for treatment in the HFQLG Pilot Project area. Section 3.13.5.9 below provides a discussion of effects related to specific species.

- Alternative B (the proposed action) calls for approximately 4,419 acres of DFPZ construction (includes 123 acres of group selection), 96 acres of group selection that would be outside the 4,419 acres of DFPZs, and 148 acres of individual tree selection; transportation system improvements; control of noxious weeds on 33 acres (31 acres controlled with herbicide); and wildlife, aquatic, and riparian ecosystem restoration. This alternative includes the use of herbicides for preventive maintenance of 1,954 acres of DFPZ.

  The project proposes to construct approximately 15 miles of DFPZs, averaging approximately 0.25 mile wide, to reduce fuel hazards; and implement uneven-aged management strategy using group selection treatments to regenerate fire-resilient species on approximately 4,419 acres found along ridgetops. The DFPZs would be situated to avoid certain areas, so the actual harvested/thinned acres would be 2,561 acres. Treatments throughout DFPZs would thin from below to remove ladder and canopy fuels to increase ground to crown height, spacing between trees, and spacing between tree crowns. Treatment prescriptions would call for removal of the smaller, suppressed, and intermediate crown-class trees; removal of some codominant and dominant trees; and retention of the largest trees to achieve the target canopy cover or spacing guidelines. Thinning in DFPZs would reduce canopy cover to a minimum of 40 percent in those units where it currently exceeds that amount. Other DFPZ treatments include 661 acres of underburning; 1,110 acres of mastication; and 87 acres of hand cutting, piling, and burning. Due to dense brush in the area, herbicides would be used to maintain the long-term effectiveness of the DFPZs on about 1,954 acres. Where California black oak is present in DFPZs, an average basal area of 25 to 35 square feet per acre would be retained

for oaks over 15 inches dbh. Smaller oaks may be retained if determined necessary for future recruitment.

The HFQLG Pilot Project area is 1,528,667 acres. The Pilot Project is intended to demonstrate and test the resource management activities detailed in the HFQLG Act (*Herger-Feinstein Quincy Library Group Forest Recovery Act*, October 12, 1998). The resource management activities include DFPZs, group selection, individual tree selection, and a program of riparian management. The HFQLG Act allows for group selection to occur at an average rate of 0.3 percent of the Pilot Project area per year.

The canopy cover estimates for Riparian Habitat Conservation Areas (RHCAs) were factored in along with the prescription for each DFPZ unit. Canopy cover in RHCAs was estimated using aerial photos. The acres of RHCAs within each DFPZ unit were calculated using a Geographic Information System (GIS). The estimates of canopy cover that would remain following group selection are based on tree stand plot data (see the "Silviculture Report" in the project record). The RHCA canopy cover in DFPZ units would be equal to or higher than that of the overall stands. Group selection canopy cover in DFPZ units would be less than the overall stands. RHCAs and group selections were factored into the overall DFPZ canopy cover calculations. Any proposed mastication would not affect canopy cover percentages, and the effects of any underburning would be very minimal (see the "Fire and Fuels Report").

The treatments in DFPZ units would consist of 1,317 acres of CWHR size class 4 stands (Forest Service size class 3 stands of trees 11–24 inches dbh—refer to table 15 in the Slapjack Project BA/BE) thinned from a range of 47 to 83 percent canopy cover, and 865 acres of CWHR size class 5 stands (Forest Service size class 4 stands of trees 25–40 inches dbh—refer to table 16 of the Slapjack Project BA/BE) thinned from a range of 47 to 87 percent, to a 40 percent minimum canopy cover. The acres are from VESTRA and are approximates.

- **Alternative C** proposes the same suite of actions as alternative B, but herbicides would not be used for preventive maintenance of DFPZs or to control noxious weeds.
- **Alternative D** (Forest Service preferred alternative) would implement DFPZs, group selection, and individual tree selection; transportation system improvements; control of noxious weeds; and wildlife, aquatic, and riparian ecosystem restoration as described under alternative B; however, herbicides would not used for the preventive maintenance of DFPZs.
- **Alternative E** would implement DFPZs, group selection, and individual tree selection; transportation system improvements; control of noxious weeds; and wildlife, aquatic, and riparian ecosystem restoration as described under alternative B. However, herbicides would not be used to control noxious weeds.
- **Alternative F** would implement DFPZs and individual tree selection; transportation system improvements; control of noxious weeds; and wildlife, aquatic, and riparian ecosystem restoration as described under alternative B. However, this alternative calls for

190 acres of group selection, instead of 219 acres, because group selections located in watersheds predicted to be over the Threshold of Concern have been dropped. This alternative includes the use of herbicides for preventive maintenance of DFPZs and as a tactic to control noxious weeds.

- **Alternative G** would implement DFPZs and individual tree selection; transportation system improvements; control of noxious weeds; and wildlife, aquatic, and riparian ecosystem restoration as described under alternative B. Like alternative F, this alternative calls for 190 acres of group selection because group selections located in watersheds predicted to be over the Threshold of Concern have been dropped. Herbicides would not be used for preventive maintenance of DFPZs or to control noxious weeds.

3.13.5.7 All Action Alternatives: Effects on Habitat Components and Structure

Canopy Cover. DFPZ construction and group selection would be accomplished through thinning from below with a variety of site-specific prescriptions, mastication of shrubs and small trees, and the reintroduction of fire into the ecosystem. DFPZ thinning and group selection harvest would reduce canopy cover, but underburning and mastication either would have no effect or a minimal effect on canopy cover (see the “Fire and Fuels Report” in the project record). Thinning that involves the cutting of some dominant and codominant conifers would remove both large structure and canopy cover.

Treatments in DFPZ units, under all action alternatives, would be conducted on approximately 1,317 acres of CWHR size class 4 trees (Forest Service size class 3 trees that are 11–24 inches dbh) and approximately 865 acres of CWHR size class 5 (Forest Service size class 4 trees that are 25–40 inches dbh) (refer to section 2.1, table 2-2).

Table 3-64 (also see section 3.12, table 3-54) shows a comparison of post-treatment canopy cover by alternative. Mature and old-forest-associated species, in general, have been shown to select stands containing at least 40 percent canopy cover for foraging/dispersal and at least 60 percent canopy cover for nesting/denning habitat. The table below shows that the forested areas in Slapjack Project area are already just above minimal nesting/denning levels. The action alternatives (harvest and underburning) propose 40 percent canopy cover, which is a minimal requirement for foraging/dispersal habitat. Because most of the understory would be reduced in the stands, retaining a minimum of a 40 percent canopy cover may not maintain even minimal quality foraging habitat for mature and old-forest dependent species.

Table 3-64. Comparison of post-treatment canopy cover, by alternative.

CWHR Size Class	Treatment	Alternative A Existing Condition	All Action Alternatives Post Treatment
4	DFPZ	66% (range from 47% to 83%)	40%
	Group Selection		11%–22%
	Individual Tree Selection		50%
5	DFPZ	67% (range from 47% to 87%)	40%
	Group Selection		11%–22%
	Individual Tree Selection		50%

Trees in the Slapjack Project area would require approximately another 10 years for a maximum-sized (24 inches dbh) CWHR size class 4 stand to reach the minimum (25 inches dbh) of a CWHR size class 5—this is based on a moderate growing site (soils) and moderate conditions (spacing). It takes 30–50 years to grow a CWHR size class 4 (between 11–24 inches dbh) stand and approximately 100 years to grow a CWHR size class 5 (greater than 24 inches) stand (Oliver 1997; Dunning and Reineke 1933). The removal of smaller trees would provide reductions in stand densities and result in a slight increase in remaining tree growth and potentially producing stands to the next crown size or CWHR size class (that is, from CWHR size class 4 to size class 5). The number of trees per acre is important to habitat because, as the tree density per acre is thinned, the remaining trees have a higher growth potential. In general, the larger the tree the more wildlife that can use individual trees for homes, breeding, and food; and the greater the number of large trees, the more mature/old-forest-dependent wildlife species can use the habitat. In addition, the amount of understory retained (predominately the 6- to 20-inch trees) can affect the suitability of the habitat for foraging and nesting. For example, retaining a minimum of a 40 percent canopy cover without any understory may not maintain even minimal quality foraging habitat for mature/old-forest-dependent species (refer to "Slapjack Silviculture Report" in the project record).

Group selection harvest would occur on 4.9 percent of the project area (219 acres) under alternatives B, C, D, and E. Under alternatives F and G, group selection harvest would occur on 4.3 percent of the project area (190 acres). Group selection treatments would result in the creation of forest openings and gaps that would have (1) all conifers and hardwoods below 30 inches dbh removed; (2) four of the largest snags/acre retained, if they do not pose a health and safety risk to operations; and (3) 10–15 tons per acre of the largest down logs greater than 12 inches in diameter retained where it exists. For the first few years after implementation, these group selection gaps or openings would result in early seral herb/grass and seedling shrub types, replaced through planting or natural seed establishment into seedling tree stages. As shown above in table 3-64, group selection timber harvest would result in stands with portions of nonstocked or sparse canopy cover (11–22 percent). Within the "matrix" (conifer stands between the groups), it is expected that there may be openings in the understory for the skid trails used to remove sawlogs from the groups to designated landings.

As stated on page 2-5 of the HFQLG Act final EIS, "Group selection treatment areas are not considered to be individual timber stands, but are viewed as subcomponents of larger stands. Treatment effects on crown cover and basal area retention are, therefore, averaged over the larger

stand." The larger the stand, and the less treatment within the stand, the less changes will be seen in vegetation size class. CWHR habitat classification (see the "Glossary") serves as the baseline for analysis of vegetation changes. The suitability of the habitat for wildlife would be determined as discussed above.

Large Trees. Under each action alternative, trees greater than 30 inches dbh may be removed for operability purposes to accommodate temporary road construction (3.2 miles), reconstruction (20.9 miles), new landing construction (160 landings), and existing landings (40 landings). Potentially, 487 trees that are 30 inches dbh and larger could be removed on approximately 80 acres under all action alternatives. It is estimated that 1.7 percent of trees 30 inches dbh and larger may be removed from the project area (Silviculture Report, table A-32). This is a high estimate based on vegetation modeling; however, Forest Inventory and Analysis plots on the ground show that the numbers may be much lower. It is estimated that it takes approximately 120 years to grow a 30-inch dbh tree in the Slapjack Project area (Dunning and Reineke 1933). The HFQLG final EIS and SNFPA final EIS and final supplemental EIS each discuss the importance of retaining large trees for old-forest-associated species.

Large trees are an important habitat component, and the loss of this large tree component would affect numbers of large trees for future snag recruitment and large woody material and could negatively affect wildlife populations that are dependent on large trees as essential habitat components in the short term. On the other hand, treated stands would remain at their existing size class and, in some cases, stands may move to a size class higher. In addition, opening up stands would increase the growth potential of remaining trees, which would increase the recruitment potential for snags and large woody material. In addition, the risk of stand-replacing catastrophic fires would be reduced but allow for natural lighter burns.

Snags. The SNFPA final supplemental EIS (HFQLG Land Allocation) standards and guidelines for snags would be followed for the Slapjack Project: Four of the largest (greater than 15 inches dbh) snags per acre would be clumped and distributed irregularly. The potential loss of some snags due hazard removal or use of prescribed fire should be considered during project planning to achieve desired snag retention levels. These levels were evaluated for the HFQLG final EIS and SNFPA final supplemental EIS for Threatened, Endangered, and Sensitive species. It is anticipated that most snags in group selections would be felled for operability and safety reasons, and snags would not be retained within all the groups but would exist on the periphery of the groups.

Tree growth could be affected at varying rates due to competition for nutrients and space depending on density and tree sizes in each stand. The reduction of tree competition could increase the recruitment of large trees, future snags, and large woody material for the long term, while maintaining the minimum snag requirements in the short term.

Large Woody Material. The SNFPA final supplemental EIS (HFQLG Land Allocation) standards and guidelines for large down woody material would be followed for the Slapjack Project; that is, 10–15 tons of large down wood per acre with an emphasis on retention of wood that is in the earliest stages of decay. These levels were evaluated for the HFQLG final EIS and SNFPA final supplemental EIS for Threatened, Endangered, and Sensitive species.

Tree growth could be affected at varying rates due to competition for nutrients and space, depending on density and tree sizes in each stand. The reduction of tree competition could increase the recruitment of large trees, future snags, and large woody material for the long term, while maintaining the minimum snag requirements in the short term.

Management direction for large woody material (10–15 tons per acre of the largest diameter) would not be met due to the existing low quantities of large woody material. The "C" (contractual line item by the sale administer) clause (C6.705) would be used for all proposed thinning and group selection treatment units. The contractor would be required to leave five logs per acre (which generates approximately 10–15 tons per acre) that are 20 inches or greater in small-end diameter and 10 feet long or longer. Logs would be evenly distributed within units to the extent possible. If there were not enough logs meeting these requirements, then all available logs in the unit would be left to satisfy this requirement. In areas where woody material is low, fuel treatments would be designed to maximize retention of large material. Cull logs can be left on-site to meet downed log requirements. In areas with sufficient snags and deficient large down woody material, excess snags may be felled after harvest operations or prescribed burning treatments are completed in order to replenish down logs lost due to treatment activities.

Black Oak Habitat. Management requirements include the retention of important habitat components such as large trees, snags, large woody material, and black oaks. Where oak is present within DFPZs, a minimum of 25 to 35 square feet basal area per acre of oaks over 15 inches dbh would be retained. Hardwoods 30 inches dbh and greater would be retained within group selections.

Black Oaks equal to and greater than 30 inches dbh would be retained within group selections. This is a change from the HFQLG Act final EIS which states, "Where oak is present, retain an average of 25 to 35 square feet basal area per acre of oaks over 15 inches dbh." The final EIS also states that site-specific planning will determine feasibility and specific needs and to retain smaller oaks, if determined to be necessary for future recruitment. In addition, the action alternatives provide for black oak enhancement in the Slapjack Project area, thereby improving the quality of existing black oak stands for associated wildlife species.

Road Density. There are approximately 200 miles of roads in the project area. The proposed transportation system improvement work is listed below and identified on figure A-3 in appendix A (this figure is comprised of three maps). Under alternatives B through G, approximately 7 miles of existing system roads would be closed with barriers upon project completion. Approximately 19 miles of existing system or nonsystem roads would be decommissioned during project implementation. Approximately 22 miles of existing system roads would be reconstructed prior to project use. Reconstruction would consist of brushing, blading the road surface, improving drainage, and replacing/upgrading culverts where needed. Another 2 miles would be resurfaced as part of a watershed improvement opportunity. Approximately 4 miles of temporary spurs would be constructed, and 4 miles of existing spurs would receive light maintenance to clear the road bed of young vegetation and debris. Harvest landings in group selection units and DFPZs would be constructed or reconstructed as needed.

As discussed above, estimates indicate that as many as 487 trees that are 30 inches dbh and greater could be removed for the construction of permanent and temporary roads, reconstruction of temporary roads, and landings for all action alternatives.

The average road density in the Aquatic/Hydrological Analysis Area is 5.7 miles per square mile. Many species are sensitive to the noise and human activity associated with roads. For example, the Duncan Furbearer Interagency Workgroup and the Mooretown Deer Herd Management Plan both recommend a maximum road density of 2 miles per square mile in order to minimize disturbance to forest carnivores and mule deer, respectively. Decommissioning roads would lower the average road density to 5.5 miles per square mile. These activities could result in some short-term site-specific disturbance but could also create additional nesting, denning, foraging, and resting habitat in the long term. However, disturbance in the long term would be only slightly reduced as a result of the proposed road reduction.

Wildfires. There would be short-term disturbance and loss of understory from DFPZ and group selection under each action alternative, as well as from mastication and underburning activities. However, the long-term fuel-reduction activities would protect habitat by reducing the risk of stand-replacing fires.

Historical fire regimes are described by a five-tiered system, which ranks fire regimes by frequency and severity. Historically, the Slapjack Project area was considered to be a Fire Regime 1 / Condition Class 1. Through the absence of fire, this has changed to a Fire Regime 1 / Condition Classes 2 and 3 (see the “Fire and Fuels” section 3.5 in this document). The action alternatives would provide a way to control and suppress potential wildfires in the area by actively treating fuels and decreasing the potential for more intense burn, which could lead to increased rates of spread, a decreased potential for stand-replacing fires in the future, and loss of wildlife habitat. Important forest structure and components, such as large trees and large woody material, would be maintained.

Low to moderate burns could reduce habitat suitability in the short term, but high-intensity burns could contribute to loss of habitat (particularly critical habitat components such as large trees, snags, and large woody material) well into the future. The loss of mature/late-successional forests could eliminate habitat for species associated with those forests in the event of a severe wildfire. Wildfires could also increase the potential for sedimentation into streams, increased stream temperatures, and loss of fish prey species, which could adversely affect the habitat required by amphibian, reptile, and fish species (Rotta 2002).

Prescribed burning is proposed for approximately 661 acres in Slapjack DFPZ units. Approximately 4,000 acres would be burned annually over a five-year period. Underburns typically kill all seedlings, small trees (up to 4 inches dbh), and nonsprouting shrubs in the fire path. In addition, 40–60 percent of trees 8 inches dbh or less may burn. Underburns may also kill trees 8–24 inches dbh, but usually no more than 30 percent of them. The overstory canopy is usually not affected. Large logs are generally reduced in volume but rarely completely consumed. Prescribed burning could result in short-term effects on wildlife from treatment disturbances, smoke, and loss of understory but, in the long term, the species should benefit because habitat would be protected from wildfire. The understory is also expected to return in varying degrees. Protection measures, such as Limited Operating Periods, would be implemented to further reduce disturbance to Threatened, Endangered, and Sensitive species.

There may also be impacts on terrestrial habitat from the construction of firelines around the perimeter of DFPZ units that would be underburned. The Slapjack Project proposes 23 miles (2,040 chains) of firelines made by hand crews and 10 miles (800 chains) of firelines made by

tractors. Construction of the firelines would result in noise disturbance, and tractor lines are often used as trails by off-highway vehicle (OHV) enthusiasts after project activities are completed. However, following standard design practices, such as riparian buffers and implementing Best Management Practices, the long-term effects should be minimal.

DFPZ Maintenance. The use of herbicides to maintain DFPZs is recommended where tanoak makes up to 10 percent or more of the stand composition by basal area (see chapter 2 for a detailed description of the alternatives and proposed treatments). The herbicide imazapyr would be used specifically to control tanoak and shrub regrowth and prevent its re-formation as ladder fuels. Black oak and live oak are important habitat components for wildlife and are nontarget species. The Record of Decision on the Sierra Nevada Forest Plan Amendment (SNFPA) contains specific direction for oak management that would be adhered to at the site-specific project level (refer to appendix K in the BA/BE for species-specific effects from the use of herbicides). The effects of imazapyr on wildlife were analyzed in the HFQLG final supplemental EIS (this document should be reviewed for specific information on herbicide application and its effects).

3.13.5.8 All Action Alternatives: Effects of Riparian Restoration

All applicable Best Management Practices (BMPs) would be implemented during the replacement of the culverts. Mulching and revegetation would occur as determined on a site-by-site basis to prevent soil erosion following project implementation. This work would be conducted in fall when the water level is lower, and there would be fewer impacts on fish.

Direct Effects. The installation (replacement) of culverts would create short-term direct effects (1–3 months), such as increased sedimentation and reduced water quality, from the ground-based equipment that would be used in the drainage during culvert replacement. There is the potential for a trout species to get crushed by equipment or suffocated by sediment churned up by the installation of a new culvert or upgrading of the existing culvert. The project sites would be electrofished prior to construction.

There would be a long-term beneficial direct effect by improving the aquatic connectivity and resizing the culvert to accommodate a 100-year flood in the project area. The proposed aquatic species passage projects would improve watershed connectivity and open up 3.75 miles of high-quality spawning, holding, and rearing habitat for trout and, potentially, for hardhead minnow.

There would be no direct effects on hardhead minnow or trout species from the bank stabilization and meadow restoration projects.

Indirect Effects. The culvert improvement and bank stabilization projects would create a short-term indirect effect by increasing sedimentation during construction, but with the implementation of BMPs, the effects would be minimized. In the long term, the culvert improvements would be beneficial for the hardhead minnow and trout species habitat downstream from the resizing of the culvert to accommodate a 100-year flood and stabilizing the banks to reduce erosion. This work would result in a temporary reduction in water quality. However, after the project is completed there would be a positive indirect effect on hardhead minnows and trout Management Indicator Species by improving retention of water for augmented base flow of streams below the restored meadows and improving downstream water quality (see the “Hydrology Report” in the project record).

Cumulative Effects. The bank stabilization and meadow enhancement projects would result in improved hydrologic function and water quality below the culverts. This would produce a positive cumulative effect from the overall reduction in ERA values.

3.13.5.9 All Action Alternatives: Effects on Specific Species

The effects of herbicides on specific species are discussed below. The HFQLG final supplemental EIS analyzed NPE-based (nonylphenol ethoxylate-based) surfactants because of scientific findings concerning potential endocrine disruption (reproductive problems). The two additives (SYL-TAC® and Hi-Light® Blue) proposed for use under the Slapjack Project were not analyzed in the HFQLG final supplemental EIS, and they are not known to cause problems with endocrine disruption. SYL-TAC® (or an equivalent seed oil/silicone blend) is used to increases the ability of the herbicide to adhere to and penetrate the leaf surface; and the marker dye Hi-Light® Blue (or equivalent) is used to indicate where herbicides have been applied.

3.13.5.10 All Action Alternatives: Effects on California Red-legged and Foothill Yellow-legged Frogs from DFPZ, Group Selection, and Individual Tree Selection

Critical Habitat for the California red-legged frog has been reevaluated and re-proposed by the U.S. Fish and Wildlife Service (USFWS). In contrast to the latest USFWS proposal for Critical Habitat, the Plumas National Forest is excluded because the provisions of the SNFPA and Adaptive Management Strategy provide more benefits for the conservation of California red-legged frog Critical Habitat than the USFWS proposed provisions (*Federal Register*, April 13, 2006, Volume 71). A final Recovery Plan provides direction for managing this Threatened species (USFWS 2002).

Buffers around aquatic and riparian areas would be used to minimize the amount of project activity. Aquatic habitat would not be directly entered except for potential habitat enhancement or maintenance. In the DFPZ plantation treatment areas, RHCAs would be treated to improve riparian habitat conditions (see appendix A in the “Hydrology Report”).

Direct Effects. Although no activities are planned around the site where the California red-legged frog population is found, a standard 500-foot buffer would normally apply as a protection measure. No adverse direct effects are expected to occur from project activities since no activities would occur in riparian or aquatic habitats. Loss of riparian vegetation, especially along shorelines, would increase access for predators and reduce estivation (dormancy in summer for some animals) sites. Decreased shading of aquatic systems would increase water temperatures, which could cause reduced rates of embryonic survival and potentially contribute to the declining trend in frog populations. It is highly unlikely that breeding California red-legged frogs or yellow legged-frogs would be present in or near the proposed treatment areas. Activities that would require the use of heavy equipment (such as for timber harvest and mastication), or could cause ground disturbance (grubbing), would have the potential to disturb and/or kill individual frogs if they are present during project implementation. However, any potential adverse direct effects would be avoided by the implementation of management standards and guidelines.

Indirect Effects. No major indirect adverse effects are expected to occur, but minor indirect effects could occur. Impacts on amphibians from logging activities would include changes to their

upland habitat quality and quantity. Dispersal habitat may be adversely affected if vegetation or soils are disturbed near perennial or intermittent streams.

Mastication activities would take place in the dry season when frogs would not be traveling overland. Mechanical harvesting would not result in direct mortality because these activities would be scheduled during the nondispersal period (before October 15th or the first wetting rains) and because mechanical harvesting is prohibited in the RHCAs. No group selection skid trails would cross streams with running water. In addition, it is expected that none of the skid trails associated with DFPZ construction would cross RHCAs. Consequently, indirect effects due to skidding would likely not occur or would be minimal. Stream crossings, springs, and water sources for dust abatement would be checked by the Feather River Ranger District biologist for the presence of sensitive frog or turtle species prior to project implementation.

Prescribed fires would not affect canopy cover in RHCAs, but they could remove some ground cover. This would be minimal because the fires would not be ignited in the RHCAs. The implementation of Standard Protection Measures would help minimize indirect effects on amphibians and reptile species. Burns occurring before the first soaking rains in fall are least likely to directly affect amphibians because the frogs would be in the RHCAs at that time. Burns occurring during the spring would be more likely to cause direct effects on amphibians and reptiles because individuals would be outside the RHCAs at that time.

California red-legged frogs are known to migrate overland during the wet season without regard to topography. The frog's dispersal habitat provides connectivity between breeding habitat and upland habitat. The proposed dispersal area for the California red-legged frog is a minimum of 0.7 mile (*Federal Register* April 2006)—no activities are proposed within the 0.7-mile buffer.

In consultation with the USFWS, a 1-mile dispersal area was applied to known populations in the Slapjack Project area. There are 72 acres (36 acres of DFPZs, 7 acres of individual tree selection, and 29 acres of mastication) of proposed treatments within the 1-mile dispersal area. These treatment units are not located near the known breeding site but are on the outer boundaries of the 1-mile area for dispersal. No activities would occur within the 1-mile radius from October 15 through April 15 or the first wetting rain that results in 0.25 inch of precipitation. Within the subwatershed boundary, an approximate 2-mile area, there are 228 acres proposed for DFPZs and group selections—the Scientific Analysis Team and RHCA guidelines would apply. Other potential occupied habitat in the project area was indentified at Cottage Creek. The proposed treatments (DFPZs and group selection) are approximately 0.25 mile from Cottage Creek. The DFPZ treatments would be in older plantations proposed for mastication, hand cutting/piling, and burn units. Aquatic habitat would not be directly entered, except for potential habitat enhancement or maintenance of riparian habitat.

The implementation of the Standard Resource Protection Measures identified in the project description and procedures detailed in the Burn Plan for the project would reduce the probability of habitat loss from prescribed fire for all species. The Slapjack Project would have a beneficial indirect effect because it may reduce the potential for a stand-replacing wildfire, which is a threat to habitat for forest-dwelling species.

Group selection and DFPZ construction in the uplands (including ridgetops) could potentially change the hydrologic regime in the project area. There could be the potential for a reduction in

suitable habitat if project activities alter flows or reduce the availability of surface water (refer to the BA/BE for the HFQLG Act final EIS for more discussion). Soil erosion could direct sedimentation into streams, which could suffocate egg masses and/or tadpoles; however, no minimal disruption in surface and subsurface flows or sedimentation into streams is anticipated because Scientific Analysis Team guidelines would be followed, and RHCA buffers and BMPs would be implemented. Any potential adverse indirect effects would be avoided.

Cumulative Effects. It is unlikely that the proposed activities would be a significant addition to cumulative effects on the frog species, and habitat characteristics would not change to a degree that these effects would limit populations; therefore, there would be very few cumulative effects.

Cumulative effects on amphibian habitat have occurred from vegetation management activities, recreational uses, introduction of nonnative species, road construction, timber salvage activities, water diversions, and wildfire. A past event that could contribute to cumulative effects includes the Pendola fire of 1999, which burned through Dobbins and Cottage Creeks. The Plumas National Forest implemented the Pendola Salvage Project after the fire. The salvage of 130 acres was predominately on ridgetops, riparian buffers were applied with no harvest, and no new system road construction or reconstruction was proposed. In addition, the activity was proposed for the dry season when breeding frogs would be confined to the aquatic zones but before the wet season when frogs could be dispersing. The wildfire improved some habitat conditions for the California red-legged frog by opening up the understory, and a population of the frog was located and protected. In consultation with the USFWS, there was a determination of “no effect” for this species. Chy Industries and Siller Brothers implemented salvage projects on private lands after the fire. It is not known how much riparian habitat was removed by the fire since the private land suffered the highest fire severity. Before the fire, Dobbins Creek had already experienced impacts from mining that occurred in earlier years—the mine tailings are evident throughout the area. Currently, Soper Wheeler Industries and Chy Industries are major private landholders in the area. Private urbanized and industrial timber lands are treated with different objectives than National Forest lands; however, in most cases, riparian buffers with no or limited treatments of varying widths are applied (refer to the discussion for private lands under the California spotted owl below). The HFQLG Act Record of Decision, and its associated Scientific Analysis Team guidelines for DFPZ construction and the SNFPA Record of Decision’s aquatic strategy for DFPZ maintenance, would not only prevent or strictly control any additional impacts on frog habitat but would result in actual habitat restoration and enhancement for some streams.

The informal consultations that occurred with the U.S. Fish and Wildlife Service for the California red legged-frog conclude that the actions implemented on a programmatic and project level would likely not adversely affect this species.

3.13.5.11 Alternatives B, E, and F: Effects on the California Red-legged and Foothill Yellow-legged Frogs from Imazapyr for DFPZ Maintenance

Syracuse Environmental Research Associates, Inc. (SERA) provides very few studies related to the effects of herbicides on any amphibian species. There is extremely limited published data on the relationship of herbicides proposed for use. The HFQLG final supplemental EIS contains an analysis of herbicide effects on invertebrates (a primary food for amphibians) and fish.

The risks to a variety of aquatic, amphibian, and reptilian species varies with the chemical(s), rate(s), timing, and other factors requiring site-specific information. It is not possible to assess full risks to these species given the unpredictability of potential exposures and the lack of toxicological data relevant to subcutaneous exposures for adult frogs.

Direct Effects. Direct effects on amphibian species could occur if amphibians were to come into direct contact with the herbicides, and if so, the toxicity of the herbicide could be of concern. Amphibians have permeable skin, and they breathe through their skin, making them exceptionally vulnerable to chemicals in their environment (water, land, and air). Although there is very little information regarding the effects of herbicides or surfactants on amphibian surrogates, studies have shown adverse effects on amphibians if sufficiently exposed to some herbicides (Thompson 1998; Hall and Henry 1992; Berrill et al. 1994; and Bidwell and Gorrie 1995). There was no available information on effects or risk analysis specific to imazapyr.

No imazapyr herbicide would be used within the watershed of the known California red-legged frog population, and recent surveys have revealed no other populations in the project area. In addition, vegetation in aquatic and riparian zones would not be targeted for herbicide treatment.

Indirect Effects. Even though aquatic and riparian habitats would be avoided during herbicide applications, the potential for run-off, percolation, and drift into watercourses or spray contaminating food sources (such as invertebrates and aquatic or riparian plants) is of some concern.

Surface and subsurface runoff and wind erosion are particularly important in the aquatic environment. Under normal and expected conditions of herbicide and surfactant use, background concentrations would be found in the aquatic environment. This concentration is highly site-specific and depends on many factors, including the mobility of a given herbicide in the soil, soil type, soil pH, soil moisture holding capability, rainfall, application rate, chemical degradation, and ambient and soil temperatures. For specific information regarding these factors, refer to “Environmental Fate” (HFQLG Act final supplemental EIS, appendix F). Estimates of background herbicide concentrations in the aquatic environment following normal herbicide application are given in the SERA reports (SERA 1996–2001 and 2003).

Runoff, percolation, and wind erosion are highly site and chemical specific; because of this, these factors must be addressed in an herbicide plan at the site-specific project level. The need for any buffers or other protection measures would be implemented at the site-specific project level.

The indirect effects of herbicides on the invertebrate food source for amphibians are expected to be more similar to the analysis for small mammal species than any other group of species. The acute exposure resulting from small mammals consuming contaminated insects is discussed in “Terrestrial Associated Species Risk Assessment, Mammals” (HFQLG Act final supplemental EIS BA/BE 2003). Imazapyr and triclopyr BEE did not show adverse effects on mammal species consuming contaminated insects. Indirect effects on amphibians from herbicides on their vegetative food source are expected to be more similar to the analysis for avian species than any other group of species. The acute exposure resulting from avian species consuming contaminated vegetation is discussed in “Terrestrial Associated Species Risk Assessment, Avian” (HFQLG Act final supplemental EIS BA/BE 2003).

There is scientific evidence that shows a strong correlation between chemical drift and amphibian declines in the Central Valley. However, this information is related to different insecticides (Davidson et al. 2000). Chapter 3 of HFQLG final supplemental EIS (Issue 2) addresses drift, indirect effects, and cumulative effects related to old-forest and aquatic/riparian species. Herbicide drift is of concern, and the factors to consider during application are wind, slope, and air moisture. Invertebrate prey species and vegetation could be affected by herbicide drift, but the actual effects are unknown. It is expected that any effects from potential drift of herbicides would be far less than from the exposure rates from direct spray.

Imazapyr treatments are not planned within protected areas surrounding known red-legged frog populations or the 1-mile dispersal area (see appendix F). Herbicide applications for DFPZ maintenance would be limited to areas outside of aquatic and riparian zones. There is no indication that California red-legged frogs and foothill yellow-legged frogs would be exposed to adverse levels of imazapyr (under the conditions of use specified) if there is full implementation of all (1) protection measures, such as 500-foot amphibian buffers within a 1-mile radius of known populations and riparian buffers as recommended by the Scientific Analysis Team; (2) Best Management Practices; and (3) mitigation measures for applying herbicides. The indirect effects of imazapyr application should be low.

Cumulative Effects. Mammal exposure to herbicides was based on 100 percent absorption that would be more reflective of potential exposure for amphibians. Amphibians disperse when the first wetting rains start to fall, usually during the month of October. Typically, amphibians move back overland into or near stream systems by late March. Herbicide and surfactant application would not be occurring during times of precipitation, especially during the wet season. Surveys would be conducted prior to any management activities and would be performed in accordance with direction and guidelines in the *Plumas National Forest Land and Resource Management Plan* (the "Forest Plan"), as amended by HFQLG Act final supplemental EIS and SNFPA final EIS. Surveys would be conducted prior to DFPZ construction (refer to HFQLG final supplemental EIS).

No herbicides would be used in perennial, intermittent, or ephemeral streams. The assessment of cumulative effects was made based on implementation of riparian and aquatic "protection measures" managed under the HFQLG Act as amended by the Sierra Nevada Forest Plan and administered by the Plumas National Forest. It is expected that cumulative effects based on implementing alternatives B, E, and F would have minimal indirect effects, and direct adverse effects of herbicides are not expected to occur.

3.13.5.12 Alternatives B, D and F: Effects on the California Red-legged and Foothill Yellow-legged Frogs from Triclopyr BEE for Noxious Weed Control

Triclopyr BEE is proposed to control 31 acres of noxious weed species of broom, including limited use in riparian areas in units 29 and 77. The herbicide would be a direct spray with an expected herbicide drift of 50 feet. Triclopyr treatments are not planned within protected areas surrounding known red-legged frog populations or the 1-mile dispersal area (see appendix F). No direct, indirect, or cumulative effects are expected.

Direct Effects. Direct effects on amphibian species could occur if amphibians were to come into direct contact with the herbicides, and if so, the toxicity of the herbicide could be of concern.

Amphibians have permeable skin, and they breathe through their skin, making them exceptionally vulnerable to chemicals in their environment (water, land, and air). A few studies provide values for triclopyr; those are Bidwell and Gorrie 1995; Perkins et al. 2000; Berrill et al. 1997; CDFG 1998; Berrill et al. 1994; Fort et al. 1999; and USFS 2003.

A study of three species of frogs in Ontario, Canada, found that low concentrations of triclopyr BEE inhibited their avoidance behavior. Tadpoles normally move when touched or prodded—this behavior helps them escape from predation. Tadpoles of all three species exposed to just over 4.0 parts per million (ppm) of triclopyr lost their avoidance response. Tadpoles initially affected by exposure to lower concentrations of triclopyr usually recovered within 1 to 3 days. Newly hatched tadpoles of all species were very sensitive to 2.4 and 4.8 ppm triclopyr, either dying or remaining paralyzed following exposure. The researchers from Trent University and the Canadian Wildlife Service concluded that newly hatched tadpoles of all species were very sensitive to 2.4 and 4.8 ppm of triclopyr and "is likely to paralyze the sensitive tadpoles, and such exposure may occur in a managed forest system." At exposures of 1.2 ppm, there were no deadly effects on these frogs (Berrill et al. 1994).

In both the triclopyr and hexazinone experiments conducted by Berrill et al. (1994), tadpoles appear to have been unaffected by their exposure as embryos to either herbicide. The authors conclude that the jelly layer on frog eggs probably provides additional protection, compared to fish eggs. Direct effect threshold values were not available for amphibian species. The acute exposure for small mammals from direct application is discussed in "Terrestrial Associated Species Risk Assessment, Mammals" (HFQLG Act final supplemental EIS BA/BE 2003). The acute exposure for triclopyr BEE is below the lethal dose / lethal concentration (LD/LC_{50}). Exposures for mammals were based on 100 percent absorption, which would be more reflective of potential exposures for amphibians. Amphibians disperse when the first wetting rains start in fall, usually during the month of October. Amphibians move back overland into or near stream systems typically by late March. It is expected that herbicide application would not be occurring during times of precipitation. SNFPA standards and guidelines are set to avoid pesticide application within 500 feet of known occupied sites for the California red-legged frog, Cascade frog, Yosemite toad, mountain yellow-legged frog, foothill yellow-legged frog, and northern leopard frog; a 300-foot buffer around streams within the dispersal area of a known site; and a 150-foot buffer in the watershed of the known population. Additional protection measures, such as Limited Operating Periods, would be applied. No adverse direct effects are expected to occur. See table 3-65 for summary of doses in surrogate species.

Table 3-65. Summary of herbicide use and risks compared to the NOEL/NOAEL and LD_{50}/LC_{50} in surrogate aquatic and riparian species.

Herbicide	NOEL/NOAEL[a]	LD_{50}/LC_{50}[a]	Risk Assessment	
			Amphibian	Reptile
Imazapyr	Below	Below	Low	Low
Triclopyr BEE	Exceeded	Below	Some	Some

Source: USDA Forest Service 2003

Note:

a. See the "Glossary" at the back of this document for definitions of NOEL – No Observed Effect Level; NOAEL = No Observed Adverse Effect Level; LD = Lethal Dose; LC = Lethal Concentration.

Indirect Effects. Triclopyr treatments are not planned within protected areas surrounding known red-legged frog populations or the 1-mile dispersal area (appendix F).

As far as affecting the viability of special status amphibian species, a major spill could affect the future reproductive ability of frogs associated with a stream or the potential loss of a population, especially if associated with an isolated water source. Triclopyr BEE exceeded the NOEC and lethal levels by factors of 9.1 and 4.5, respectively. Exposures were below the LD/LC_{50} but resulted in observable effects when applying triclopyr BEE. Stream flows should dilute any stream spills; however, any spills near or in ponds could be of concern. Triclopyr BEE resulted in adverse exposure levels from consuming contaminated vegetation. Although triclopyr BEE exposures would be of concern, spill scenarios, worst-case or otherwise, are not expected. In accordance with mitigation measures for herbicide use, mixing would not occur near watercourses, so no adverse indirect effects are expected.

A SNFPA standard and guideline is “prohibit storage of fuels or other toxic materials within Riparian Conservation Areas and Critical Aquatic Refuges except at designated administrative sites. Ensure that spill plans are reviewed and up-to-date.”

Cumulative Effects. Refer to the above discussion on imazapyr. There would be no cumulative effects from implementing alternatives B, D, or F.

3.13.5.13 All Action Alternatives: Effects on the Western Pond Turtle from DFPZs, Group Selection, and Individual Tree Selection

Direct Effects. Based on the following information, direct effects are not expected to occur. The major factors that could pose a risk to the western pond turtle are changes in riparian and aquatic habitat abundance and quality, breeding site disturbance, and risk of high-severity fires. Western pond turtles require aquatic habitat for breeding, and young are highly dependent on aquatic habitat until maturity. There would be no noxious weed treatments scheduled around ponds in the project area. Surveys were conducted in areas proposed for DFPZ construction, and surveys would be conducted prior to any DFPZ maintenance activities. The two known occupied breeding sites, Hampshire and Nutmeg Creeks, would be protected. The implementation of Limited Operating Periods, buffers (for RHCAs and ephemeral streams), or other protection measures would be applied if it is determined that activities could adversely affect the western pond turtle. Movement to nests in upland habitat could be affected by project activities. Equipment or workers could crush the turtles as they move to and from aquatic zones to upland breeding sites and could disturb or crush adults that are hibernating upland. In addition, nest sites with eggs or young could be adversely affected, as could the young turtles as they move back to aquatic habitat.

The loss of individuals is not expected, however, given that protection measures (such as Limiting Operation Periods and limiting access to the road next to a pond) would be implemented. For further discussion, see appendix F of this EIS. Although riparian habitat is not the vegetation type proposed for prescribed burns, the burns could run into riparian habitat; however, protective measures would be in place to ensure that ponds and upland habitat are protected while benefiting from the positive effects of a light underburn. In addition, measures have been taken to protect the area when turtles may be moving upland to lay eggs and/or hibernate.

Indirect Effects. Indirect effects could occur due to potential loss of riparian habitat and important habitat components such as large woody material and ground cover during prescribed burning activities. This loss of riparian vegetation could limit potential breeding sites and invertebrate prey base. This would likely only occur if high-intensity wildfires were to enter riparian habitat and aquatic zones and remove a substantial amount of forest ground cover. Prescribed burns are expected to be of low intensity, but if loss of ground cover were to occur, it would likely be low. The intent of a DFPZ is to reduce the risk of high-intensity fires and thus prevent the loss of riparian habitat. However, some decreased shading could occur as a result of DFPZ construction, but effects are expected to be low. Optimally, turtles prefer ponds with less vegetation because they require sunlight for basking. Group selection and individual tree selection are not proposed in riparian zones.

Indirect effects are expected to be low due to the implementation of riparian protection measures as described in the HFQLG Act final EIS, Scientific Analysis Team guidelines, the SNFPA Aquatic Strategy and Riparian Management Objectives, and associated Forest Plan standards and guidelines to maintain or improve key riparian components and implement actions to reduce fire hazard.

Cumulative Effects. The Slapjack Project area and the lands outside the project boundary have experienced many cumulative impacts in past years. In the 1920s, the Hutchinson Lumber Company operated a logging camp in the town of Feather Falls. Camps were constructed nearby to accommodate the lumber company. One of the camps was in the same area where western pond turtles are found today. Mooretown, located to the west of Feather Falls, was a mining and trading center. At Hampshire Creek, extensive mining and timber operations in the past have impacted an archaeological site. Currently, there are buffers around the heritage resource site to protect it. The Hampshire and Nutmeg Creeks are protected by Scientific Analysis Team and RHCA guidelines. The road at Hampshire Creek has been impacted by past and present activities and is proposed for closure as part of the Slapjack Project.

At Cottage Creek, the 1999 Pendola fire destroyed much of the timber and trigged the growth of undesirable underbrush. As a past event, the Pendola wildfire could have contributed to cumulative effects. The Plumas National Forest implemented the Pendola Salvage Project after the fire. The salvage of 130 acres was predominately on ridge-tops, riparian buffers were applied with no harvest, and no new system road construction or reconstruction was proposed. In addition, the activity was proposed for the dry season when breeding turtles would be confined to the aquatic zones but before the wet season when turtles could be dispersing. The wildfire improved some habitat conditions for the western pond turtle by opening up the understory. A population of western pond turtles was located in a pond along Little Oregon Creek and at its confluence with New Bullard's Bar Reservoir. Units modified as a result of the California red-legged frog population also helped to protect the western pond turtle, and there was a determination of "no effect" for this species. Chy Industries and Siller Brothers implemented salvage projects on private lands after the fire. The two companies retained little to no riparian buffers for their projects; however, it is not known how much riparian was removed by the fire since the private land suffered the highest fire severity. Before the fire, creeks within the watershed had already experienced impacts from mining that occurred in earlier years—the mine tailings are evident throughout the area. Currently, Soper Wheeler Industries and Chy Industries are major private landholders in the area. Private, urbanized, and industrial timber lands are treated with different objectives than National Forest lands; however, in most cases there is some level of riparian buffers with no or limited treatments. The ongoing private land operations, in

conjunction with the Slapjack Project, could have a negative cumulative impact on the western pond turtle; however, the Slapjack Project proposes construction of DFPZs to help prevent catastrophic fires, remove thick underbrush, decommission roads, repair culverts, enhance riparian areas, and improve habitat condition for the long term.

There would be no direct effects, but low indirect effects and possibly positive effects, on the western pond turtle from DFPZ construction, group selection, and individual tree selection. There would be low incremental cumulative effects. The guidelines set forth in the HFQLG Act Record of Decision, with its associated Scientific Analysis Team guidelines for DFPZ construction, and the SNFPA Record of Decision guidelines covering aquatic strategy for DFPZ maintenance, would not only prevent or strictly control any additional impacts on turtle habitat, but would likely result in habitat restoration and enhanced connectivity for many streams (see appendix F of this EIS for the proposed mitigation measures). Due to no direct effects and low indirect effects, cumulative effects are not expected, or effects would be low as a result of implementation of action alternatives.

3.13.5.14 Alternatives B, E, and F: Effects on the Western Pond Turtle from Imazapyr for DFPZ Maintenance

Direct Effects. The effects discussed in this section were derived from effects on avian and fish species because no information exists on the effects of herbicide treatment on reptiles. Studies of herbicide effects on fish show nontoxic to moderate toxicity. Inert ingredients, additives (dyes), surfactants, and environmental factors, such as water chemistry (water hardness), can influence the toxicity of the proposed herbicides. For this analysis, it is assumed that western pond turtles would be no more susceptible to direct adverse effects of herbicide application than aquatic organisms (such as fish) or terrestrial animals (such as avian species). Since turtles are much less likely to absorb herbicide chemicals through their skin, and they do not breathe through gills, up-take would be less than for other organisms. Conversely, turtles are less able to escape disturbances compared to avian or fish species, which can easily escape.

Herbicide applications for DFPZ maintenance would be limited to areas outside of aquatic and riparian zones. Herbicide application for noxious weed control is proposed within riparian areas in units 29 and 77 (see section 3.13.5.15 for discussion of potential effects).

There would be no potential for accidental spills in aquatic or riparian zones because the application of herbicides and surfactants for DFPZ preventive maintenance would not occur in those areas. A spill contingency plan has been developed along with other protection measures, such as stream buffers following SAT guidelines and buffers around ponds with known turtle populations (maximum of 300 feet; see appendix F). In addition, protection (mitigation) measures would prohibit herbicide mixing near stream courses, thus accidental spills in waterways would be very likely. Other protection measures, such as Limiting Operating Periods (LOPs), would be implemented.

A major spill could affect the future reproductive ability of turtles (thus the viability of a turtle population) associated with a stream or pond. Herbicide exposure is predicted to be below the LD/LC_{50}, but there could be some risk when applying imazapyr. Direct effects of the herbicides should be very low for the western pond turtle. The proposed treatments would be evaluated and mitigated to avoid or reduce any potential adverse effects at the site-specific project level. Although imazapyr exposures would be of concern, spill scenarios (worst-case or otherwise) are not expected.

The egg-laying period (during June-July) and very young individuals are of most concern for possible effects of herbicide or surfactant spray, but as mentioned previously, herbicides would generally be applied during the spring and very early summer months when vegetation is actively growing. Herbicide treatments are not proposed near or in streams, ephemerals, and ponds.

There is no information regarding the impacts of herbicide contact with turtle eggs. The eggs are very porous and allow moisture to be absorbed inside the shell, but moisture does not seep back out (Holland 2001). Western pond turtles typically dig their nests about 15 centimeters (6 inches) deep (Holland 2001). Herbicide spray should not reach eggs in the nests, although the potential for leaching varies by herbicide. Egg embryo, however, may be susceptible to the effects of herbicide contamination if the spray drains down under the soil and reaches the eggs.

Effects from direct herbicide and surfactant application on turtles when they are moving overland are expected to be more similar to avian species than any other group of species. The acute exposure for avian species from direct application is discussed in the "Terrestrial Associated Species Risk Assessment, Avian" in the HFQLG Act final supplemental EIS BA/BE. There would be a reduced potential for impacting turtles because the turtles associated with stream systems and ponds are generally widely distributed, and it is unlikely that a whole population would be moving upland to the same potentially treated area. Surveys are conducted for special-status herpetological (amphibians and western pond turtle) species prior to implementing any management activities—surveys follow the direction and guidelines in the 1988 Forest Plan, as amended by HFQLG Act final EIS and SNFPA final EIS.

Individual western pond turtles would not be directly affected by herbicide application since aquatic and riparian habitat, the primary habitats used by this species, would be avoided. Direct adverse effects of herbicides are not expected to occur from alternative B, E, or F.

Indirect Effects. Even though aquatic and riparian habitats would be avoided the potential for run-off, percolation, and drift into water courses or spray contaminating food sources such as invertebrates and aquatic plants is of some concern.

Consumption of contaminated food items (such as invertebrates; small fish; amphibian larvae, tadpoles and juveniles; and some plant material) may indirectly affect adult and juvenile turtle survivorship. Bioaccumulation could also be of concern. Individual western pond turtles would not be directly affected by herbicide application since aquatic and riparian habitat, the primary habitats used by this species, would be avoided. Due to low to no indirect effects, there would be no incremental effects as a result of implementation of any of the action alternatives.

For imazapyr, the difference in concentrations between initiation of adverse effects and mortality is small. However, LC_{50} and NOEC values are well above expected exposure rates to the runoff/percolation and spill scenarios. No adverse effects on fish, the surrogate species for reptiles, are expected from application of imazapyr (SERA 1999). Due to low direct and indirect effects, there would be no incremental effects as a result of implementation of action alternatives.

The vegetation in aquatic and riparian zones is not the target vegetation proposed for herbicide treatment except for limited invasive or noxious weed control. Use of any herbicides within aquatic/riparian ecosystems would be evaluated at the site-specific project level. With full

implementation of all protection measures and BMPs, there is no indication that western pond turtles would be exposed to adverse levels of herbicides. Adverse indirect effects from implementation of alternative B, E, or F are not expected to occur.

Cumulative Effects. DFPZ construction (employing provisions of the HFQLG Act Record of Decision and Scientific Analysis Team guidelines) and DFPZ maintenance (governed by the SNFPA's Aquatics Management Strategy) would not only prevent or minimize impacts on the turtle habitat but would result in habitat restoration and enhanced habitat connectivity for many streams.

Herbicide application for DFPZ maintenance would not occur in aquatic or riparian zones. Similar to impacts on fish species, direct impacts on reptiles in aquatic habitat would likely be low..

By adhering to management directions, standards, guidelines, BMPs, and mitigations, direct and indirect adverse effects are not expected; therefore, cumulative adverse effects are not expected to occur.

3.13.5.15 Alternatives B, D, and F: Effects on the Western Pond Turtle from Triclopyr BEE for Noxious Weed Control

The effects discussed in this section were derived from effects on avian and fish species because no information exists on the effects of herbicide treatment on reptiles.

The acute dose exceeds the acute NOAEL for the bird-eating contaminated insects with a high residue rate. Exposure from a direct spray on the mallard duck and bobwhite quail are below the acute NOAEL. If a mallard were to consume contaminated water for an extended period of time, it could lead to a chronic dose. This is well below the chronic NOAEL for avian species. When making an adjustment for the variation in the pileated woodpeckers diet, consumption of the combination of contaminated berries and insects could lead to an acute dose at a high residue rate. Table 3-66 shows the overall summary of doses compared to the NOEL/NOAEL in surrogate species scenarios and the risk associated with those doses.

Table 3-66. Overall summary of doses compared to the NOEL/NOAEL in surrogate species scenarios and the risk associated with those doses.

Herbicide	NOEL/NOAEL[a]	Residual Rate	Risk Assessment
Triclopyr BEE	Below	High	Low

Source: USDA Forest Service 2003.

Note:

a. See the "Glossary" at the back of this document for the definitions of NOEL and NOAEL.

Direct, Indirect, and Cumulative Effects. Triclopyr BEE is proposed to control a maximum of 31 acres of noxious weeds, including riparian areas in units 29 and 77. The areas proposed for treatment are over 2 miles from any known western pond turtle population. Broom plants grow in dense clumps and do not provide breeding habitat for the turtle. Because additional populations may be present in the project area, protection measures have been developed, including a spill contingency plan, stream buffers following SAT guidelines, and buffers around ponds with known turtle

populations (maximum of 300 feet; see appendix F). With full implementation of all protection measures following BMPs, there is no indication that western pond turtles would be exposed to adverse levels of herbicides. Direct, indirect, or cumulative effects on the pond turtle are not expected.

3.13.5.16 All Action Alternatives: Effects on Bald Eagles from DFPZs, Group Selection, and Individual Tree Selection

Direct Effects. There would be no direct effects. There are no known bald eagle residents in the project area. Nesting bald eagles on the Plumas National Forest are associated with reservoirs or lakes (including the Poe Powerhouse nesting pair located along the North Fork Feather River and also Lake Oroville). Other nesting pairs are found at New Bullard's Bar Reservoir on the Tahoe National Forest. Suitable nesting and/or foraging habitat for the bald eagle would not be affected by DFPZ construction, group selection, or individual tree selection harvests in the project area.

Indirect Effects. Indirect effects are not expected. A known winter roost site is located within 0.5 mile of a group selection. However, project activities are not expected to cause indirect effects. Typically, the wintering eagles arrive in late October when proposed activities would not be occurring. The proposed fuel treatments, group selection, and individual tree selection would not change in the fish production in New Bullard’s Bar Reservoir. The implementation of Best Management Practices, and the meeting of all Riparian Management Objectives (located in the project record), would ensure that no indirect effects on fish or their habitat would occur.

Cumulative Effects. The Slapjack Project would not cause direct or indirect effects on known bald eagle territories or bald eagle management areas. No direct or indirect effects are expected on the known winter roost. Therefore, implementation of the Slapjack Project would not contribute to cumulative effects on bald eagles or bald eagle habitat.

3.13.5.17 Alternatives B, E, and F: Effects on Bald Eagles from Imazapyr for DFPZ Maintenance

Refer to the discussion below for the effects of imazapyr on the California spotted owl.

Direct Effects. The acute exposure for avian raptors from direct application is discussed in the “Terrestrial Associated Species Risk Assessment for Avian Species” (USDA Forest Service 2003). Acute exposures were below the LD/LC_{50} and the NOEL/NOAEL. Individual bald eagles would not be directly affected by herbicide spray since they predominately keep to tree canopies. Nest and/or roost trees would not be directly affected because they would be avoided. The USFWS “Recovery Plan for the Pacific Bald Eagle” (USFWS 1986) would be followed. The plan lists a number of recovery tasks such as surveys, avoidance, Limited Operating Periods, and buffers. The protection measures for osprey would follow the guidelines outlined in the *Migratory Bird Treaty Act*. Direct adverse effects on bald eagles are not expected with full implementation of directions and guidelines contained in the “Recovery Plan for the Pacific Bald Eagle,” the *Migratory Bird Treaty Act*, and the 1988 Forest Plan (*Plumas National Forest Land and Resource Management Plan*).

Indirect Effects. Bald eagles could be indirectly affected if stream courses, water bodies, or fish (the eagle’s primary prey) were directly affected by surface or subsurface runoff, drift, wind erosion, or soil contamination. The acute exposure for a stream contaminated by runoff and/or percolation is

discussed above in the indirect effects section for California red-legged frog and the foothill yellow-legged frog. Acute exposures were below the LD_{50}/LC_{50} for herbicides. The risk assessment completed for fish species concluded that no adverse direct effects and low adverse indirect effects would occur. However, the overall effects analysis for fish species concluded no adverse direct or indirect effects. Waterfowl and small mammals are a secondary food source for bald eagles and could be affected; however, these prey species are primarily winter prey and would not be a ready food source during the months herbicides would be applied. Any potential adverse indirect effects would be avoided.

Cumulative Effects. By adhering to management directions, standards, and guidelines, no direct and indirect effects are expected, and therefore, adverse cumulative effects are not expected to occur.

3.13.5.18 Alternatives B, D, and F: Effects on Bald Eagles from Triclopyr BEE for Noxious Weed Control

Direct, Indirect, and Cumulative Effects. Triclopyr BEE is proposed to control up to 31 acres of noxious weeds. The broom species of noxious weeds would be treated by direct spray. There are no known eagle nesting sites in the project area. Broom plants grow in dense clumps and do not provide nesting or foraging habitat. Because eagle foraging may occur in the project area, protection measures have been developed, including a spill contingency plan and stream buffers following SAT guidelines (appendix F). Direct, indirect, and cumulative effects are not expected. Refer to the effects of triclopyr BEE on California spotted owl below for a complete discussion of possible effects..

3.13.5.19 All Action Alternatives: Effects on California Spotted Owl from DFPZs, Group Selection, and Individual Tree Selection

No project activity (no trees removed) would be conducted within Protected Activity Centers (PACs) and Spotted Owl Habitat Areas (SOHAs), with the exception of three small, light underburns. The Slapjack Project area provides additional nesting and foraging habitat outside the PACs and SOHAs. These areas are considered having old-forest components with larger-diameter trees, snags, and large woody material. California spotted owl studies show they prefer dense canopy cover (70+ percent canopy cover) in conifer forests for nesting, and an average tree size of 24 inches dbh or greater. California spotted owls use a wider range of forest types for foraging. Foraging owls use microhabitats that are characterized by multiple vegetative strata, large tree size classes, high tree basal areas, and woody debris. The action alternatives would reduce suitability of some possible future dispersal nesting habitat and reduce the foraging habitat to the minimum suitability of 40 percent canopy cover. Habitat that meets the need for nesting also provides foraging habitat.

Direct Effects. Direct effects are not expected. The analysis of direct effects on California spotted owl is focused on the PACs and SOHAs that currently exist or were created as a result of surveys. The effect on potentially suitable nesting habitat outside of established PACs was considered under indirect effects based on the assumption that surveys (following regional protocol) would have detected activity centers. Any new activity centers would become part of established PACs, or new PACs would be designated. Regional protocols require two years of surveys (three visits per year); however, due to project delays, the Slapjack Project area had three years of surveys. Direct effects are not expected, or they would be minimal under all action alternatives, as described below.

There are 22,939 acres of Forest Service land in the Slapjack Project area. Of the 22,939 acres, there are 13,317 acres of suitable nesting habitat. Of the 13,317 (3,767 + 2,019 + 7,531) acres, there are 3,767 acres of PACs; 2,019 acres of SOHAs; and 7,531 acres outside of PAC and SOHA habitat suitable for California spotted owl nesting. PACS and SOHAs would not be entered under the Slapjack Project area, except for three small, light underburns. This estimate is based on the most recent vegetation data available for the Slapjack Project. According to the silviculturalist for the Feather River Ranger District, there have been no subsequent vegetation management projects that would have altered stands in the Slapjack Project area since the aerial photos were taken in 2000. Direct effects on spotted owls are not anticipated in PACs or SOHAs because no treatment units fall within these protected areas.

- If spotted owls are detected during future surveys or project-related activities, PACs and Home Range Core Areas (HRCAs) would be delineated, and all treatments would be modified to comply with the standards and guidelines of the HFQLG Act final EIS and Record of Decision.

- Within 0.25 mile of treatment units and light underburn areas, Limited Operating Periods would be implemented for active nests identified during current and future surveys or incidental detections.

- Proposed treatment activities could occur as early as 2006 and may continue for five years beyond the initiation of implementation. Regional protocols require two years of surveys (three visits per year). The protocol requires additional surveys if project activities continue for more than two years after the last survey year. New territories (nests) that were not located using survey protocol could be established during project implementation.

- No new road construction would occur in spotted owl PACs or SOHAs. A Limited Operating Period would be applied for any road reconstruction in PACs.

- A Limited Operating Period would be applied to haul routes within 0.25 mile of an active nest. The Limited Operating Periods are expected to reduce impacts from increased human activity and vehicle and equipment noise. Disturbance would be limited to individual treatment units and would last a few days to two weeks in any location. Impacts from disturbance are not expected to substantially affect habitat use or reproductive capacity of this species.

Indirect Effects. The DFPZs would be constructed along existing roads, ridgetops, or other suitable terrain (HFQLG Act final EIS, page 2-20). DFPZs that are constructed on ridgetops would likely not be nesting or roost habitat preferred by owls. The reduction of wildfire hazard would benefit this species by reducing the threat to individuals and/or preventing habitat loss.

There are 7,886 acres of suitable foraging habitat within the 22,939-acre (National Forest System lands) terrestrial wildlife analysis area, outside of the California spotted owl PACs and SOHAs and suitable nesting sites. The 7,531 acres of suitable nesting habitat outside of PACs and SOHAs are also available for foraging. Of the 15,417 (7,886 + 7,531) acres available for foraging, 6,484 acres are within HRCAs established for PACs. Approximately 2,256 acres, 15 percent of the 15,417 acres

available for foraging, and 10 percent of the 22,939-acre terrestrial wildlife analysis area (National Forest System lands) are proposed for treatment.

California spotted owls and associated species have been shown to select stands with at least 40 percent canopy cover for foraging and at least 60 percent canopy cover for nesting habitat. The action alternatives propose 40 percent canopy cover, which is a minimal requirement for spotted owl foraging habitat. However, because of the removal of understory in the stands, retaining a minimum 40 percent canopy cover may not maintain quality foraging habitat for mature and old-forest-dependent species.

The percent of canopy cover for DFPZ units under all action alternatives would be affected by group selection (canopy covers of 11 to 15 percent) in the DFPZ units. Other than the required retention of trees 30 inches dbh and greater, there are no canopy cover requirements for group selection. The more acres and concentrations of group selection there are per DFPZ unit, the greater the effect on the percent canopy cover. The majority of the reduction would result from the removal of trees that are 0-6 inches dbh for all action alternatives. Between the no-action and action alternatives, there would be a small overall California Wildlife Habitat Relationship (CWHR) size class change for stands; however, any changes would be an increase in size class. The CWHR typing changes are expected in size class and density. In most cases, the size class would stay the same, and in some situations, the size class would go up to the next size class. In most cases the stand density would be reduced. Any effects are expected to be low. The far majority of trees removed by treatments would be between 0-6 inches dbh, and the next size trees removed would be between 6–20 inches dbh. These trees would contribute to a dense lower level canopy (refer to table 3.64, “Comparison of post-treatment canopy cover, by alternative”).

The risk associated with habitat as a result of project implementation would be the reduction in suitable (down to a minimum of 40 percent canopy cover) foraging habitat in the HRCAs associated with the following 13 California spotted owl PACs: YU003, YU004, YU009, YU011, YU012, YU013, YU014, YU016, YU022, YU024, BU019, BU039, and BU078.

- The HRCAs are 700 acres of foraging buffers that surround 300-acre PACs. Some HRCAs maintain less than 700 acres of foraging habitat due to the lack of available suitable habitat, predominately due to the amount of surrounding private lands. In the Slapjack Project area, there are approximately 6,484 acres of HRCAs associated with the 13 PACs. Of the 6,484 acres, 1,621 acres are proposed for treatment (see table 3.67 below). A HRCA is established surrounding each territorial spotted owl PAC detected after 1986. The HRCA size on the Plumas National Forest is 1,000 acres. The HRCA includes the 300-acre PAC, as well as 700 acres of foraging habitat, where available (SNFPA Record of Decision 2004, page 39).

- The SNFPA owl strategy includes the implementation of HFQLG Act as directed on pages 66–69 of the 2004 SNFPA Record of Decision (including table 2 of that document). In accordance with the direction contained in that Record of Decision, the Forest Service only considered spotted owl PACs, SOHAs, Off Base and Deferred Lands, late-successional old-growth size classes 4 and 5, and other HFQLG land allocations in project design and implementation of HFQLG Act vegetation projects. SNFPA standards and guidelines for HRCAs do not apply to the Pilot Project area and vegetation projects

(HFQLG / SNFPA Implementation Consistency Crosswalk - SNFPA final supplemental EIS Direction [June 4, 2001]).

The 1,621 acres are 25 percent of the 6,484 acres of HRCAs in the wildlife analysis area for the Slapjack Project (see table 3-67) that would be treated and 12.8 percent of the habitat available (7,531 nesting and 7,886 foraging) for foraging. The DFPZ units in CWHR size class 4 and 5 stands may still provide some marginal to adequate foraging habitat for spotted owls because the prescription calls for maintaining a minimum of 40 percent canopy cover (Verner et al. 1992), resulting in minimal level of suitability for foraging, at least in the short term. The individual tree selection treatments would retain a 50 percent minimum canopy cover. Also, the 1,621 acres equal approximately 0.4 percent of the Pilot Project area (HFQLG final EIS, page 3-103). In addition, this is expected to be a short-term impact to achieve fuels hazards reductions, improve fire-fighting capabilities, prevent potential stand-replacing fires, and increase stand size classes by reducing tree densities and brush competition. Table 3-67 shows the number of foraging acres associated with each PAC and how many acres are proposed for treatment. The HRCAs (1,000 acres, as identified by the SNFPA) consist of 300 acres of nesting habitat (PACs) and 700 acres for foraging habitat. The PACs cannot be entered except for light underburns, but treatments are allowed within the foraging areas. For example, YU009 has 704 acres of foraging habitat and 144 acres are proposed for treatment; this would affect approximately 20 percent of foraging habitat associated with YU009. The majority of the DFPZs for treatment were designated due to their proximity to private lands and communities.

Table 3-67. Treatments in California spotted owl foraging habitat associated with each PAC.

California Spotted Owl PACs	Foraging Acres	Affected Acres	Number of Treatments in the Foraging Habitat	Acres			
				Harvested (DFPZ, Individual Tree Selection, Group Selection)	Mastication	Underburn	Hand Cut and Pile
BU019	149	28	1	28	0	0	0
BU039	402	209	17	168	24	17	0
BU078	612	122	5	42	9	71	0
YU003	755	287	6	287	0	0	0
YU004	785	64	6	35	29	0	0
YU008	632	1	2	1	1	0	0
YU009	704	144	10	75	69	0	0
YU012	143	124	9	86	27	10	1
YU013	315	97	7	62	28	0	7
YU014	363	40	1	40	0	0	0
YU016	206	39	3	0	39	0	0
YU022	721	126	8	51	36	39	0
YU024	697	340	20	43	1	40	0
Totals	**6,484**	**1,621**	**95**	**918**	**263**	**177**	**8**

Due to the large amount of private land adjacent to the PACs, in some cases, there is not enough Forest Service lands surrounding PACs to provide for 700 aces of foraging habitat for each owl PAC. In addition, some of the Forest Service lands that do surround PACs are not classified as suitable

foraging habitat. Because of the limited habitat available to designate as PACs, some of the PACs are very close together, and suitable foraging acres overlap.

There are approximately 200 miles of roads in the Slapjack Project area. In general, the existing transportation system of roads, landings, and skid trails would be used to access treatment areas and to remove products (see section 3.11 of this EIS for a list of the proposed road improvements/ changes).

The management requirement common to all action alternatives that could affect the spotted owl includes the retention of large trees (30 inches dbh and larger), snags (4 per acre of 15 inches dbh and larger), and down woody material (10–15 tons per acre of the largest diameter). Down woody material is deficit, but the project would meet standards by retaining either existing material or by log recruitments. The current snag density (1.5 per acre) is below the standard 4 per acre. In addition, due to operability and safety concerns, existing snags may be removed. In addition, 487 trees 30 inches dbh or greater would be removed for road and landing construction and reconstruction. The loss of 487 large trees would be in habitat typed as suitable (although not currently occupied by California spotted owl)—this would decrease nesting opportunities. Approximately 661 acres are proposed for prescribed burns, which are designed to retain large pieces of dead and down material and maintain adequate ground cover to reduce erosion. Burns would primarily remove shrubs and trees that are 0–6 inches dbh. The treatments affecting ground-level fuels would modify habitat for prey species. The removal of shrub cover may increase the susceptibility of prey species to predators, such as the spotted owl. Prescribed burns leave a mosaic of burned and unburned areas, so some shrubs would remain to provide cover for prey species using these areas (see the effects of prescribed light burn above). The retention of snags and down woody material would aid in minimizing effects on the spotted owl and their prey species. The prescription for the RHCAs would minimize the loss of canopy cover and remove some of the dense ground cover by allowing fires to back burn into riparian habitat.

Approximately 1,110 acres are proposed for mastication. Hand cut, pile, and burn would occur on approximately 87 acres. Effects are expected to be minimal in the short term, with a long-term gain of reducing fuel loading and opening up very dense stands. This activity would reduce the existing dense understory and increase habitat suitability over time as trees increase in size and some understory returns. The retention of snags and down woody material and avoiding riparian zones would aid in minimizing effects on the spotted owl and their prey species.

For all action alternatives, the majority of group selection units would become CWHR size class 1 (trees are in the seedling stage with a dbh of less than 1 inch) post-treatment. Most of the group selections would be 1.5 to 2 acres in size. The approximate amount of canopy coverage provided in a group by the remaining conifers would be 11–22 percent. This would make the group selection acreage unsuitable for foraging and nesting habitat. However, group selection treatments are not considered to be individual timber stands but are viewed as subcomponents of larger stands. Treatment effects on crown cover and basal area retention are, therefore, averaged over the larger stand (HFQLG final EIS page 2-5).

These small openings in the forest may be marginal for foraging spotted owls due to the isolation from the forest interior (Glenn et al. 2004). Reforestation should shorten the timeframe to develop forested stands as well as accelerate the development of old-forest conditions that owls prefer when

compared to natural succession. The small mammal component of the Plumas and Lassen National Forests Case Study (USFA Forest Service 2003b) would monitor changes in small mammal density/distribution that may occur as a result of project implementation. Edges created by groups in suitable owl habitat may reduce the use of foraging habitat by spotted owls and increase use by great horned owls (an effective competitor of the spotted owl and predator of spotted owl young).

It is currently not known how the prey species preferred by spotted owls (dusky-footed woodrats and northern flying squirrels) would respond to group selection and DFPZ construction. Following treatments, the habitat in most group selection units would be classified as Sierra mixed conifer 1–2 (seedlings and saplings), and as this habitat matures, woodrats may recolonize sooner than flying squirrels because they are known to use earlier successional habitats (Zeiner et al. 1990). A study in northwestern California showed that woodrat density was low until previously cut stands reached the sapling/brushy pole timber stage (15–40 years after timber harvest) (Sakai and Noon 1993). Flying squirrels would likely be absent from the group selection openings (Waters and Zabel 1995). The proposed reforestation would accelerate the process.

The proposed fuel treatments would help achieve desired fire behavior and, in so doing, bring about the changes in fire regime / condition class described in the “Fire and Fuels” section (3.5) of this EIS. The effects of a potential wildfire on wildlife habitat are discussed under the effects of alternative A. Indirect effects are expected to be low.

Cumulative Effects. Since direct effects are not expected and indirect effects would be low, it is expected that there would be low cumulative effects. Additional spotted owl PACs and HRCAs in the project area would be created in the future, if required. The establishment of additional spotted owl PACs and HRCAs, as well as northern goshawk PACs, would conserve habitat for this species. This follows the determinations for the Records of Decision on the HFQLG Act final EIS (1999) and final supplemental EIS (2003), and the 2004 Record of Decision on the SNFPA final supplemental EIS. Cumulative effects on owls would occur from habitat modification as a result of logging, road construction, fire, and mining; habitat modification of prey species from grazing; and disturbances from roads and recreational uses. The loss of California spotted owl dispersal habitat from implementation of treatments could be detrimental to the species. Invasion of California spotted owl habitat by the barred owl may also contribute to cumulative effects.

Ongoing timber operations on private land, in conjunction with the Slapjack Project, could have a negative cumulative impact on the California spotted owl. However, the Slapjack Project proposes construction of DFPZs to reduce hazardous fuels and remove thick underbrush, decommission roads, repair culverts, and enhance riparian areas to protect habitat for the long term. On National Forest System lands, short-term habitat suitability reductions within the project area would be offset by the benefits of fuel treatments that, in the long term, would reduce the potential risk of loss of wildlife habitat to wildfire. Wildfire can add to large-scale habitat fragmentation, which could potentially reduce spotted owl occupancy in the Slapjack Project area.

Wildfires. Since 1948, approximately 4,250 acres of National Forest and 430 acres of private lands have burned as a result of wildfires within the Slapjack Project area.

The 1999 Pendola wildfire burned 1,538 acres of timber and triggered the growth of undesirable underbrush. The Plumas National Forest implemented the Pendola Salvage Project after the fire. The

salvage project harvested 130 acres within 160 acres of high-intensity burn areas. The salvage of 130 acres was predominately on ridgetops, riparian buffers were applied with no harvest, and no new system road construction or reconstructions were proposed. Suitable California spotted owl habitat was not entered. A determination of "may affect but not likely lead to a trend toward listing" was made because disturbance to adults and/or young was possible.

Private. Of the 34,725-acre Slapjack Project area, there are 11,786 acres of private lands. In general, the nature of the private lands is that they are urbanized or managed for industrial timber. These private lands are treated with different objectives than National Forest lands and generally are minimally suitable or not suitable as habitat for mature/older-forest-dependent species like the spotted owl. Urban areas and immediate surrounding are not now or ever expected to provide suitable habitat for the owl.

Most large private landowners in the Sierra Nevada (such as Soper Wheeler Industries) have outlined strategies that provide certain owl protections on their land. The companies implement activities such as conducting surveys for spotted owls before timber harvests, buffering nest centers from disturbances, and/or protecting forest units with nesting spotted owls from harvest altogether. Estimates in documents submitted to California forestry officials indicate that habitat with nest-site characteristics could more than double during the next 100 years as forests mature.

Soper Wheeler Industries, Siller Brothers, and Chy Industries are major private industrial timber landholders in the area. Chy Industries and Siller Brothers implemented salvage projects on private lands after the Pendola fire. The majority of burned acres were clearcut since the private land suffered the highest fire severity. Also, before the fire, creeks within the watershed had already experienced impacts from mining that occurred in earlier years—the mine tailings are evident throughout the area.

For this analysis, activities on private land within the wildlife analysis area were examined in detail. In addition, activities on private land surrounding the analysis area were summarized in order to establish larger trends or patterns in vegetation management. From 1984 to 2005, vegetation management occurred on 14,325 acres within the 66, 247-acre hydrology analysis area (see figure 3-4 in the "Hydrology" section), an area that includes and surrounds the wildlife analysis area. Management included approximately 2,750 acres of clearcuts; 440 acres of sanitation salvage; 645 acres of seed tree removal; 6,060 acres of shelterwood removal; and 1,930 acres of group selection. Because of the intensity of these treatments, this analysis assumes that these acres do not currently provide suitable nesting or foraging habitat for the California spotted owl and are not expected to provide suitable habitat within the timeframe of the analysis.

Other vegetation management included commercial thinning and selection harvest. It is possible that the 405 acres treated by commercial thinning and 950 acres of selection are suitable for foraging. However, the dominant size class of the stands before and after harvest is unknown. It is expected that the larger trees were removed, reducing the size class of the stands.

Future treatments on private land are proposed for approximately 4,000 acres of land. Future treatments include 9,100 acres of seed tree removal; 210 acres of sanitation salvage; 1,600 acres of clearcuts; and 1,735 acres of shelterwood removal. These treated acres are not expected to provide suitable foraging or nesting owl habitat. In addition, 305 acres of selection (including commercial

thin) are proposed, which are not expected to provide suitable nesting habitat, but it is possible they may provide foraging habitat.

HFQLG Projects. The project may affect individual California spotted owls and change the distribution of spotted owl habitat because it is part of the larger HFQLG Pilot Project. The projections for the HFQLG Pilot Project area indicate that 123,500 acres of stands with more than 50 percent canopy cover could be reduced to 40 percent canopy cover during the Pilot Project period. Over the longer term (see table 4.3.2.3g of the SNFPA final EIS), there would be a cumulative growth over current conditions of suitable nesting and foraging habitat for the California spotted owl outside of treatment areas, both inside and outside of the HFQLG Pilot Project Area.

The other proposed HFQLG Pilot Projects, which are not adjacent to the Slapjack Project but that may alter suitable nesting and foraging habitat, are listed below. All of these projects had "may effect but not likely lead to a trend toward listing" for the California spotted owl. These projects would not enter California spotted owl PACs or SOHAs, and foraging habitat would be maintained at minimal suitability levels. The Forest Service Region 5 Protocol for surveys would be followed.

- *Basin Project* – would modify 943 acres of suitable nesting habitat and 247 acres of suitable foraging habitat. Of these 1,190 acres, 405 are HRCA habitat. Implementation of this project is scheduled to begin in 2006.

- *Bald Mountain Project* – would modify 55 acres of suitable nesting habitat and 136 acres of suitable foraging habitat. Of these 191 acres, 39 are HRCA. Implementation of this project is scheduled to begin in 2006.

- *Bald Onion Project* – would not modify any acres of suitable nesting habitat or foraging habitat and no HRCA habitat. Implementation of this project is scheduled to begin in 2006.

- *Watdog Project* – would modify 2,031 acres of potentially suitable spotted owl nesting habitat and approximately 4,613 acres of potentially suitable spotted owl foraging habitat. All or portions of 15 PACs (2,812 acres) are in the Watdog Project analysis area. There are 5,794 acres of HRCAs in the analysis area that are associated with these 15 PACs. Portions of four SOHAs take up 763 acres of the analysis area. All proposed treatment units are outside of PACs and SOHAs. Implementation of this project is scheduled to begin in 2006.

The only HFQLG Pilot Projects directly adjacent to the Slapjack Project are Lower Slate and South Fork Projects. These two projects have already been implemented—they would not reduce suitability of nesting or foraging habitat and, thus, HRCA habitat suitability would not be reduced. Another project that is close to the Slapjack Project, but not adjacent, is the Watdog Project, which proposes several alternatives. The alternatives propose a reduction of suitable foraging habitat that varies between 110 and 680 acres, depending on the Record of Decision. The potential reduction in suitable nesting habitat would be between 56 and 127 acres. In addition, a salvage project is being implemented in the Feather Falls area that proposes to salvage up to 14,314 acres of dead, dying, or diseased trees. It is unclear what effects on wildlife and fish species may occur from this project, but some level of effects are likely. The Pike County Lookout Project included approximately 55 acres of

reduced hazardous fuels, predominately mastication. However, proposed treatments for the Slapjack Project are expected to result in low incremental impact when added to actions on the private land.

SNFPA Final Supplemental EIS. The cumulative effects of HFQLG Pilot Project actions, such as the proposed action for the Slapjack Project, and other vegetation management actions in the Sierra Nevada were assessed in the SNFPA final supplemental EIS, to which this Slapjack Project EIS is tiered. The habitat modeling used for the SNFPA assessment was intended to indicate the direction, magnitude, and timeframes (general trends) of change and was not intended to provide precise information. The SNFPA final supplemental EIS (pages 260-280) acknowledged that suitable foraging habitat provided by CWHR size class 4 stands would diminish in early decades under the SNFPA but would be offset by increases in acreage of CWHR size class 5 and 6 stands. According to projections (SNFPA final supplemental EIS table 4.3.2.3g), the total spotted owl habitat in the HFQLG Act planning area would increase 11 percent 20 years after implementation of the SNFPA. By year 50, the net gain would have dropped to 6 percent, and by year 130, a net reduction of 7 percent would occur in the Pilot Project area. In the Sierra Nevada bioregion as a whole, however, total habitat would increase 13 percent by year 20, 18 percent by year 50, and 20 percent by year 130. Within the HFQLG Act planning area, full implementation of HFQLG Pilot Projects under the 2004 Record of Decision on the SNFPA final supplemental EIS is projected to result in roughly 65,000 fewer acres of suitable habitat in year 20 than under the 2001 Record of Decision on the SNFPA final EIS (alternative S1 in the 2004 SNFPA final supplemental EIS). This would primarily be due to (1) implementation of group selection harvest, and (2) the fact that standards and guidelines for CWHR size classes 4M and 4D do not have any minimum canopy cover requirements and have a 30 percent basal area retention standard. Also, under the 2004 Record of Decision, the canopy cover in CWHR size class 5M, 5D, and 6 stands is more likely to drop to 40 percent in DFPZs. (SNFPA final supplemental EIS, chapter 4, page 269). Because the spotted owl population is currently within the 95 percent confidence limits of a stable population (Franklin et al. 2003, as cited in the 2004 SNFPA final supplemental EIS), the SNFPA final supplemental EIS and BA/BE concluded that these cumulative habitat changes (within the range of the California spotted owl within both the Sierra Nevada and the HFQLG planning area) would not result in a trend toward listing or loss of viability of the California spotted owl.

Forest Inventory and Analysis data collected from the project area were run through the Forest Vegetation Simulator growth and yield model, and it appears as if tree growth and subsequent habitat recovery would follow the trends projected in the SNFPA final supplemental EIS. Modeling indicates that all action alternatives that implement fuels treatments in the Slapjack Project would provide suitable owl habitat over time (year 20 through 50). Individual groups are projected to be CWHR size class 3M by year 50, with structurally suitable habitat occurring beyond year 50, with some stands approaching CWHR size classes 4 and 5 as a result of retaining the large trees.

Response to Petition to List the California Spotted Owl. On May 23, 2006, the U.S. Fish and Wildlife Service (USFWS) issued a news release that stated, “Listing of California Spotted Owl Found Not Warranted - Service Finds Most Owl Populations Stable or Increasing in the Sierra Nevada” *(*also see *Federal Register*, May 24, 2006 (Volume 71, Number 100). The USFWS has concluded that most owl populations in the Sierra Nevada are stable or increasing and is denying a petition to list the California spotted owl under the *Endangered Species Act*.

In responding to a second petition to list the species in three years, the USFWS conducted a comprehensive study of the California spotted owl populations. It assessed the best scientific and commercial information available, reviewed comments and information received during two public comment periods, and consulted with recognized spotted owl experts and federal and state resource agencies, including an interagency Science Team. The agency has concluded that the California spotted owl should not be listed as a Threatened or Endangered species under the *Endangered Species Act*.

The following are among the USFWS's conclusions:

- The best available data indicate most California spotted owl populations in the Sierra Nevada are stable or increasing, and adult survival rates show an increasing trend.
- The San Bernardino population in southern California does show a statistically non-significant decline. But in light of the health of all California spotted owl populations, this decline does not warrant a listing of the California spotted owl.
- Forest fuels reduction activities, notably those provided for in the Sierra Nevada Forest Plan Amendment [SNFPA] of 2004, may have a short-term impact on owl populations. But fuels reduction will have a long-term benefit to California spotted owls by reducing the risk of catastrophic wildfires that pose a major threat to California spotted owl habitat.
- Barred owls, which have had an adverse impact on northern spotted owls in Washington and Oregon, have not been detected in the mountains of southern California and have moved into the Sierra Nevada at much slower rates than they did in other parts of western North America.

Large-scale changes in owl habitat as a result of past wildfires and anticipated future fires in spotted owl habitat have been identified as a potential threat that could affect spotted owl distribution (*Federal Register*, Volume 70, June 2005 and Volume 71, April 2006). An annual average of four and one-half PACs have been lost or severely modified by wildfire since 1998 in the range of the California spotted owl (SNFPA final supplemental EIS chapter 3, page 145). Table 3.2.2.3b in the SNFPA final supplemental EIS indicates that approximately seven PACs on the Plumas National Forest are considered to be lost due to fire effects. None of these PACs have been removed from the Plumas National Forest designated PAC network, and none of these PACs were in the Slapjack Project area. Spotted owls may have relocated in habitat outside of the fire perimeter, which could have resulted in increased crowding and competition with established owls, resulting in lower owl numbers and occupancy in the general area. None of these large-scale fires have occurred in the Slapjack Project area during the last 10 years, although the project area has had several large-scale fires in the past that probably displaced spotted owl.

Demographics / Meta-analysis. California spotted owl surveys conducted for the Slapjack Project were not designed to be a "demographic study" but were to determine the location of activity centers (such as nests, pairs, young) and reproductive success for the three years surveyed. Demographic studies, which are currently being conducted for the California spotted owl in the Sierra Nevada, are looking at demographic parameters that include age-specific nesting and nest success

rates, age-specific fecundity (reproductive ability), age- and sex-specific survival rates, the finite rate of population change, and sex and age class structure of the population.

The meta-analysis addressed in the "Notice of 12-month Petition Finding" in the *Federal Register*, May 24, 2006 (Volume 71, Number 100, pages 13–16) states, "Our analysis of more recent data up through 2005 (Blakesley et al. 2006) indicates more positive trends for spotted owls in the Sierras and is discussed at length below."

The draft 2006 meta-analysis ("Demography of the California Spotted Owl in the Sierra Nevada: Report to the U.S. Fish and Wildlife Service on the January 2006 Meta-Analysis") has been reviewed by the Pumas National Forest. The 2006 meta-analysis was similar to the 2001 meta-analysis (Franklin et al. [2004] but included five years of additional data [2001–2005]), excluded the San Bernardino study, and included a population viability analysis.

This 2006 meta-analysis indicates the following:

1. Demographic studies show lambda (rate of population change) was either relatively stationary for the Lassen and Sierra studies (lambda below 1), or increasing on the Eldorado National Forest and Sequoia-Kings Canyon Studies (lambda above 1).

2. Only the Lassen population decreased significantly based on the 95 percent confidence interval with steady decreases from 1995–1998 and 2002–2004, suggesting the Lassen owl population may be declining.

3. The population viability analysis (PVA) indicated two of the four study areas (Lassen and Sierra) are likely to experience population declines within 7 years and very unlikely to experience population increases under current population trends, but there was great uncertainty in the PVA analyses for time intervals of greater than 10 years.

4. There is a positive trend in adult survival in all studies and estimates of apparent survival increased with time.

5. Spotted owl management needs to maintain a high survival rate of territorial owls in order to maintain spotted owl populations, but that management directed at increasing reproductive output and subsequent recruitment may be the most successful way to maintain or increase spotted owl populations in the Sierra Nevada, as long as these actions do not decrease adult survival. Population growth rate (lambda) can be viewed as the sum of apparent survival probability and the per capita recruitment rate. The study indicates high adult survival and that the majority of immigrating owls onto the study areas considered in the meta-analysis "were likely natal dispersers rather than breeding dispersers."

So, these lambda figures are good for the populations being studied. Applying such information to other owl populations in a general context is appropriate, but it cannot be said that the Plumas National Forest owl population is similar to the populations on the Lassen or Eldorado National Forests.

The 2006 meta-analysis concludes that the potential consequences to spotted owls from the Forest Service management plan are unknown because (1) the extent of vegetation manipulations is largely under the control of local managers and will likely vary across the Sierra Nevada; and (2) threshold levels of quality habitat necessary to maintain individual pairs of spotted owls on a site are largely unknown. The recommendations from the meta-analysis are to develop well-designed experimental studies coupled with the spotted owl demographic studies. The Plumas-Lassen Administrative Study is mentioned as quasi-experimental, thus limiting the scope of the results of the studies.

Barred Owl. The documented range expansion of the barred owl has been hypothesized as a contributing factor in the decline in the population of northern spotted owls. This may occur through both hybridization as well as displacement of the northern spotted owl in some areas. Evidence supporting this hypothesis comes from a study published by Pearson and Livezey (2003) who found that (1) northern spotted owls are more likely to abandon a site if barred owls take up residence close to that site; (2) a combination of habitat lost due to timber harvest and the presence of barred owls may work together to put northern spotted owl pairs at risk of losing their territories; (3) there is evidence that barred owls sometimes kill northern spotted owls; and (4) barred owls can cause a reduction in the northern spotted owl populations by physically excluding them from historic sites and making those sites unavailable for recolonization. Some researchers believe that this range expansion and subsequent northern spotted owl displacement may be a result of forest fragmentation and the barred owls' ability to adapt better to a mosaic of habitats; however, other researchers disagree (Dark et al. 1998; Kelly et al. 2003).

Barred owls readily respond to spotted owl calls (Pearson and Livezey 2003). Barred owls have been seen numerous times between 1991 and 1997 on the Downieville Ranger District of the Tahoe National Forest, with a suspected sparred owl hybrid produced in 1991. In 2002 at the Hat Creek Ranger District of the Lassen National Forest, two observations were recorded of either sparred owls or spotted/barred pairs. On the Feather River Ranger District of the Plumas National Forest, four observations of barred owls occurred in 1992. Barred owls were seen and heard in 2000 in the vicinity of Pats Gulch and Mountain Boy Mine, and individual barred owls were documented in 2001 in Wisconsin Ravine, at Dixon Creek, and near Grass Flat. In 2002 and 2003, there were two sightings each year on the Feather River Ranger District. In 2004, a male barred owl was located in the Glazer Ridge area. In 1992, a barred owl was detected in the Slapjack Project analysis area, and they have been observed within the Lower Slate Project boundary. Outside the Feather River Ranger District, only one sighting of a barred owl has occurred on the Plumas National Forest. A female barred owl was located in 2002 and moused in Treatment Unit 3 near Long Valley, on the Mt. Hough Ranger District. Barred owls were not detected during spotted owl calling efforts during the surveys for the Slapjack Project.

The potential for the barred owl to become established and compete with California spotted owls in the Slapjack Project area is a possible additional cumulative effect, but at this point, it is unknown as to what the extent of this effect would be.

West Nile Virus. The petition to list the California spotted owl identified West Nile Virus as a serious potential threat to owls and that its effects on owls be monitored (*Federal Register*, Volume 70, June 21, 2005). West Nile Virus has not yet been detected in a wild spotted owl (ibid.). Researchers tested for the virus (Eldorado National Forest study area, northern spotted owls in the

Willow Creek Study area) in 2004, and in 2005, blood samples were taken from spotted owls in the Plumas and Lassen National Forests. None of these owls tested positive for West Nile Virus exposure (ibid.; J. Keane, personal communication, 2005). The USFWS found there was no substantial information that the virus may threaten the continued existence of spotted owl (*Federal Register*, Volume 70, June 2005; and Volume 71, April 2006).

3.13.5.20 Alternatives B, E, and F: Effects on the California Spotted Owl from Imazapyr for DFPZ Maintenance

The application of imazapyr would have a low risk of adverse effects on the spotted owls, great gray owl, northern goshawk, and other raptors. This is based on the herbicide hazard analysis and risk assessment, coupled with the appropriate application procedures, Best Management Practices (BMPs), and appropriate mitigation measures.

Direct Effects. These raptors could be directly sprayed during herbicide application, if the species were in the area targeted for treatment. However, information provided above shows that avian surrogates with direct herbicide application did not experience doses above the LD/LC_{50} and did not experience doses above the NOEL/NOAEL. It is likely these raptor species would not remain in an immediate area that is experiencing disturbance or that individual northern or California spotted owl, northern goshawk, or great gray owl would predominately keep to tree canopies associated with large and/or older trees. If individuals are on the ground (hacking post or bathing) or in lower canopy, it is expected that due to the disturbance from the activities, they would fly to the mid to upper canopies or leave the immediate vicinity; therefore, the direct spray scenarios discussed above are highly unlikely to occur.

Spotted owl nest and/or roost trees would not be directly affected since existing or any newly established Habitat Conservation Areas (northern spotted owl) and PACs (California spotted owl) would not be entered for DFPZ construction and would also not be entered for maintenance. In addition, during the site-specific maintenance activities, there would be a minimum 500-foot buffer around all spotted owl and northern goshawk nest sites (SNFPA Record of Decision). Surveys would be conducted prior to any treatment activities to make sure these species would not be adversely exposed to herbicide treatment. Other protection measures, such as expanded buffer widths or herbicide selection, would be determined at the site-specific project level. Given these conditions, direct adverse effects are not expected.

Indirect Effects. Indirect effects on these species would include the acute doses as a result of herbicide and surfactant application as discussed in the “Herbicide Hazard Analysis” section above. Indirect effects on owls, goshawks, or great gray owls could be from surface or subsurface run-off, drift, wind erosion, or soil contamination that could affect stream courses or water bodies. Spotted owls and northern goshawks are highly associated with watercourses—predominately for thermal regulation during summer months and for bathing.

Indirect effects could also include prey species that could be contaminated as a result of herbicide application. The acute doses by consumption of contaminated small mammals by these raptors are discussed above in the “Herbicide Hazard Analysis” section. All doses are below the LD/LC_{50}. For surfactants and herbicides, the doses are below the NOEL/NOAEL for the spotted owls and northern goshawk. There may be a possibility that prey species remaining in the area could receive doses;

however, doses are based on 100 percent exposure and absorption, which is unlikely for each or all prey species. Also, raptors have large foraging areas, and it is unlikely that they would repeatedly consume contaminated prey from the same site. In addition, great gray owls forage predominately from meadows, which would not be targeted for herbicide application. Any activities in California spotted owl, northern goshawk, and great gray owl PACs are required to follow SNPFA standards and guidelines, and site-specific mitigations (such as Limited Operating Periods, no treatment zones, and herbicide selection) could be applied. In addition, using protection measures, such as stream buffers, adverse indirect affects are not expected.

Cumulative Effects. By adhering to management directions, standards and guidelines, BMPs, and mitigations, direct and indirect adverse effects are not expected; therefore, cumulative adverse effects are not expected to occur.

3.13.5.21 Alternatives B, D, and F: Effects on the California Spotted Owl from Triclopyr BEE for Noxious Weed Control

Based on the herbicide hazard analysis and risk assessment, coupled with the appropriate application procedures, BMPs, and appropriate mitigation measures, the application of triclopyr BEE should have a low risk of adverse effects on the spotted owls, great gray owl, northern goshawk, and other raptors.

Direct, Indirect, and Cumulative Effects. Triclopyr BEE is proposed to control 31 acres of noxious weeds (several species of broom), including riparian areas in units 29 and 77. The acres proposed for treatment are not in any known PACs. Broom plants are in dense clumps and provide neither nesting nor foraging habitat. Broom plants would be treated by direct spray, and the expected herbicide drift is 50 feet. Protection measures that have been developed include a spill contingency plan and stream buffers following SAT guidelines (see appendix F). Direct, indirect, or cumulative effects are not expected.

3.13.5.22 All Action Alternatives: Effects on Northern Goshawk from DFPZs, Group Selection, and Individual Tree Selection

Direct Effects. There would be no direct effects. The SNFPA Record of Decision includes additional direction for project activities proposed under the HFQLG Pilot (and nonpilot) Project—that direction states, “Apply the standards and guidelines in this appendix for management of goshawk PACs.” Currently, there are no activity centers and therefore no established northern goshawk PACs in the Slapjack Project area. The lack of detections is possibly due to such factors as low productivity years and a dense understory. Of the total 22,939 acres of Forest Service lands in the Slapjack Project area, approximately 8,502 acres are classified as suitable nesting habitat, and approximately 11,753 acres are classified as suitable foraging habitat for the northern goshawk. This estimate is based on the most recent vegetation data available for the Slapjack Project. Although, canopy cover would be reduced, it would not be completely removed (“lost”) but would be retained at a minimum of 40 percent for DFPZs and group selections and 50 percent for individual tree selection.

If new northern goshawk PACs (such as nests or young) are detected in future surveys or project activities, PACs would be delineated, and applicable resource protection measures, such as Limited Operating Periods, would be applied. Without additional surveys, there is the potential that goshawks

would establish new territories (activity centers) after the initial surveys were complete, and those centers would not be protected.

DFPZ construction would decrease the probability that a catastrophic wildfire would destroy potential or existing habitat. There is suitable northern goshawk habitat in the project area but no PACs; therefore, direct effects are not expected.

Indirect Effects. Indirect effects are expected to be low. In addition, habitat suitability for the northern goshawk should improve as a result of project activities. DFPZ construction in an area, and how broad and broken up they are, may increase the amount of horizontal diversity, which could have a beneficial indirect effect on the goshawk by increasing its prey base or decreasing the probability that a catastrophic wildfire would destroy potential or existing habitat. The underburn proposed in California spotted owl PACs and SOHAs would help achieve the horizontal diversity. Considering there is suitable nesting and foraging habitat for the goshawk in the Slapjack Project area, there may be a potential for occupied territories that were not detected by surveys. The effects on potentially suitable nesting habitat were considered under indirect effects based on the assumption that surveys, following protocol, would have detected any territories. Any detection would have been reported, and a new PAC would have been designated.

Of the 22,939 acres of Forest Service lands in the Slapjack Project area, approximately 8,502 acres are classified as suitable nesting habitat, and approximately 11,753 acres are classified as suitable foraging habitat for the northern goshawk. Approximately 2,877 acres are proposed for treatment, 19 percent of the 15,417 acres available for foraging, and 12 percent of the 22,939-acre terrestrial wildlife analysis area (National Forest System lands). Although canopy cover would be reduced by these treatments, it would not be completely removed. Canopy cover would be retained at a minimum of 40 percent on DFPZs and 50 percent for individual tree selection.

Although there are no known northern goshawk activity centers within the Slapjack Project area and therefore no designated PACs, the action alternatives would decrease goshawk habitat suitability and, potentially, goshawk use of the treated areas. However, for the long term, the proposed action would reduce the potential for large and intense wildfires, which could result in habitat loss.

Since there are currently no goshawk PACs in the Slapjack Project area, but there is suitable habitat, any indirect effects are expected to be low. Project treatments are expected to increase the suitability of habitat and help protect habitat from a stand-replacing wildfire for the goshawk.

Cumulative Effects. Refer to the cumulative effects discussion above for California spotted owl. Although surveys detected no goshawks in the Slapjack Project area, cumulative effects for the species were considered based on available habitat and possible future recruitment. Incremental loss of the quantity and/or quality of habitat could reduce habitat for recruitment. There would be reduced suitable habitat in the short term, but there could be higher quality habitat in the long term as a result of removing understory density and thus increasing tree size. Increases in urbanization, increase in recreational use of Forest Service lands, and the use of natural resources on state, private, and federal lands may contribute to habitat loss for this species. By adhering to management directions, standards and guidelines, BMPs, and mitigations, no adverse direct effects are expected, and indirect effects are expected to be low. Cumulative adverse effects would likely be minimal. The proposed Slapjack Project treatments would be expected to increase suitable habitat for nesting and foraging, and this

would have a long-term beneficial effect on the goshawk. Refer to the California spotted owl discussion above for the summary of past and future treatments on private lands. It is expected that the selection and commercial thin treatments may provide some level of suitable foraging, and possibly nesting, habitat for the northern goshawk.

3.13.5.23 Alternatives B, E, and F: Effects on Northern Goshawk from Imazapyr for DFPZ Maintenance

Direct, Indirect, and Cumulative Effects. See the discussion above for the California spotted owl. There are no established northern goshawk PACs in the project area. Direct, indirect, and cumulative effects are not expected with adherence to management directions, standards and guidelines, BMPs, and mitigations.

3.13.5.24 Alternatives B, D, and F: Effects on Northern Goshawk from Triclopyr BEE for Noxious Weed Control

Direct, Indirect, and Cumulative Effects. See the discussion above for the California spotted owl. There are no established northern goshawk PACs in the project area. Direct, indirect, and cumulative effects are not expected with adherence to management directions, standards and guidelines, BMPs, and mitigations.

3.13.5.25 All Action Alternatives: Effects on the Great Gray Owl from DFPZ, Group Selection, and Individual Tree Selection

Direct Effects. There are no activity centers and therefore no established great gray owl PACs (territories) in the Slapjack Project area. Potentially suitable habitat for the owl was surveyed, and no new nests or individuals were detected. Potential direct effects on the great gray owl may result from the modification or loss of habitat by group selection openings or habitat components through thinning (due to reduction of canopy cover and availability of future nest trees). Meadows that provide potential habitat are either not within the proposed treatment units or are in wet meadows within a treatment polygon that would have an RHCA buffer applied. If nests are discovered, protection measures would be applied. Those measures would include Limited Operating Periods within 600-feet of occupied wet meadow habitats and restricting harvest activity within 0.5 mile of nest sites. The protection measures would reduce or completely eliminate direct impacts on this species from the proposed action.

Indirect Effects. The lack of detections during surveys does not mean species absence. Group selection openings may provide additional suitable foraging habitat. Project activities are not expected to result in indirect effects on known great gray owls, and they may improve habitat conditions in certain situations. No indirect effects are expected to occur.

Cumulative Effects. Cumulative effects on the great gray owl could occur with the incremental loss of the quantity and/or quality of habitat for this species. Overall, increases in urbanization, recreational use of National Forest System lands, and use of natural resources on private and federal lands may contribute to habitat loss for this species. Based on the direct and indirect effects discussion above, the proposed project is not expected to add any other cumulative effects on great

gray owls in the Slapjack Project area or the Plumas National Forest, and may improve habitat conditions in the project area in certain situations.

By adhering to management directions, standards and guidelines, BMPs, and mitigations, no direct and indirect adverse effects are expected; hence, cumulative adverse effects are not expected to occur.

3.13.5.26 Alternatives B, E, and F: Effects on Great Gray Owl from Imazapyr for DFPZ Maintenance

Direct, Indirect, and Cumulative Effects. See the discussion above for the California spotted owl. There are no established great gray owl PACs in the project area. Direct, indirect, and cumulative effects are not expected with adherence to management directions, standards and guidelines, BMPs, and mitigations.

3.13.5.27 Alternatives B, D, and F: Effects on Great Gray Owl from Triclopyr BEE for Noxious Weed Control

Direct, Indirect, and Cumulative Effects. See the discussion above for the California spotted owl. There are no established great gray owl PACs in the project area. Direct, indirect, and cumulative effects are not expected with adherence to management directions, standards and guidelines, BMPs, and mitigations.

3.13.5.28 All Action Alternatives: Effects on Little Willow Flycatcher from DFPZ, Group Selection, and Individual Tree Selection

The 1988 Forest Plan (*Plumas National Forest Land and Resource Management Plan*) does not provide specific management guidelines for this species, but it does instruct the Forest Service to maintain viability of state-listed species. At a minimum, the Forest Service is directed to provide habitat sufficient to maintain existing populations. General Forest Plan guidelines direct the forest to improve habitat capability for hardwood-, riparian-, and meadow-associated species.

Direct Effects. No direct effects are expected. Wet meadows with willow shrubs appear to be the most common habitat for willow flycatchers, but riparian deciduous shrubs along streams are also used. These habitats are not targeted for treatment except in cases where treatment of noxious weeds could be proposed. There is a small amount of minimally to marginally suitable habitat in the project area RHCAs, and the lack of little willow flycatcher detections during surveys does not mean species absence. There is a small possibility that nesting pairs not detected in surveys (or that have moved to the site after surveys) may be impacted during prescribed fire activities, but occupancy of the habitat by this species would be in the summer, and most prescribed burning would occur in autumn. If nesting little willow flycatchers are found at a later date, appropriate management requirements, such as a Limited Operating Period, would be applied before implementation of treatments to reduce or completely eliminate impacts on the little willow flycatcher from the proposed action.

Indirect Effects. Based on the below information, no indirect effects are expected. Treatments would not take place near any little willow flycatcher territories, so treatment-related activities would not disturb any known little willow flycatchers. Construction of DFPZs and group selection timber

harvest in the uplands could potentially change the hydrologic regime in an area. Any activities that would alter the flows and reduce the availability of surface water on meadows in June, could result in a reduction in suitable willow flycatcher habitat (refer to HFQLG Act BA/BE for more discussion). However, with the implementation of Scientific Analysis Team guidelines, RHCA buffers, and BMPs, it is anticipated that there would be no disruption in surface and subsurface flows (see the "Hydrology Report").

In general throughout the project area, prescribed burning may impact some isolated willows. Although willows have been known to respond vigorously after fire (Stein et al. 1992), the closely related and federally endangered southern willow flycatcher is known to respond poorly in early-successional post-fire conditions (Finch and Stoleson 2000). However, fire would not be directly ignited in the required 300-foot RHCA buffer but would be allowed to back in. Low-intensity fire is not expected to cause any long-term reductions in little willow flycatcher habitat.

Scientific Analysis Team guidelines, including the creation of RHCA buffers, would serve to protect breeding little willow flycatchers from noise disturbances from road construction and reconstruction, machinery, hauling, and other project-related activities. There may be a short-term indirect effect as a result of some pile burning in groups adjacent to meadow/willow habitat, which may send smoke into some riparian deciduous shrub habitat. However, pile burning is planned for late fall or winter during the nonbreeding period. Regeneration of aspen stands, which are associated with willow habitat, may provide additional foraging and possibly nesting habitat in the long term, as well as expand protection buffers. Little willow flycatchers are associated with willows in conjunction with standing water. Removal of conifers can increase the surface water, thereby enhancing existing willow habitat.

Cumulative Effects. By adhering to management directions, standards and guidelines, BMPs, and mitigations, no direct and indirect adverse effects are expected; as a result, cumulative adverse effects are also not expected to occur. DFPZs and group selection would not occur in suitable little willow flycatcher habitat. Overall, increases in urbanization and recreational use of National Forest System lands and use of natural resources on private and federal lands may contribute to habitat loss for this species. In the Slapjack Project area, riparian areas would be enhanced by proposed restoration projects, such as decommissioning the road at New Hampshire Creek, to reduce impacts on wetlands and support protection measures for the species found there.

3.13.5.29 Alternatives B, E, and F: Effects on Little Willow Flycatcher from Imazapyr for DFPZ

Refer to California spotted owl and western pond turtle sections for a discussion of herbicide effects.

Direct Effects. Direct adverse effects on the little willow flycatcher are not expected. Individual little willow flycatchers would not be directly affected by herbicide application since willows, the primary habitat used for breeding and foraging by this species, would not be a target species. Surveys would be conducted prior to any management activities and would follow the direction and guidelines contained in the 1988 Forest Plan, as amended by HFQLG Act final EIS and SNFPA final EIS. The SNFPA Conservation Strategy for the little willow flycatcher would be followed—the strategy lists a number of protection measures such as surveys, avoidance, and buffers.

Indirect Effects. Herbicide applications for DFPZ maintenance would be limited to areas outside of riparian areas used by the willow flycatcher. Alternative B, E, or F could have indirect effects on little willow flycatcher and/or their habitats from surface or subsurface run-off, drift, wind erosion, or soil contamination, which could affect stream-side riparian habitat. Also, invertebrates, a primary food source, could be impacted if they are sprayed. A review of exposure rates to surrogate aquatic invertebrates resulted in potential adverse doses from the use of triclopyr BEE. The acute exposure by avian species eating contaminated insects is discussed in "Terrestrial Associated Species Risk Assessment, Avian."

Cumulative Effects. Because there would be no direct or indirect effects, as discussed above, the proposed project would not result in cumulative effects on the little willow flycatcher in the Slapjack Project area or the Plumas National Forest. With full implementation of all protection measures, such as stream buffers following SAT guidelines and by following BMPs, there is no indication that the little willow flycatcher or its prey species would be exposed to adverse levels of herbicides under the conditions of use specified. Indirect adverse effects of herbicides and/or surfactants are not expected to occur.

3.13.5.30 Alternatives B, D, and F: Effects on Little Willow Flycatcher from Triclopyr BEE for Noxious Weed Control

Direct, Indirect, and Cumulative Effects. No direct, indirect, or cumulative effects are expected. Refer to the imazapyr discussion above and the effects discussion for the California spotted owl and western pond turtle. Triclopyr BEE is proposed to control 31 acres of noxious weeds (several species of broom), including limited use in riparian areas in units 29 and 77. However, the project area does not have any known willow flycatcher breeding habitat. Broom plants are in dense clumps and provide neither nesting nor foraging habitat. Broom plants would be treated by direct spray; the expected herbicide drift is 50 feet. A 50-foot no-spray buffer would be applied along the perennial streamcourse in unit 77. In unit 29, a Limited Operating Period would be imposed to restrict spraying to the driest time of year (August and September) when these streams are not flowing. Spraying would not occur if precipitation is forecasted.

With full implementation of all protection measures (such as BMPs and stream buffers following SAT guidelines), there is no indication that the little willow flycatcher or its prey species would be exposed to adverse levels of herbicides under the conditions of use specified.

3.13.5.31 All Action Alternatives: Effects on the Pacific Fisher from DFPZs, Group Selection, and Individual Tree Selection

The existing habitat in the Slapjack Project area could be favorable for the forest carnivores (such as fisher) because of their avoidance to open areas—they prefer moderate to dense canopy cover. The project could eliminate possible future dispersal nesting habitat and bring the foraging habitat down to a minimal 40 percent standard. American martin or Pacific fisher have not been detected during surveys in the Slapjack Project area, and this could be because private lands bordering the project have been either heavily harvested or at least thinned, thereby removing the old growth component and leaving vast areas of open fragmented lands.

Direct Effects. Direct effects are not expected. The SNFPA final supplemental EIS provides direction for managing fisher den sites. The Slapjack Project area does not have any known den sites. The Plumas National Forest has mapped a draft forest carnivore network (DFCN) across the Plumas National Forest that consists of scattered known sightings, large habitat management areas, and wide dispersal or connecting corridors. Martin and fisher habitat type overlap, although marten prefer higher elevational forests, particularly the red fir forest type (Zielinski et al. 1995). There are 1,979 acres of the DFCN in the Slapjack Project area; however, none of the 1,979 acres are proposed for treatment. The network is comprised of four components: (1) the riparian zone, (2) old-forest habitat, (3) connectors, and (4) known sightings. None of those acres are proposed for DFPZ treatment, group selection, or individual tree selection; hence, there would be no overlap between the Slapjack Project treatment units and the DFCN. The network would eventually provide a continuously connected system of habitats focused on the needs of the American marten and Pacific fisher. This corridor is designed to provide a habitat connectivity corridor linking the Tahoe National Forest with the Lassen National Forest. Much of the DFCN lies in areas reserved from harvest for other reasons such as California spotted owl and northern goshawk PACs or designated wilderness. Because of this, there is concern for the protection of corridors between these reserves that allow immigration and emigration to maintain healthy populations.

To the north of the Slapjack Project area, the DFCN includes a riparian or movement corridor along the Middle Fork Feather River. To the east and northeast of the project area, the DFCN includes mature/old-forest blocks and a corridor along the South Fork Feather River. As mentioned above, there would be no overlap between the proposed Slapjack Project treatment units and the DFCN.

The potential direct effects on forest carnivores from vegetation management activities consist of modification or loss of habitat or habitat components, especially with regard to denning/resting habitat and foraging/travel habitat. Direct effects would also include behavioral disturbance to denning from logging, road building, or other associated activities. There are no known forest carnivore den sites in the project area, but there is suitable habitat in the project area, and the lack of detections does not mean species absence. If a den site is found in the future, the site would be protected, and a Limited Operating Period would be implemented within 0.5 mile of the den site (USDA Forest Service 1999, 2001).

Indirect Effects. Although forest carnivores may be affected, indirect effects are expected to be low. Project treatments are expected to improve habitat conditions in the long term. The 2004 Record of Decision on the SNFPA final supplemental EIS states that a higher than average canopy closure is a habitat attribute important to the fisher and that a minimum of 40 percent canopy cover is needed. Additional forest carnivore habitat may exist outside of the DFCN. Forest carnivores primarily travel and forage along rivers and streams, but they den and forage in mature/old-forest habitat. Riparian zones (used as travel corridors), in general, would not be altered by the proposed treatments; therefore, indirect effects that could result from implementation of any of the action alternatives would have minimal effects on nesting or foraging habitat of forest carnivores.

Implementation of any of the action alternatives should have little effect on the approximate 758,431 acres of suitable denning and foraging habitat identified in the HFQLG final EIS (page 3-110).

Outside of the DFCN, but within the Slapjack Project area, there are 19,905 acres of suitable denning/resting habitat and 4,549 acres of suitable foraging/travel habitat. Of the proposed treatments, group selection would have the greatest impact on fisher habitat, since group selection would create openings from 0.5 acre to 2 acres and average 1.5 acres. Group selection has the potential to create fragmentation of contiguous areas and, because fishers are prone to localized extirpation, colonizing ability is somewhat limited. Habitat connectivity is a key to maintaining fisher populations within a landscape. Avoidance of open areas may restrict fisher movement between habitat patches and decrease colonization of unoccupied yet suitable habitat. The highest likelihood of conserving fisher populations is management of areas large enough to include many contiguous home ranges. The proposed alternatives would not increase any large-scale, high-contrast fragmentation above existing levels. The design features of DFPZs would retain habitat elements within the range of those used by fisher for foraging and dispersal, such that the DFPZs would likely note create large barriers to further expansion and connectivity to fisher habitat (BA/BE for the HFQLG final EIS, page 243). In addition, the proposed treatments would not be within the DFCN. No observations of Pacific fisher have been recorded in the Slapjack Project area. The risk for potential stand-replacing fires would be higher under the no-action alternative, which could mean a loss of many more acres of potentially suitable nesting, foraging, roosting, and travel habitat in the long term. The Pacific fisher may be affected by project activities, but the activities are not expected to result in significant indirect effects. Outside of the DFCN and within the Slapjack Project area, implementation of any of the action alternatives could effect 1,597 acres of potential denning and resting habitat to below suitability and 1,828 acres of foraging and travel habitat to low suitability for Pacific fisher. This analysis is based on HFQLG Act final EIS, page 3-110; these, however, would be short-term effects. The risk for potential stand-replacing fires would be higher under the no-action alternative, which could mean a loss of many more acres of potentially suitable nesting, foraging, roosting, and travel habitat in the long term. Also, even though habitat outside of the DFCN boundaries is potentially suitable, this habitat has a lower potential for selection for habitat utilized by forest carnivores.

Cumulative Effects. Since direct effects are not likely and indirect effects would be low, it is expected that cumulative effects would be low. Cumulative effects on forest carnivore habitat could occur from the incremental reduction of the quantity and/or quality of habitat for this species. Overall, increases in urbanization and recreational use of National Forest System lands, and the use of natural resources on state, private, and federal lands, may contribute to habitat loss for this species. High-intensity stand-replacing fires, and the methods land managers use to control them, have contributed and may continue to contribute to loss of habitat for this species.

The eventual implementation of other proposed HFQLG Pilot Projects could potentially alter habitat within the DFCN. The Basin Project proposal includes 17 acres of individual tree selection and 407 acres of group selection within the DFCN. The Meadow Valley Project proposes to place 420 acres of DFPZs and 123 acres of group selections within the DFCN. The Bald Mountain Project includes group selections that would modify 62 acres and individual tree selection that would occur on 95 acres. These three projects are scheduled to begin in 2006.

The 1999 Pendola wildfire burned 1,538 acres of the timber and trigged the growth of undesirable underbrush. (See the California spotted owl discussion above for more information.) The Plumas National Forest implemented the Pendola Salvage Project after the fire. The salvage project harvested 130 acres within 160 acres of high-intensity burn areas. The salvage of 130 acres was predominately

on ridgetops, riparian buffers were applied with no harvest, and no new system road construction or reconstructions were proposed. The DFCN was not affected, and suitable habitat was not entered for the salvage. A determination of “no effect” was made. After the wildfire, there were salvage projects on surrounding private lands by two companies: Chy and Siller Brothers. The two companies retained little to no riparian buffers from their projects. The Slapjack Project proposes construction of DFPZs to help prevent catastrophic fires, remove thick underbrush, decommission roads, repair culverts, and enhance riparian areas.

Cumulative effects on the Pacific fisher could occur if incremental amounts of habitat are lost though a variety of activities over time. Increases in road density can negatively affect fisher. The proposed alternatives would not increase any large-scale, high-contrast fragmentation above existing levels. The design features of DFPZs would retain habitat elements within the range of those used by fisher for foraging and dispersal, such that the DFPZs would likely note create large barriers to further expansion and connectivity to fisher habitat (BA/BE for the HFQLG final EIS, page 243) In addition, the proposed treatments would not be in the DFCN. No observations of Pacific fisher have been recorded in the Slapjack Project area. The protection of California spotted owl PACs and SOHAs and potential northern goshawk habitat, and the establishment of the DFCN and RHCAs, would provide connectivity between large blocks of suitable habitat. In addition, implementation of Riparian Management Objectives would also improve habitat conditions within riparian corridors. Implementation of any of the action alternatives would not increase any large-scale, high-contrast fragmentation above current levels. As stated in the carnivore analysis, no observations of Pacific fisher have been recorded in the Slapjack Project area.

3.13.5.32 Alternatives B, E, and F: Effects on Pacific Fisher from Imazapyr for DFPZ Maintenance

Based on the herbicide hazard analysis and risk assessment, coupled with the appropriate application procedures, BMPs and appropriate mitigation measures, the application of imazapyr should have a low risk of adverse effects on small-sized mammal species.

Direct Effects. There should not be adverse direct effects on medium- and large-sized mammals. Acute exposures from direct spray are below the LD/LC_{50}s for all nine herbicides and surfactants. Of the nine herbicides, only hexazinone exceeded the NOEL/NOAEL. Some protected old-forest habitat would be provided through the establishment of Habitat Conservation Areas for the northern spotted owl, PACs for the California spotted owl, 500-foot buffers around northern goshawk and California spotted owl nest sites, and protection of great gray owl PACs. Mesocarnivores could be affected if they are sprayed when traveling in or between watersheds over ridges. However, they would tend to move from the area where treatment activities occur or avoid disturbance by escaping to the forest canopy. In addition, herbicides would not be applied within riparian zones, with the exception of possible noxious weed treatments that are proposed for DFPZ maintenance. It is expected that mesocarnivores would leave an area during disturbance from herbicides application. Surveys are required to be conducted for these species prior to DFPZ construction and maintenance. If a den site is located, it would be protected (avoidance, buffer, Limited Operating Period) at a site-specific project level. Given these conditions, there should not be adverse direct effects on medium- and large-sized mammals.

Indirect Effects. Adverse indirect effects are not expected. Indirect effects could also include prey species (predominantly small mammals) that could be contaminated by herbicide application. The acute dose by consumption of contaminated small mammals by a medium-sized mammal is analyzed above under the Risk Assessment discussions. For all nine herbicides and surfactants, the doses are below the LD/LC_{50}s and the NOEL/NOAELs, the level for adverse effects for medium and large-sized carnivorous mammals. Additional indirect effects on mesocarnivores could result from surface or subsurface run-off, drift, wind erosion, or soil contamination that could affect stream courses or water bodies, although these effects would be expected to be even further below NOEL/NOAELs. The DFPZs may be constructed through a stream course to maintain the continuity of the DFPZ; however, hand treatment would be the only method prescribed to maintain these areas. Therefore, aquatic and riparian zones would be avoided, except for possible noxious weed control for DFPZ maintenance.

Cumulative Effects. By adhering to management directions, standards and guidelines, BMPs, and mitigations, direct and indirect adverse effects are not expected; therefore, cumulative adverse effects are not expected to occur.

3.13.5.33 Alternatives B, D, and F: Effects on Pacific Fisher from Triclopyr BEE for Control Noxious Weed Control

Based on the above information, when applying the appropriate application procedures, BMPs, and appropriate mitigation measures, the application of triclopyr BEE should have a low risk of adverse effects on medium- and large-sized mammal species.

Direct, Indirect, and Cumulative Effects. Refer to the discussion above for imazapyr.

Triclopyr BEE is proposed to control a maximum of 31 acres of noxious weeds, including riparian areas in units 29 and 77. There are no draft forest carnivore network acres in the project area. Broom plants grow in dense clumps and are not denning or foraging habitat. Broom plants would be treated by direct spray—the expected herbicide drift is 50 feet. A 50-foot no-spray buffer would be applied along the perennial streamcourse in unit 77. In unit 29, a Limited Operating Period would be imposed to restrict spraying to the driest time of year (August and September) when these streams are not flowing. Spraying would not occur if precipitation is forecasted. With full implementation of all protection measures, such as BMPs and stream buffers following SAT guidelines, there is no indication that the Pacific fisher or its prey species would be exposed to adverse levels of herbicides under the conditions of use specified. No direct, indirect, or cumulative effects are expected.

3.13.5.34 All Action Alternatives: Effects on Pallid, Western Red, and Townsend's Big-Eared Bat from DFPZ, Group Selection and Individual Tree Selection

The project area contains habitat for all three of the Forest Service Sensitive bat species. The implementation of Management Area direction and habitat prescriptions and allocations for California spotted owl, northern goshawk, forest carnivores, little willow flycatcher, great gray owl, and amphibians would provide for many acres of untreated mature or old-forest and riparian habitat (see the 1988 Forest Plan, as amended by the 1999 HFQLG Act final EIS and 2004 SNFPA final supplemental EIS). The Standard Management Requirements include the retention of large trees

(30 inches dbh or greater), snags (4 per acre of 15 inches dbh or greater), and downed woody material (10–15 tons per acre of the largest diameter). The Slapjack Project "Silviculture Report" (appendix A, table A-4) provides a summary of trees per acre by dbh class for black oak and tanoak.

The treated acres could provide many of the habitat attributes necessary to support sensitive bat species by employing BMPs and Scientific Analysis Team guidelines and by maintaining aquatic and riparian ecosystem processes in the RHCAs. Limited Operating Periods for the California spotted owl and northern goshawk overlap the spring and summer seasons when bats are rearing their young. Where these Limited Operating Periods are implemented, further minimization of disturbance to bat species is likely. The Standard Management Requirements and/or Resource Protection Measures and mitigations identified above would reduce or eliminate possible direct and indirect affects on the three bat species. Of the three bat species, it is expected that pallid bats could potentially be more directly impacted due to their general use of the forest for roosting and foraging. A study initiated by the Forest Service and entitled "Pallid Bat - Habitat Use Assessment" is planned to start in 2006, and some information for management purposes may possibly be available prior to implementation of the Slapjack Project. It is anticipated that part of the pallid bat study would take place in the Slapjack Project area. Western red bats are more dependent on riparian habitat for roosting and foraging, and Townsend's big-eared bats are more closely associated with structures (such as caves, bridges, and buildings) for roosting and riparian habitat for foraging. It is expected that the latter two species would be more indirectly affected.

Direct Effects. Direct effects are expected to be low. Direct effects from the proposed treatments are possible because all three sensitive bat species have been observed in the project area. However, pallid bats would tend to be the bat species that would be found roosting in the general forest. Pallid bats tend to select snags and large-diameter trees (greater than 20 inches dbh) for roosting. Destruction of active roosts through felling and/or removal of large trees, small trees with hollows, or mature oaks could displace or harm individual bats. Hazard trees, including snags, along the road and those removed for safety or operability reasons, could result in direct mortality of bat species that may be roosting in the tree or snag. Project activities could also result in the loss of structures used by Townsend's big-eared bats; however, surveyors did not find any potentially suitable structures in the project area.

All action alternatives would result in a reduction of the number of trees per acre. Under the action alternative, trees 30 inches dbh and greater would not be removed except for hazard and/or operability purposes. In addition, retaining snags and employing riparian protection measures would help protect bat habitat and foraging areas. Mastication (1,110 acres), underburning (661 acres), or hand cut, pile, and burn (87 acres) would not affect much change on overstory stand structure.

Adult bats may be able to flee from the destruction of their roost tree, but if activities were to take place in spring and early summer, juvenile bats (prior to initiation of flight skills) would have no means of escaping direct disturbance and would be killed if roost trees were felled. Prescribed burns in the spring could affect pallid bats due to their habitat preferences. Forest Service fire personnel intend to limit spring underburning to a minimum and do as much burning as possible in the fall, which would minimize the risk of mortality to bats because, by fall, the young bats can fly, and hibernation has not yet begun.

The use of chain saws or heavy equipment could create ground vibrations that may cause noise and tremor disturbance significant enough to cause temporary or permanent roost abandonment. However, machinery used for mechanized treatment would disturb most tree-roosting bats (potentially cause them to flee the area) prior to tree removal activities, and therefore reduce the potential for direct mortality of these species. On the other hand, if activities were to take place during the spring and early summer, juvenile bats, prior to initiation of flight skills, would have no means of escaping direct disturbance and would perish if maternity roosts were abandoned. If bats are roosting in trees that are not felled (trees 30 inches dbh or greater), or trees adjacent to the treatment area, temporary or permanent roost abandonment could also result in lowered reproductive success or even worse, total maternity roost abandonment and death of the young of the year.

Indirect Effects. Indirect effects are expected to be low. Implementation of Standard Management Requirements and/or Resource Protection Measures and mitigations would minimize indirect effects on bats by minimizing effects on foraging habitat and prey species in RHCAs. Also, bats primarily forage at dusk or night when project activities would be minimal or not occurring.

Western red bats are more dependent on riparian habitat for roosting and foraging, and Townsend's big-eared bats are more closely associated with structures (such as caves, bridges, and buildings) for roosting and riparian habitat for foraging. It is expected that disturbances due to activities versus habitat modification would likely affect western red and Townsend's big-eared bat species.

It is difficult to determine where bats are roosting and foraging because of their small stature and difficulty surveying for them. Ground disturbances, caused primarily by mechanical treatments but also by prescribed fire, may change prey populations or their availability as food, either positively or negatively, in areas outside of riparian habitat. This would have a greater impact on pallid bats since they also forage on shrubs and on the ground. The available insect prey base for bats may have some short-term site-specific reductions following treatment due to direct mortality and/or loss of vegetation. However, post-treatment conditions have been shown, in many instances, to increase plant vigor (Lyon and Stickney 1976; Debyle 1984; Stein et al. 1992). It has also been shown that many herbivorous insects preferentially feed on, and have increased reproductive success and fitness on, more vigorous plants and plant parts, as described by "the plant vigor hypothesis" (Price 1991; Spiegel and Price 1996). Therefore, post-treatment conditions may increase the forage base available to pallid bats. Because the three sensitive bats are insectivores, the felling of snags and removal of logs may reduce the amount of microhabitat available for wood-boring beetles and other insect species that may be used as prey. Impacts would be minimized by following the management requirements for downed woody materials and snag retention.

"Tree roosting has been documented in large conifer snags . . . and bole cavities in oaks" (Sherwin, personal communication, 1998). Cavities in broken branches of black oak are very important, and there is a strong association with black oak for roosting (Pierson, personal communication, 1996). Bat foraging habitat is protected under the HFQLG Act final EIS and SNFPA final EIS Record of Decision standards and guidelines protecting aquatic and riparian zones (see the "Silviculturel Report" for information about black oak retention). Logging and prescribed fire would result in a loss of snags that are important for wildlife; however, snag recruitment is also expected with retention of conifers over 30 inches dbh and some recruitment due to fire kill. The recommended

standards and guidelines for snag retention (from table 2, page 69 of the SNFPA Record of Decision) would be followed for this project.

Cumulative Effects. With full implementation of Standard Management Requirements and/or Resource Protection Measures and mitigations, cumulative effects on bats would be low because there would be low direct and indirect effects. Cumulative effects on these bat species would occur predominately from loss of quantity and quality of habitat (conifer, oak, and riparian) as a result of tree removal and disturbance during roosting attempts and of prey base. Overall, increases in urbanization, recreational use of National Forest System lands, and use of natural resources on state, private, and federal lands may contribute to habitat loss for this species. High-intensity stand-replacing fires, and the methods land managers use to control them, have contributed, and may continue to contribute, to loss of habitat for these species. Activities that result in disturbance to maternal dens or wintering roosts can result in total loss of bat populations within a large area due to the isolated distribution of these sites across the tri-forest area (Plumas, Lassen, and Tahoe National Forests). However, DFPZ maintenance is not likely to result in direct effects and may only result in minor indirect effects, since little maintenance would be conducted in riparian areas. As a protective measure, alternatives F and G do not propose group selection harvests in watersheds over the Threshold of Concern.

3.13.5.35 Alternatives B, E, and F: Effects on Pallid, Western Red, and Townsend's Big-Eared Bats from the Use of Imazapyr to Maintain DFPZs

Based on the herbicide hazard analysis and risk assessment, coupled with the appropriate application procedures, BMPs, and appropriate mitigation measures, the application of imazapyr would have a low risk of adverse effects on small-sized mammal species.

Direct Effects. Given the following conditions, direct adverse effects are not expected on these three bat species. Direct effects on these species would include the acute exposure for small-sized mammals as a result of direct application as discussed under the Risk Assessment section above. For all herbicides and surfactants, acute exposures are below the LD/LC_{50}s. It is unlikely that bats would be directly sprayed by any herbicides since they do not forage during the daylight hours when herbicides would be applied. Also, herbicide drift would be expected to be much less than any direct exposures, resulting in exposures below adverse effects. Surveys and/or Limited Operating Periods are required for sensitive species, including bats, under the HFQLG Act final EIS, and mitigations would be applied where adverse impacts could occur.

Indirect Effects. Based on the below, it is unlikely that any maternity colonies would be indirectly adversely affected. Indirect effects on these species would include the acute doses for small-sized mammals as a result of herbicide application as discussed under the Risk Assessment section in the HFQLG Act final supplemental EIS BA/BE. The analysis uses a small placental mammal (a mouse) and extrapolates what the doses could be from consuming contaminated insects. All doses are below the LD/LC_{50}s. Mice have a slow-moderate metabolism and eat approximately 20 percent of their body weight daily (EPA 1988). Bat species are different than other small mammals (such as mice) in that they have a very high metabolism and can consume up to 100 percent of their body weight in a single night feeding, thereby magnifying any potential adverse effects (Pierson 2003; Brown 2003; Heady, personal communication, 2003). Possible acute doses are based on

conservative assumptions such as high residue rates and 100 percent consumption of contaminated insects.

Herbicide applications for DFPZ maintenance would be limited to areas outside of aquatic and riparian areas. Dispersed aquatic sites (seeps, springs, and large depressions) are being found highly attractive to bat species not so tightly associated with riparian habitat and may prove to be very important to bat species associated with interior forests (Heady, personal communication, 2003). These sites should be adequately protected by following SNFPA standards and guidelines for aquatic/riparian areas (refer to “Aquatic and Riparian Associated Species” sections).

Western red bats are tightly associated to riparian habitat for locating their maternity roosts, as well as for foraging (Pierson, personal communication, 2003). Direct adverse effects are not expected. This species is solitary in nature and tend to disperse their foraging within riparian zones, dispersed aquatic sites, or forested areas. Females and young are more closely associated with riparian zones for foraging. Insects of target are primarily those in the mid-upper forest canopy (Pierson 2003 and Brown 2003, personal communication).

Townsend’s big-eared bats are tightly associated to structures (such as caves, mines, bridges, and abandon buildings) for locating their maternity roosts. Suitable roosting structures would be evaluated for active roosts and protected as necessary. Adverse direct effects are not expected. This species is solitary in nature, tends to disperse their foraging within the mid-upper canopies of forested areas, and are relatively hard to locate while foraging. However, they have been known to use gullies for foraging (Pierson, personal communication, 2003). Based on the above, it is unlikely that any whole colony would realize adverse indirect effects.

Pallid bats are colonial, with individual populations roosting and foraging together, in nature. This bat species forages usually within a 0.25 mile of their roost sites and has night roosts close to or within their feeding sites (Pierson 2003 and Brown 2003, personal communication). They exhibit a feeding pattern different from most bats in that they feed on foliage or on the ground for prey such as crickets, beetles, grasshoppers, moths, cicadas, centipedes, and scorpions. During the day, a *Ceanothus* brushfield could be sprayed with triclopyr, and the residing grasshoppers contaminated. That same night, a pallid bat colony could arrive at the site to forage for grasshoppers. The pallid bat may stay at this site and forage until the grasshoppers are exhausted, or they are done feeding for the night. They could possibly return to the same *Ceanothus* brushfield site the next night to forage on the same herbicide-contaminated grasshoppers.

It is possible that whole colonies could be adversely affected with herbicides and surfactants; however, based on the following factors, adverse indirect effects are not expected. Exposure to insects that may be hidden in foliage or soil would be greatly reduced compared to those insects in the open that may be directly sprayed. Insects that are not directly sprayed, but rather are exposed to herbicide drift, would also see considerably less exposure than from direct spray. Surveys would be conducted where herbicide and surfactants would be sprayed in potential foraging habitat for the pallid bat, and mitigations would be applied to protect the species from any potential adverse effects. A similar or greater reduction would be expected in other food sources, such as insects that would not be subjected to a liquid spray. Other mitigations (such as herbicide selection, lower application rates, avoid areas, and Limited Operating Periods) would be applied.

Cumulative Effects. By adhering to management directions, standards and guidelines, BMPs, and mitigation, direct and indirect effects are not expected; therefore, cumulative effects are not expected to occur.

3.13.5.36 Alternatives B, D, and F: Effects on Pallid, Western Red, and Townsend's Big-Eared Bats from Triclopyr BEE for Noxious Weed Control

Based on the herbicide hazard analysis and risk assessment, the application of triclopyr BEE should have a low risk of adverse effects on small-sized mammal species when following appropriate application procedures, BMPs, and appropriate mitigation measures.

The HFQLG Act final supplemental EIS BA/BE document states that for site-specific projects, evaluate and implement design features to reduce indirect and cumulative effects on the western red bat, Townsend's big-eared bat, and pallid bats. If bats are located, buffers would be used around roosts, Limiting Operating Periods would be implemented, and herbicide application rates would be reduced. Herbicides would be applied using a backpack with a wand to help reduce factors that could potentially expose the roost site to herbicides.

Alternatives B, D, and F may cause vegetation disturbance. Negative effects from direct or indirect mortality and/or loss of vegetation pose a threat to available insects, which is a prey base for bats.

Triclopyr BEE is proposed to control a maximum of 31 acres of noxious weeds, including limited use in riparian areas in units 29 and 77. Broom plants grow in dense clumps and are not roosting or denning habitat. Broom plants would be treated by direct spray—the expected herbicide drift is 50 feet. A 50-foot no-spray buffer would be applied along the perennial streamcourse in unit 77. In unit 29, a Limited Operating Period would be imposed to restrict spraying to the driest time of year (August and September) when these streams are not flowing. Spraying would not occur if precipitation is forecasted. With full implementation of all protection measures, such as BMPs and stream buffers following SAT guidelines, there is no indication that bats or their prey species would be exposed to adverse levels of herbicides under the conditions of use specified. Direct, indirect, and cumulative effects are not expected.

3.13.5.37 All Action Alternatives: Effects on Hardhead Minnow from DFPZ, Group Selection, and Individual Tree Selection

The major differences in effects between alternative A and the action alternatives would be from proposed activities and future activities on private land. It has been determined that the direct, indirect, and cumulative effects on the aquatic systems would be the same for all action alternatives; thus again, the alternatives were analyzed together. The subwatersheds approaching or over the Threshold of Concern are listed in tables 3-34, 3-35, and 3-36 in the "Hydrology" section (3.8) of this EIS. A comparison of ERA scores in relation to the Threshold of Concern for each alternative is included in table 17 of the "Slapjack Hydrology Report."

Direct Effects. Activities proposed under the Slapjack Project would not directly affect hardhead minnows since this species inhabits large river and lake habitats, and most project activities are confined in the upper watersheds adjacent to smaller drainages. Perennial, intermittent, and ephemeral

streams occur within the project area, and overall, very little change in structure of the riparian vegetation is expected due to minimal activities within the RHCAs. Most trees providing cover to aquatic and riparian habitats would be retained.

There would be minimal direct effects from DFPZ construction, group selection, and individual tree selection on hardhead minnows and MIS fish species because these vegetation management activities would occur mostly outside of RHCAs. No group selection or individual tree selection would occur within the RHCAs, and skid trails would only cross ephemeral dry streambeds. No group selection skid trails would cross streams with running water. In addition, it is expected that none of the skid trails associated with DFPZ construction would cross RHCAs. Consequently, direct effects due to skidding are expected to be minimal. All riparian protection standards apply to the action alternatives. Scientific Analysis Team guidelines and associated Riparian Management Objectives would be met with the action alternatives. All applicable BMPs and Soil Standard Protection Measures would be instituted.

There would be the potential for direct effects on hydrologic function from proposed vegetation management activities under the action alternatives. However, this potential could be eliminated or entirely mitigated by the application of the required standards and guidelines, including all applicable BMPs, as listed above in the “Regulatory Framework” section. Standards and guidelines and BMPs are designed to severely limit the scope and intensity of management activities in channel and riparian corridors and to provide maximum protection to these features. The designation of RHCAs and limitations on mechanical entry to RHCAs should essentially negate the threat of direct effects on watershed condition from DFPZ treatments.

Indirect Effects. Mechanical treatments are not proposed in riparian areas. Where low ground-pressure equipment is used, sufficient ground surface cover would be retained to prevent erosion. There are no anticipated indirect effects from mechanical treatments. Construction of a DFPZ would be distant from perennial waters and would not create indirect effects on aquatic species or their habitats. Planting and replanting do not create ground disturbance sufficient to produce indirect effects on aquatic species or their habitats. Thinning of existing conifer stands would not contribute to erosion or affect riparian vegetation and is not likely to create indirect effects on hardhead minnow species or their habitats. Underburning treatments would not result in soil conditions that would increase erosion. Post-fire runoff could result in nutrient pulses in streams, contributing to increased productivity (Pilliod et al. 2003). Pile burning would not occur near streams and is not likely to contribute to sediment or nutrient loading.

Triclopyr BEE is proposed to control a maximum of 31 acres of noxious weeds, including limited use in riparian areas in units 29 and 77. A 50-foot no-spray buffer would be applied along the perennial streamcourse in unit 77. In unit 29, a Limited Operating Period would be imposed to restrict spraying to the driest time of year (August and September) when these streams are not flowing. Spraying would not occur if precipitation is forecasted.

Road building and their continued use have the potential to be the largest contributor of surface erosion and sediment delivery. Early erosion and sediment modeling in the Idaho Batholith (Gray and Megahan 1981) concluded that a standard 16-foot road on a 5–7 percent grade, could produce 67,500 tons per square mile of eroded material after the first year of construction, declining to a steady rate of 5,000 tons per square mile after 3 years. The proposed 19 miles of road

decommissioning and 7 miles of road closures in the project area would reduce erosion and sedimentation and mitigate increased sediment to downstream hardhead habitat—the sediment could be produced by the proposed new road construction under the action alternatives.

In the project area, six culverts have been identified for upgrades. Implementation of the proposed fish passage improvement projects would provide approximately 2 miles of high-quality fish spawning and rearing habitat. Improvement of these culverts would also reduce downstream erosion and improve water quality by reducing the scour and plunge pool development from undersized culverts.

The Scientific Analysis Team guidelines and BMPs would be followed. Implementation of BMPs designed to minimize upslope erosion should serve to minimize sedimentation of the streambed and subsequent degradation of downstream aquatic habitats. The Cumulative Watershed Effects (CWE) analysis states there would be no measurable downstream effects on beneficial uses due to sediment from the proposed project, thus minimal indirect effects on fish species could occur downstream (refer to the "Hydrology Report" in the project record).

Cumulative Effects. It is unlikely that the proposed activities would be a significant addition to cumulative effects, given that RHCAs would be maintained, very few new roads would be constructed, and miles of roads would be decommissioned or closed. The application of BMPs and meeting the Riparian Management Objectives would provide additional protection for this species.

Urban development may continue downstream of the project area, within the Oroville Basin to the southwest of the project boundary, which would continue to sustain bank down-cutting and sedimentation into the North Fork Feather River. All proposed Slapjack Project activities have minimal potential to affect hardhead and trout species or their habitat.

The active grazing allotments would continue to contribute sustained bank down-cutting and sedimentation. The Slapjack Project would not result in any changes from the existing sedimentation or bank cutting caused by livestock.

3.13.5.38 All Action Alternatives: Effects on Mule Deer

Direct and Indirect Effects. Under all action alternatives, deer foraging habitat would increase, and populations would likewise tend to increase for the following reasons:

- The Challenge Landscape Assessment determined that the ratio of forage to cover for deer was at 24.5:75.5. The desired ratio is 50:50 for summer range. More open forest habitat would be created, allowing more sunlight and moisture to reach the forest floor, thus creating more forage and brush cover and increasing the forage as a result of implementing the action alternatives. The post-project forage:cover ratio would persist for several years and slowly change as brush quality for forage declines due to increased shade from developing conifers in fuel treatment areas and increased conifer growth in group selection units. It is predicted that in 12 to 15 years, the amount of forage would again decline. With reforestation, conifers would dominate the brush in group openings anywhere from 15 to 50 years, depending on site and aspect.

- Fuel treatments (including 1,100 acres of mastication, 661 acres of underburns, and 87 acres of handcut, pile, and burn) are proposed in old, decadent brushfields and dense timber stands that are located within mule deer summer range. The treatments would result in new, highly palatable, nutritious forage for deer. A slight increase of forage is also expected as a result of group selection openings (123 acres in DFPZs and 96 acres outside of DFPZs).

- Road closure and decommissioning would slightly increase habitat effectiveness, potentially reducing roadkill, hunting mortality, illegal kill, and harassment of deer on winter range. The effects would be similar for all action alternatives.

Some negative effects could occur during project implementation (in 1 to 8 years) because of the following:

- There would potentially be increased mortality as a result of increased traffic along all roads during project implementation. Treatment activities could disrupt fawning activity that would be occurring between June and August. This disruption could include direct mortality to hiding fawns, as well as displacement of fawns and does, which could increase fawn mortality through predation. There could be disturbances to individuals that may be foraging in habitat within or adjacent to units proposed for treatment; this would result in animals moving out of the area during treatment activities

Cumulative Effects. With the exception of a 3-acre opening designed to improve visibility at the Pike lookout, no past actions in the Wildlife Analysis Area (on National Forest lands) in the past number of years have created any new openings or resulted in opening up stands and regenerating understory browse species. In the Slapjack Project analysis area, foraging habitat for mule deer could be improved as a result of implementing all action alternatives and could provide higher quality habitat (from existing conditions) until brush is shaded out or becomes decadent in 12 to 50 years. With reforestation, brush would be set back through release and plantation thin treatments, allowed to recover and provide a small amount of new browse, and eventually be shaded out by the growing conifers at about 50 to 60 years. The action alternatives would improve deer foraging habitat within fuel treatment areas through mastication and broadcast/underburning actions.

The SNFPA final EIS stated that mule deer habitat utility would decline under all alternatives, including implementation of the standards and guidelines outlined in the Record of Decision (SNFPA final EIS, volume 3, part 4.2, page 26). This decline was based on the assumption that practices that open up canopies through mechanical treatments (like thinning, biomass, and salvage logging within green stands) do not generate dense understories of shrubs, forbs, and grasses that provide deer foraging habitat. Current direction under the SNFPA emphasizes mechanical treatments in order to ensure minimizing potential changes to canopy cover. Because of this, deer habitat would decline by -5.6 to -6.6 percent over a five-decade period across the Sierra Nevada range. With the analysis of alternative S2 in the 2004 SNFPA final supplemental EIS, there was no projected difference in deer habitat from what the 2001 SNFPA analysis disclosed.

The action alternatives are designed to reduce the risk of future stand-replacing fires and promote the reestablishment and development of a mature closed canopy mixed conifer forest. The short-term cumulative effects would improve the forage base and edge effects that would benefit deer. The long-

term cumulative effects of this action would fall in line with the analysis conducted for the SNFPA (described above) and potentially contribute to the decline of mule deer in the project area, the Plumas National Forest, and the Sierra Nevada range.

The action alternatives propose implementation of positive habitat manipulations (creation of brushfields, using prescribed fire, opening up overstocked conifer stands, reducing road densities) that would tend to reduce potential limiting habitat factors for California deer herds (CDFG 1998). There could be a short-term increase in brush/forb regeneration within these treated areas that would flourish with group openings and in any treated area that would be underburned, prescribed burned, or masticated. This increase in deer use may be more reflective of changes in use patterns by deer than any major increase in animals. On the other hand, other identified limiting factors (predation) could also be increased by the action alternatives. Urban sprawl would not be affected by the proposed action, although human access into deer habitat would be reduced.

Future foreseeable actions include DFPZ maintenance (underburning, hand thinning). These actions would benefit deer for a time by regenerating sprouting brush until the forest canopy closes in and shades out brush. The Challenge Landscape Assessment (2005) identified the opportunity to improve deer summer range through broadcast burning and underburning. In addition, the opportunity was identified to improve water distribution for upland species with waterhole development and guzzler installation through habitat improvement projects funded either with KV and/or partnership funds.

Based on the direct and indirect effects, implementation of the action alternatives would contribute to an increase in open forest habitat, improving the grass/forb/brush mix resulting in increased forage and decreased forested cover, as well as decreased road density. These cumulative effects would improve two limiting factors identified by the California Department of Fish and Game that affect deer herd health.

Based on the potential direct, indirect, and cumulative effects of the action alternatives, it is suspected that the carrying capacity in the analysis area would be improved, and deer numbers would respond to the habitat changes such that there would be some upward trend in the Mooretown Deer Herd population for the next 10–20 years. Winter range would be improved by opening up stands through thinning, prescribed burning in thinned stands, and prescribed burning of old brushfields; all three actions would provide additional high-quality forage. Improving carrying capacity on National Forest land would contribute to moving the population toward its herd population goal, as well as contributing to the Forest Plan goal of 24,000 deer on Plumas National Forest land.

3.13.5.39 All Action Alternatives: Effects on Golden Eagle

Direct and Indirect Effects. Under all action alternatives, no known golden eagle nesting territories in the Wildlife Analysis Area would be affected, so there would be no direct effects on the population of golden eagles on the Plumas National Forest. No trees greater than 30 inches dbh would be cut unless required for operability (for example, road construction and reconstruction), and the largest snags would be retained. Therefore, large perches and potential large nest trees would be present across the landscape at pre-treatment densities. Habitat suitability may increase slightly because there would be a greater number of open forest stands as a result of fuel treatments, and there

would be more forested edges as a result of group selection harvest; this could result in prey species becoming more abundant.

Cumulative Effects. Based on the direct and indirect effects, implementation of the action alternatives would contribute to a cumulative increase in open forest habitat, improving the grass/forb/brush mix and resulting in increased habitat favorable to an open habitat foraging species such as the golden eagle. The direct, indirect, and cumulative effects of the proposed action alternatives would not result in any change in population trends to meet the identified Forest Plan goal of attaining 20 nesting pairs.

3.13.5.40 All Action Alternatives: Effects on Trout Group

Direct, Indirect, and Cumulative Effects. Implementation of any of the action alternatives would not result in a significant increase in sediment delivery to aquatic habitats and may even help reduce sediment transport. Through the design of the action alternatives, and by implementation of Standard Management Requirements for soils and streamside management, ground disturbance activities would be minimized. However, fuels reduction harvesting in the RHCAs could decrease wood available for ground cover and sediment traps in those RHCAs.

The Scientific Advisory Team guidelines and BMPs would be followed. The implementation of BMPs designed to minimize upslope erosion should serve to minimize sedimentation of the streambed and subsequent degradation of downstream aquatic habitats. Based on the “Cumulative Watershed Effects Analysis for the Slapjack Project” (Slapjack Project Hydrology Report 2006), there would be no measurable downstream effects on beneficial uses due to sediment from the proposed project, thus no indirect effects on MIS fish species would occur downstream.

Fuels reduction harvesting in RHCAs and on upland slopes would lower the risk of future wildfire and reduce the probability that retained snags, woody debris, and live vegetation in the RHCAs would be consumed by future fire. Fuels reduction harvesting of some trees in the RHCAs would reduce fuel loading and the potential for a stand-replacing fire.

Triclopyr BEE is proposed to control a maximum of 31 acres of noxious weeds, including limited use in riparian areas in units 29 and 77. A 50-foot no-spray buffer would be applied along the perennial streamcourse in unit 77. In unit 29, a Limited Operating Period would be imposed to restrict spraying to the driest time of year (August and September) when these streams are not flowing. Spraying would not occur if precipitation is forecasted.

Trout distribution in Indian, Deadwood, and Hampshire Creeks would be improved with the replacement of six culverts to allow for upstream fish passage. Replacing these culverts would result in increased trout distribution and, potentially, increased numbers in these creeks.

Many of the creeks in the Wildlife Analysis Area are subjected to mining activities. The timeframe for dredging season is from the third week of May through October 15 each year. Dredging must be in compliance with state regulations under a permit issued by the California Department of Fish and Game.

3.13.5.41 All Action Alternatives: Effects on Neotropical Migratory Birds

Direct, Indirect, and Cumulative Effects. Actions that open up forest stands through thinning, such as with the proposed fuels treatment thinning prescriptions, would result in projected increases in habitat trends for several selected Neotropical migratory bird species (warbling vireo, chipping sparrow, lazuli bunting, white-crowned sparrow, western bluebird, common nighthawk, and common poorwill). These species respond favorably to the opening up of forest canopy, allowing for increased understory plant diversity. Swainson's thrush appears to be adversely affected by thinning actions that convert closed forested stands to open forested stands. The olive-sided flycatcher and evening grosbeak also appear to have a projected decrease in habitat suitability. The no-action alternative would create fewer open stands across the Wildlife Analysis Area and subsequently maintain more habitat for Swainson's thrush, olive-sided flycatcher, and evening grosbeak.

Actions that create openings in the forested landscape with group selection harvests could result in declines in species habitat trends for osprey, Swainson's thrush, warbling vireo, yellow warbler, western wood-peewee, evening grosbeak, red crossbill, and band-tailed pigeon. There are three species (white-crowned sparrow, lazuli bunting, and common nighthawk) that have a projected increase in habitat suitability. They respond favorably to habitat that contains small gaps in the forest landscape.

It is assumed that alternatives that place group selection harvest units (groups) within stands at densities higher than 11.4 percent of the stand would create more edge and reduce forest interior habitat (the threshold of 11.4 percent represents a 20-year treatment cycle within the stands supporting CWHR classes 4M, 4D, 5M, and 5D). The threshold of 11.4 percent was chosen as a result of the assumptions, modeling, and group simulations and the corresponding effects analysis presented in the HFQLG final EIS, which allowed for the planning of group treatments at 20-year intervals (see appendix D, HFQLG final EIS). Groups would be dispersed across the landscape. Stand fragmentation caused by high-density placement of groups would increase edge effects created by the groups, reducing effective forest interior habitat and potentially creating unsuitable forest interior habitat in that Slapjack Wildlife Analysis Area for certain Neotropical migrants. Neotropical migrants that favor forest interior habitat (Swainson's thrush, western wood-peewee, evening grosbeak, red crossbill, and band-tailed pigeon) would have reduced habitat capability with the action alternatives that propose group selection harvests.

The cumulative actions of the past may have benefited species that prefer early successional, as well as more open habitats. Species that prefer shrub habitat benefited as shrub habitats increased with even-aged regeneration management actions, while species preferring closed canopies likely declined in numbers. With fire suppression and minimal vegetation management in the project area, together with natural succession, species preferring closed canopies may have rebounded as canopy covers filled in; conversely, as shrub habitat declines through conifer development, these species may have declined some. The cumulative effect of recent regeneration harvest on private land, together with Slapjack Project group selection harvests and fuel treatments, would overall improve habitat conditions for birds that prefer openings and open canopy habitat across the landscape. Based on the CWHR model, Swainson's thrush, evening grosbeak, and red crossbill would have decreased habitat suitability. If DFPZ treatments remove shrubs and are managed to minimize shrub regeneration through maintenance activities, it would be expected that the benefits of creating an open forest with a shrub understory component would be minimized and that there would be a decline in shrub nesting

species (USDA PSW 2006). Allowing group selection treatments to naturally regenerate would ensure that shrub habitat would remain on the landscape longer than with intensive regeneration efforts.

Increasing the amount of open forest, as well as small openings and increased edge, may increase the risk of brood parasitism by brown-headed cowbirds on various bird species that nest in riparian habitat. Very little brown-headed cowbird presence in the National Forest portion of the Wildlife Analysis Area has been documented, although they are present on private land in American Valley. There is no active livestock grazing on National Forest land in the Wildlife Analysis Area. Facilities that often are associated with brown-headed cowbirds (including pack stations, supplemental feeding stations, holding facilities, or corrals) are not present. There is some risk that brood parasitism could increase above existing levels in the Slapjack Project area because cowbirds are present in American Valley and because they respond to increased open habitat and edges.

In addition to habitat modification and its affect on Neotropical migratory birds, direct effects on nesting birds (including young birds that cannot yet fly) would occur as a result of tree removal, mastication, and prescribed burning. It is recognized that the proposed Slapjack Project, if implemented during the breeding season (April–September), could directly impact nesting birds. The overall effect on Neotropical migratory bird populations is not known.

3.13.6 Determinations

The proposed activities in the Slapjack Project area may have some effects on habitat for Management Indicator Species (MIS) and/or Neotropical migratory bird species (refer to appendix B in the Wildlife and Fish BA/BE for discussions of the potential effects on the habitat for these species).

The following are determinations for federal Threatened, Endangered, and Sensitive species based on current available data and on the following assumptions: full implementation of identified mitigations and complete compliance with the *Plumas National Forest Land and Resource Management Plan*, and all applicable amendments, including HFQLG Act final supplemental EIS and Record of Decision and the SNFPA final EIS and Record of Decision (table 18).

Based on the above analysis of the proposed project and treatments in the Slapjack Project area, it is the Forest Service determination that the activities would not affect the following federally Threatened or Endangered species: valley elderberry longhorn beetle, Carson wandering skipper, delta smelt, Lahontan cutthroat trout, winter-run Chinook salmon, Central Valley spring-run Chinook salmon, or Central Valley steelhead. These species do not occur within the elevational range of the project area, do not occur in the project area, or have not been located by surveys. Also included are those species for which the following were developed: Resource Protection Measures, Best Management Practices, Scientific Analysis Team guidelines and associated RHCAs and Riparian Management Objectives, and applicable standards and guidelines contained in the HFQLG Act final EIS and Record of Decision and the SNFPA final EIS and Record of Decision.

It is the Forest Service determination that the proposed activities in the Slapjack Project area may affect, but are not likely to adversely affect the California red-legged frog, which is a federally Threatened species.

It is the Forest Service determination that the proposed activities in the Slapjack Project area would not affect the bald eagle, which is a federally Threatened species.

If any federally listed species are found at a later date, or if any new information relevant to potential effects of the project on these species becomes available, the project would be stopped and the Section 7 Consultation process under the *Endangered Species Act* would be initiated.

It is the Forest Service determination that the proposed activities in the Slapjack Project area would not affect the following Forest Service Sensitive species: little willow flycatcher, great gray owl, Sierra Nevada red fox, northern leopard frog, greater sandhill crane, Swainson's hawk, peregrine falcon, mountain yellow-legged frog, great gray owl, American marten, and California wolverine.

It is the Forest Service determination that the proposed activities in the Slapjack Project area may affect individuals, but are not likely to result in a trend toward federal listing or loss of viability for the following Forest Service Sensitive species: western pond turtle, foothill yellow-legged frog, California spotted owl, northern goshawk, hardhead minnow, Pacific fisher, pallid bat, Townsend's big-eared bat, and western red bat.

3.13.7 Past, Present, and Reasonably Foreseeable Future Actions

This section summarizes the relevant past, present, and foreseeable future actions considered in the analyses disclosed above. Activities in the area include timber harvest, planting, pre-commercial thinning, herbicide use in plantations, recreation, mining, and grazing (refer to table 3-62 above). This table does not represent an all-inclusive list of activities and events considered in the analyses. Depending on habitat requirements, range, and other factors, the analysis for specific species may consider additional activities not listed in this table.

3.13.7.1 Past Actions

In order to understand how the effects of past actions would contributed to the cumulative effects of the proposed action and alternatives, the analysis relies primarily on current environmental conditions as a proxy for the impacts of past actions. This is because the existing condition reflects the aggregated impact of all prior human actions and natural events that have affected the environment and might contribute to cumulative effects.

Past activities in the area include timber harvest, planting, pre-commercial thinning, herbicide use in plantations, recreation, mining, and grazing. The conditions of the vegetation, streams, wildlife habitat, riparian areas, soils, and meadows in the Slapjack Project landscape today are the product of both natural occurrences, as well as post Euro-American settlement activities dating from the California Gold Rush.

Timber harvesting mostly supplied lumber and timber to ranches and mines in the vicinity. Intensive harvesting on National Forest lands began in the 1930s and continued to the 1990s. From 1917 through 2003, history records of large fires show a total of 58 fires that could have or did affect the Slapjack Project area. Large fires ranged from 100 acres to over 33,000 acres in size, the largest being the '49er fire that burned over 33,000 acres and destroyed 148 dwellings and 356 other

structures. See the “Fuels Report” for a Forest Service detailed fire history of class A, B, C, and D fires (0.1 acre to 300 acres) listed by watershed and fire cause.

It is understood that this data does not contain all of the fires that actually occurred due to numerous reasons (such as lack of reporting, differing priorities over the decades, or loss of records), but there is enough data to demonstrate the continuing influence of wildland fire in and surrounding the approximate 27,000-acre Slapjack Project area.

The combined effects of past timber harvest and fire exclusion have changed the tree species composition and structure of the forest. The most important effect is the loss of large trees and snags, and the resultant decrease in habitat values for pallid bats, goshawks, forest carnivores, great gray owls, spotted owls, and cavity-dependent species. The structural complexity of a stand comprised of predominately large trees differs from a stand comprised of small trees, even at the same canopy closure. For instance, the closer spacing of limbs in small trees allows less flight space and access into the crowns for nesting and roosting by large birds. Sunlight, moisture, and wind penetration of the stand (the microclimate) are different under a large tree canopy than that of small trees. The crowns of smaller trees are also closer to the ground, making them more susceptible to stand-replacing fires that would detrimentally affect habitat for late serial species. Changes in species composition have mixed effects; in some cases, changes may increase habitat value by increasing structural complexity in the canopy, as well as increasing canopy closure (such as white fir encroachment in pine stands). In other instances, changes may simplify stand structure (through the loss/reduction of sugar and yellow pines in mixed conifer stands) and increase the likelihood of stand-replacing fires.

Past activities on forest lands (from 1988 to 1991; before the CASPO [California Spotted Owl] Interim Guidelines) within the Slapjack Project area include clearcuts (1980, 1990, 2000), thinning (1980, 1990), and salvage activities (1980, 1990, 2000). These activities affected habitat suitability at varying levels. Other past activities, such as mining, logging camps, and railroad companies, have left scars on the land, and it will be years before suitable habitat for most species, other than the early seral stage species (such as deer), would recover from large areas of clearcut treatments. For a collective history of the project area, see “History of the Project Area” (section 3.6.3.3 in this EIS).

Other than the loss or reduction in quality of habitat, it is unclear as to the extent of the effect on Threatened and Endangered species since very little survey work was conducted. When added to the past actions, it is expected that the proposed treatments for the Slapjack Project would result in low incremental impacts in the short term and provide for a long-term gain in habitat protection and quality.

The Slapjack Project is largely surrounded by private lands that have been harvested and salvaged logged at varying degrees. The Feather Falls Salvage Project currently proposes to salvage up to 14,314 acres of dead, dying, or diseased trees. It is unclear at this time what the effects on wildlife and fish species would be from this action, but some level of effects are expected. However, proposed treatments for the Slapjack Project are expected to result in low incremental impacts when added to actions on private lands. In addition, the DFPZ treatments proposed for the Slapjack Project should help to protect private lands, as well as public lands, from habitat loss resulting from wildfires.

3.13.7.2 Present Actions

The Slapjack Project is part of a forestwide plan to place DFPZs in strategic locations. Treatments for this project would be part of DFPZs being implemented or proposed on National Forest lands in the area. Projects adjacent to the Slapjack Project include South Fork (SNFPA 2001), Lower Slate (SNFPA 2001), and Sugarberry (SNFPA 2004). The projects near the Slapjack Project, but not adjacent to it, include the Watdog Project and Bald Onion Project.

The primary impact from recreational use is vehicle traffic on roads. The Slapjack Project would not increase overall road densities. The roads in the Slapjack Project area that are proposed for decommissioning or closure are causing significant resource impacts. There are 18 miles proposed for decommissioning and 8 miles of road closures in the project area. The decommissioning of roads would lower the average road density from 5.7 miles per square mile to 5.5 miles per square mile. However, recreational use is expected to increase in the future as additional people recreate in the National Forest. Recreational use would continue to be monitored, and sensitive wildlife areas would be closed to the public, if necessary. If future recreation demands lead to increased OHV use or development of additional facilities, there would be a project analysis under the NEPA (*National Environmental Policy Act*) process.

3.13.7.3 Foreseeable Future

A Record of Decision was signed in July 2003 for the HFQLG Act final supplemental EIS. The Record of Decision documented the results of an environmental analysis of effects of alternative management strategies for maintenance of DFPZs within the HFQLG Pilot Project area. The final supplement EIS and Record of Decision, in combination with the original HFQLG Act final EIS and Record of Decision, provide programmatic guidance for DFPZ construction and maintenance in the HFQLG Pilot Project area. The DFPZ maintenance methods were developed from criteria in the final supplement EIS involving land allocations, slope classes, and vegetation characteristics.

The Record of Decision for the HFQLG final supplemental EIS calls for consideration of all practicable methods of vegetation control for site-specific projects, including the use of herbicides. As pointed out in the supplemental EIS, herbicides have been shown to be most efficient and effective in delaying or preventing the buildup of understory fuels when used within about two years of the initial treatment. Because alternatives C, D, and G do not propose herbicide use for preventive maintenance of the DFPZs, herbicide use for DFPZ maintenance in the foreseeable future is essentially precluded under these alternatives. For these alternatives, an underburn would be the final treatment where DFPZ objectives are not met with mastication. In the long term, based on site-specific analysis of land allocations, slopes, vegetation types, and previous underburning treatments (stands 1, 9, 15, 19, and 23) in the Slapjack Project area, the foreseeable maintenance of the DFPZ would consist of prescribed fire, mechanical treatments (mastication, grapple pulling), and hand treatments.

About 20 percent of the area in the proposed segments of the Slapjack Project DFPZs would be in plantations. After the completion of the mastication proposed for these areas, manzanita, *Ceanothus*, and other shrub species may re-sprout and begin reducing DFPZ effectiveness within five years of the initial treatment. However, young shrubs, especially *Ceanothus* species common in the area, have a high percentage of live material that maintains high fuel moisture content throughout the year. Younger shrubs are less flammable than older shrubs, since younger shrubs have a lower proportion

of dead to live branches than older shrubs. In addition, shrubs with high fuel moisture content can act as a heat sink by absorbing some of the heat produced by adjacent burning fuels without igniting themselves, thereby retarding fire spread. As an example, the Mosquito fire in August 1999 started from a lightning strike adjacent to a similar nine-year-old plantation of primarily ponderosa pine with a high component of *Ceanothus* shrubs. A fireline was quickly constructed through the middle of the plantation, and the fire was controlled at about 30 acres by one engine crew and a dozer.

The remaining 80 percent of the project area is made up of more natural stands of larger-sized trees, where the vegetation has not been as intensively treated. After thinning, biomass removal, mastication, and burning proposed in this project have been completed, some slow to moderate development of manzanita, *Ceanothus*, and other shrubs would occur, and in some areas, grasses would become more vigorous and dense. As the overstory canopy cover increases, shrub growth would become suppressed and overall shrub cover would decrease. Since mastication would not change canopy levels, or only change them slightly, these units would have the least understory. Over time, there would also be some natural regeneration of conifers, which could reduce DFPZ effectiveness by creating fuel ladders within 10 to 20 years after the initial treatment, depending on the site.

Even if no maintenance is conducted in these DFPZs in the future, the DFPZs should be effective for many years. In the natural stands, the DFPZs' effectiveness should not be seriously reduced for 10 to 20 years. In the plantations, the DFPZs' effectiveness should not be reduced for approximately 5 years. And, after these periods, the DFPZs would retain many of their beneficial characteristics (increased overstory crown spacing, reduced ladder fuels) for fighting fire and reducing fire intensity. For example, even if significant amounts of understory vegetation grow in the treated stands over the next several years, the proposed action would remove a significant amount of ladder fuel, such that the net amount of fuel would be reduced over time. Additionally, should there be a situation where a DFPZ has not been maintained for several years, but the Forest Service determines that the DFPZ would provide a safe position from which to fight an oncoming wildfire, Forest Service staff could conduct emergency maintenance at the time of the wildfire, such that the DFPZ would regain full effectiveness by the time the fire reached the area.

DFPZ, group selection, and individual tree selection projects are scheduled for areas adjacent to the Slapjack Project and at other locations within the Feather River Ranger District. The Upper and Lower Slate DFPZs are currently being implemented. The Upper Slate DFPZ is approximately 1,774 acres, and the Lower Slate DFPZ is approximately 3,510 acres. Analyses of the Upper and Lower Slate projects concluded that impacts on California spotted owls and other Forest Service Sensitive species would be minimal. The South Fork DFPZ (1,803 acres) and Bald Onion DFPZ (3,175 acres) Projects are also being implemented now, and the impacts are expected to be similar to the Slate DFPZ projects. Implementation of the Brush Creek DFPZ Project (2,044 acres) was initiated in 2005. The Basin Project, consisting of 1,215 acres of group selection and 80 acres of individual tree selection, is scheduled for implementation beginning in 2006. The Watdog Project includes 4,021 (including a maximum of 202.9 acres of group selection) acres of DFPZ and 28.5 acres of group selection outside of DFPZs and is scheduled for implementation in 2006. The Bald Mountain Project, with group selection (1,675 acres) and individual tree selection (190 acres), is scheduled for implementation in 2006. The Flea and Sugarberry projects propose group selection and DFPZ

construction, with a proposed implementation date of 2007. All of the projects discussed in this paragraph are HFQLG Act Pilot Projects.

3.13.8 Summary of Cumulative Effects

The cumulative effects of this project on fish and wildlife species include those effects from past, present, and reasonably foreseeable projects occurring in and adjacent to the Slapjack Project area, which includes 22,939 acres of National Forest System land. Past activities are considered part of the existing condition and are discussed in the "Affected Environment (Existing Conditions)" and "Environmental Consequences" sections for each resource.

California Red-legged Frog. By adhering to management directions, standards and guidelines, BMPs, and mitigations, direct adverse effects are not expected and indirect effects are expected to be low. The project may affect but is not likely to adversely affect the species. Adverse cumulative effects are also expected to be low.

Western Pond Turtle. By adhering to management directions, standards and guidelines, BMPs, and mitigations, impacts on turtle habitat would be prevented or strictly controlled, and habitat restoration and enhanced connectivity could result from proposed activities (including DFPZ) maintenance. The proposed activities in the Slapjack Project area would not result in direct effects but could result in low indirect effects. There would also be no incremental cumulative effects.

Bald Eagle. By adhering to management directions, standards and guidelines, direct and indirect effects are not expected, therefore cumulative adverse effects are not expected to occur.

California Spotted Owl. The determination is "low effect not likely to lead to a trend toward listing." This follows the determinations for the 1999 and 2003 Records of Decision on the HFQLG Act final EIS and final supplemental EIS, respectively, and the 2004 Record of Decision on the SNFPA final supplemental EIS. By adhering to management directions, standards and guidelines, BMPs, and mitigations, direct effects are not expected, and adverse indirect and cumulative effects are expected to be low.

Northern Goshawk. By adhering to management directions, standards and guidelines, BMPs, and mitigations, adverse direct effects are not expected and indirect effects are expected to be low. Adverse cumulative effects are not expected to occur. Habitat suitability is expected to increase as a result of the proposed treatments in the Slapjack Project area.

Great Gray Owl. By adhering to management directions, standards and guidelines, BMPs, and mitigations, no adverse direct, indirect, and cumulative effects are expected.

Little Willow Flycatcher. By adhering to management directions, standards and guidelines, BMPs, and mitigations, no adverse direct, indirect, and cumulative effects are expected.

Pacific Fisher. By adhering to management directions, standards and guidelines, BMPs, and mitigations, direct effects are not expected, and any indirect and cumulative effects would be low.

Pallid, Western Red, and Townsend's Big-eared Bat. By adhering to management directions, standards and guidelines, BMPs, and mitigations, any adverse direct, indirect, and cumulative effects are expected to be low.

Chapter 4. Consultation and Collaboration

4.1 Preparers and Contributors

The Forest Service consulted the following individuals; federal, state, and local agencies; tribes; and non-Forest Service persons during the development of this environmental impact statement:

4.1.1 Interdisciplinary Team Members

Name	Title	Education / Responsibility / Experience
Joanna Arroyo	Wildlife Biologist	M.S. in Wildlife Management and B.S. Wildlife Management, New Mexico State University, Las Cruces, New Mexico; 3 years of combined experience in wildlife.
Rick Case	District Fuels Specialist	Fire and fuels – 25 years of experience.
Deirdre Cherry	Fuels Technician	B.S. in Athletic Training, Boise State University, ID; 15 years of experience in fire and fuels.
Linda Christian	Planner	B.S. Forestry, Humboldt State University; 21 years of Forest Service experience.
Chris Christofferson	Assistant District Botanist	B.S. in Biology, with an emphasis in Ecology, California State University, Chico; M.S. in Integrated Pest Management, University of California, Davis; 6 years of experience in botany.
Jerry Gott	District GIS Coordinator	B.A. in Natural Sciences, California State University, Chico; A.A. in English, Shasta College; 6 years of experience in GIS; 21 years of experience in timber sale planning, preparation, and administration; 4 years of experience in fire management (Helitack); 2 years of experience in recreation (trails).
Pete Hochrein	Forest Transportation Engineer	B.S. in Forest Resource Management, University of California, Berkeley; M.S. in Forestry, Oregon State University; 26 years of Forest Service experience.
Kristina Hopkins	Forest Fisheries Biologist	Plumas National Forest.
Susan Joyce	Planner	B.S. in Anthropology, Franklin and Marshall College, Lancaster, PA; M.S. in Forestry, Michigan Technological University, Houghton, MI; 3 years of experience in community development and 2 years in planning.
Fred Levitan	Hydrologist	B.S. in Geology, Stanford University, Stanford, CA; M.S. candidate in Environmental Systems, Humboldt State University, Arcata, CA; 15 years of experience.
Bob Lowdermilk	Logging Systems / Transportation Planner	B.S. in Business Management, Western Carolina University, Cullowhee, NC; 34 years of experience in timber sale planning, preparation, and administration.

Name	Title	Education / Responsibility / Experience
Mike Mateyka	Silviculture and Economics	B.S. Forestry Management, University of Wisconsin; 30 years of Forest Service experience; emphasis in vegetation management, silviculture, and planning.
Linda Morehouse-Braxton	Assistant Resource Officer	Various resources – 26 years of Forest Service experience in recreations/lands/minerals management, timber sale preparation/administration, and business administration.
Cindy Roberts	District Wildlife Biologist	M.S. in Wildlife Management; B.S. in Wildlife Biology, Sacramento State University, Sacramento, CA; 16 years of experience in wildlife management.
Daniel Roskopf	Forester, Silviculturist	B.S. Forest Resource Management, Minor Natural Resources, Humboldt State University, 1984; Silviculture Institute, Oregon State University, and University of Washington, 1992; California Certified Pesticide Applicator; 22 years of experience in fire, timber, and silviculture.
Deborah Tibbetts	Assistant District Archaeologist	B.A. in Anthropology, University of California Berkeley; M.A. In Anthropology, California State University, Chico; 15 years of experience in archaeology.
Kelly Whitsett	District Hydrologist	M.S. in Hydrogeology, University of Arkansas–Fayetteville; B.S. is Geology and Geophysics, University of Missouri–Rolla; 3 years of experience in forest hydrology.
Katherine Worn	District Planner	M.S. in Interdisciplinary Natural Resources and B.S. in Forestry, Humboldt State University, Arcata, CA; 20 years of experience in natural resource management.
Sara Ashkannejhad	Forester	B.S. in Forest Management from Oregon State University, Corvallis, OR. M.S. in Forest Biology from State University of New York Environmental Science and Forestry, Syracuse, NY.
Colleen O'Brien	Landscape Architect / Planner	B.A. in Human Ecology, College of the Atlantic. MLA from the Royal Melbourne Institute of Technology.

4.1.2 Federal, State, and Local Agencies

The Forest Service consulted with the following federal and state agencies during the development of this environmental impact statement.

4.1.2.1 United States Fish and Wildlife Service

The U.S. Fish and Wildlife Service (USFWS) issued the species list for the Plumas National Forest on April 23, 2003 (USFWS reference 1-1-03-SP-1810), and updated the computer database on August 30, 2005. The list fulfills the requirement to provide a current species list pursuant to Section 7(c) of the *Endangered Species Act*, as amended.

Wildlife. The formal consultation between the Forest Service and USFWS began on May 4, 2004. At that time, the Threatened, Endangered, Proposed, Sensitive, and Candidate species with the

potential to occur in the Slapjack Project area were reviewed. Communications between the Forest Service and USFWS have been ongoing since initial contact with the USFWS.

Beginning in May 2004, a series of informal meetings and written correspondence have occurred between the Forest Service and USFWS regarding the federally listed California red-legged frog and bald eagle found in the project area. It has been determined through informal consultation that the proposed treatments for the Slapjack Project would not adversely affect the California red-legged frog and would not affect the bald eagle, if Forest guidelines were followed for protection of these species. The *Federal Register* notice released on November 3, 2005, advised that the California red-legged frog be managed under *Herger-Feinstein Quincy Library Group Forest Recovery Act* (HFQLG Act), as amended by the Sierra Nevada Forest Plan Amendment and administered by the Plumas National Forest.

The draft study plan for the Plumas and Lassen National Forests Administrative Study (now referred to as Plumas Lassen Case Study), dated September 12, 2001, was reviewed by the USFWS, as was the proposed action for the Administrative Study dated December 10, 2002. In response to the initial proposed action, a USFWS letter dated January 31, 2003, expressed concern over specific road construction proposed for access to group selection harvest units and the road's effect on fragmentation to old forest dependent species.

Rare Plants. On January 17, 2006, the Forest Service initiated formal consultation with the USFWS on the Threatened plant *Senecio layneae*. The USFWS was contacted in the spring of 2005 regarding the potential occurrence of *Senecio layneae* in the project area. Kathy Brown of the USFWS attended a field meeting in the project area on August 3, 2005. The *Senecio layneae* site was visited, and potential treatments were discussed. She was supportive of treatments consistent with those listed in the USFWS *Recovery Plan for Gabbro Soil Plants of the Central Sierra Nevada Foothills* (USFWS 2002), which includes desired future conditions for *S. layneae*. On September 26, 2005, Kyle E. Merriam (Associate Sierra Cascade Province Ecologist) sent an email to Kathy Brown requesting clarification on permitting. According to Ms. Brown, Section 7 of the *Endangered Species Act* provides for monitoring, and a permit would not be required.

4.1.2.2 California Department of Fish and Game

The department was contacted during scoping for the Slapjack Project and was provided with the proposed action. The department manages wildlife populations for the state of California, and their emphasis with the Forest Service is typically on game species such as the local deer herds and associated habitats.

4.1.3 Tribes

The following federally recognized tribes and interested and affected tribes were consulted regarding the Slapjack Project: Mooretown Rancheria, Enterprise Rancheria, Berry Creek Rancheria, Chico Band of Mechoopda Indians, and the Konkow Valley Band of Maidu.

4.1.4 Organizations

The Forest Service began collaboration in 2003 with a group of organizations interested in reducing wildland fire risk to communities and the environment in Butte and Yuba Counties. The Forest Service met regularly with a core group comprised of representatives from the Natural Resource Conservation Service, California Fire Safe Council, Butte Fire Safe Council, Yuba Watershed Protection and Fire Safe Council, the Quincy Library Group, Rancherias, industrial timberland owners including Soper-Wheeler and Chy Company, and other private landowners. Other groups or organizations involved include the Bureau of Land Management and the California Department of Forestry and Fire Protection. The Slapjack Project developed from this collaborative effort. In September 2004, the Forest Service helped organize the Eastern Butte/Yuba Fire Prevention Planning Tour, sponsored by the Butte Fire Safe Council and Yuba Watershed Protection and Fire Safe Council. The goal of the tour was to educate and promote a collaborative and coordinated planning process to address fuel reduction and fire prevention on a landscape scale.

Collaboration with the Butte Fire Safe Council and Yuba Watershed Protection and Fire Safe Council has been ongoing since 2003. Forest Service personnel have been in regular attendance at monthly Fire Safe Council meetings and have kept the councils and other stakeholders apprised of changes in project status. In September 2005, the Forest Service formally presented the Slapjack Project to the Butte and Yuba Fire Safe Councils. Both councils responded with letters of support.

4.2 Distribution of the Final Environmental Impact Statement

The final environmental impact statement was distributed to agencies, organizations, and individuals as required by the Council on Environmental Quality regulations (40 CFR 1502.19) that implement the *National Environmental Policy Act*. In addition, copies have been sent to the following federal agencies; federally recognized tribes and interested and affected tribes; state and local governments; and organizations. The complete mailing list is on file at the Feather River Ranger District Office.

4.2.1 Federal, State, and Local Agencies

Council on Historic Preservation

Director for Planning and Review Advisory, Washington DC

Environmental Protection Agency

Region 9 Federal Activities Office, Laura Fujii, San Francisco, CA

EIS Filing Section, Washington DC

Federal Aviation Administration, Western-Pacific Region, Lawndale, CA

Federal Highway Administration

California HDA-CA, Sacramento, CA

National Marine Fisheries Service, Longbeach, CA

State of California

Butte and Yuba Units of the California Department of Forestry and Fire Protection

University of California, Davis, Cooperative Extension

U.S. Department of Homeland Security

U.S. Coast Guard, Washington DC

U.S. Department of Agriculture

APHIS PPD/EAD, Riverdale, MD

Forest Service, Ecosystem Management Coordination, Washington DC

National Agricultural Library, Beltsville, Maryland

Natural Resources Conservation Service, Washington DC

Pacific Southwest Forest Research Station

U.S. Department of Defense

Army Engineer Division, CESPD-CMP, San Francisco, CA

U.S. Department of Energy

Office of NEPA Policy & Compliance, Washington DC

U.S. Department of the Interior

Fish and Wildlife Service, Wayne S. White, Sacramento, CA

Director, Office of Environmental Policy & Compliance, Washington DC

4.2.2 Tribes, Local Agencies, Nongovernmental Organizations, and Individuals

The *Slapjack Project Final Environmental Impact Statement* was sent to the following organizations, individuals, and federally recognized tribes and interested and affected tribes:

Tribes	Berry Creek Rancheria
	Enterprise Rancheria
	Mooretown Rancheria
	Chico Band of Mechoopda Indians
	Konkow Valley Band of Maidu

Local Agencies

Butte County Fire Safe Council
Yuba Watershed Protection and Fire Safe Council
Yuba County Rural Fire Joint Powers Agency
County of Yuba, Office of the Board of Supervisors
Counties of Lassen, Plumas, Shasta, Sierra, and Tehama QLG Forester

Nongovernmental Organizations

American Forest Resource Council (AFRC)
Californians for Alternatives to Toxics (CATS)
Dobbins/Oregon House Action Committee (DOACT)
John Muir Project
Lake Francis Grange #745
Lassen Forest Preservation Group
South Feather Water and Power
Sierra Nevada Forest Protection Campaign
Sierra Pacific Industries

Individuals

Ashmore, Julie
Banzaf, Joyce
Bault, William
Black, Stephen
Buschman, Sarah
Cook, Rikki
Davis, Carrol
Doner, Marc
Frederickson, Lana
Furnee, Mariele
Hai, XiangShu
Heming, Charles
Holcomb, Charles and Liz
Holmes, Wendy
Hoskins, Phil and Jean
Kellerman, Larry
Kennedy, Ashley
Mathiessen, Dougan and Bernie
Meyer, Ken
Middlebrook, John
Murphy, Robin
Murphy, Tony
Olson, Laura
Pugh, Roger and Helen
Richardson, Steffanie
Schroeder, Fred
Silvan, Sean
Steidl, Bruce and Leslie
Steele, Don
Wright, Alton

Acronyms

BA	biological assessment
BACM	Best Available Control Measure
BE	biological evaluation
BMP	Best Management Practices
CAS	Chemical Abstract Service
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CWHR	California wildlife habitat relationships
dbh	diameter at breast height
DFCN	draft forest carnivore network
DFPZ	Defensible Fuel Profile Zone
EHR	Erosion Hazard Rating
EIS	environmental impact statement
ERA	Equivalent Roaded Area
FMA	Fire Management Analyst
FOFEM	First Order Fire Effects Model
FSH	Forest Service Handbook
HFQLG	Herger-Feinstein Quincy Library Group
IPM	Integrated Pest Management
ID	interdisciplinary
LD	lethal dose
LC_{50}	lethal concentration
LD_{50}	lethal dose
LRMP	land and resource management plan
LSOG	late-successional old-growth
MIS	Management Indicator Species
mmbf	million board feet
MMM	Management and Mitigation Measures
NEPA	National Environmental Protection Act
NFFL	Northern Forests Fire Laboratory

NFMA	National Forest Management Act
NOAEL	No Observable Adverse Effects Level
NOEC	No Observable Effect Concentration
NOEL	No Observable Effects Level
NRHP	National Register of Historic Places
NTMB	Neotropical migratory birds
NTU	nephelometric turbidity units
OHV	off-highway vehicle
PAC	Protected Activity Center
PM	particulate matter
PSW	Pacific Southwest Research Station
RAWS	Remote Automated Weather Station
RCA	Riparian Conservation Area (under SNFPA)
RFCC	fire regime and condition class
RHCA	Riparian Habitat Conservation Area (under HFQLG)
RCO	Riparian Conservation Objective
RMO	Riparian Management Objective
ROS	Recreational Opportunity Spectrum
SAT	Scientific Analysis Team
SMC	Sierra mixed conifer
SMZ	Stream Management Zone
SNFPA	Sierra Nevada Forest Plan Amendment
SOHA	Spotted Owl Habitat Area
TMDL	Total Maximum Daily Load
TOC	Threshold of Concern
USDA	United States Department of Agriculture
VQO	Visual Quality Objective

Glossary

Acid equivalent — when making herbicide rate recommendations for herbicides that are available as either salts or esters or both, it is a common practice to make the recommendations on the basis of pounds of the acid equivalent of the active ingredient per acre (lb ae /A). The acid equivalent of a salt or ester form of an herbicide is that portion of the molecule that represents the parent acid (herbicidal portion) form of the molecule (Wood et al. 1996).

active crown fire — the independent movement of flames from a fire through the branches and top of the trees.

age class — a distinct aggregation of trees originating from a single natural event or regeneration activity.

all-aged — see uneven-aged.

allelopathic — the suppression of growth of one plant species by another due to the release of toxic substances.

bald eagle habitat —

primary bald eagle habitat – land within a 0.25 mile radius of a nest tree.

secondary bald eagle habitat – land adjacent to the primary habitat that is used predominantly for roosting and perching and also to a lesser degree for foraging.

tertiary bald eagle habitat – areas used by eagles for foraging.

basal area — the combined area of the cross sections of tree boles at a height of 4.5 feet above the ground, generally given as square feet per acre.

biomass — limbs and foliage (parts of trees other than logs) that can be collected, chipped, or ground; exported from the forest; and used for power production or manufacture of wood fiber products.

bole — the main stem of a conifer tree, which becomes a log or logs when the tree is cut.

California Wildlife Habitat Relationships (CWHR) — a system developed jointly by Forest Service Region 5 and the California Department of Fish and Game that classifies forest stands by dominant species types, tree sizes, and tree densities and rates the resulting classes in regard to habitat value for various wildlife species or guilds. The CWHR system has three elements: (1) major tree-dominated vegetation associations, (2) tree size, and (3) canopy cover. Tree size and canopy cover classes are:

Tree Size Classes

1 = Seedling (less than 1 inch dbh)
2 = Sapling (1–6 inches dbh)
3 = Pole (6–11 inches dbh)
4 = Small (11–24 inches dbh)
5 = Medium/Large (greater than 24 inches dbh)
6 = Multilayered (size class 5 over a distinct layer of size class 3 or 4, total canopy greater than 60-percent closure). In this EIS, class 6 is included in class 5.

Canopy Cover Classes

S = Sparse Cover (10–24 percent canopy closure)
P = Poor Cover (25–39 percent canopy closure)
M = Moderate Cover (40–59 percent canopy closure)
D = Dense Cover (greater than 60 percent canopy cover)

canopy — the branches and foliage of trees (as distinct from the stem or bole).

Canopy base height — the height above the ground of the first canopy layer where the density of the crown mass within the layer is high enough to support vertical movement of a fire.

canopy cover — the ground area covered by tree crowns, or the degree to which the canopy blocks sunlight or obscures the sky, expressed as a percent of ground area; also referred to as canopy closure or crown cover.

chain — A chain is a measurement of distance. One chain = 66 feet.

closed road — a road from which mechanical equipment is excluded. A Forest Service road in closed status is a road that is still part of the Forest Service road system but has been closed to traffic by some type of barrier, such as a gate, berm, or boulder(s).

crown — see canopy.

crown base height — for a single tree, it is the height from an imaginary line drawn across the trunk to the bottom of the obvious lowest live foliage.

crown bulk density — canopy weight per unit volume.

crown cover — see canopy cover.

decommission — closing a road to mechanical use and returning the road to a natural or semi-natural condition. This could include removing stream crossing fills and structures (e.g., culverts or bridges), recontouring to natural topography obliteration (e.g., replacing fill slope material against cut slopes), surface shaping (e.g., constructing in-road water bars), and/or surface scarification.

Defensible Fuel Profile Zone — a zone approximately 0.25 mile wide accessible to firefighters (usually along roads) in which fuel loads are light enough to cause approaching crown fires to drop to the ground where it may successfully be attacked by ground forces during 90th percentile weather conditions.

diameter at breast height — the diameter of a tree measured at 4.5 feet above the ground on the uphill side.

direct economic impact — effects caused directly by forest harvest or processing or by forest uses.

disturbance — a natural event such as a fire, flood, or earthquake.

dripline — the perimeter of the vertical projection of a tree canopy upon the ground.

duff / duff layer — Decaying leaves and branches on the forest floor.

effective ground cover — is the amount of ground cover left after the fire; it is expressed in percent.

endemic — in the context of this environmental impact statement, refers to localized pockets within a small area, such as a pocket within a stand or a small stand.

Equivalent Roaded Area — a conceptual unit of measure used to assess ground-disturbing activities. All landscape disturbances are evaluated in comparison to a completely impervious or roaded surface. Road surfaces are considered to represent 100 percent hydrologic disturbance, with maximum rainfall-runoff potential. Other ground-disturbing activities are assigned disturbance coefficients that represent a typical ratio of their hydrologic impact compared to the same roaded area. Disturbance coefficients are assigned based on local conditions. In a given watershed, disturbances are added together to determine a cumulative equivalent roaded area and compared to the Threshold of Concern.

fire brand — burning material, such as foliage, that is carried by the wind to start new fires outside the main fire (spotting).

fire frequency — the average number of years between fires.

fire regime and condition class — a classification of the amount of departure from the natural fire regime. Assessing fire regime and condition class can help guide management objectives and set priorities for treatments.

fire type — a description of how a fire burns, such as on the forest floor (surface) or in the tree crowns.

flame length — the length of flame measured in feet. Increased flame lengths increase resistance to control and likelihood of torching events and crown fires.

fuel arrangement — how fuels are distributed in the fuel bed.

fuel bed — The fuels both living and dead that are available to burn.

fuel loading — the weight of fuel (vegetative matter both living and dead) present at a given site; usually expressed in tons per acre. This value generally refers to the fuel that would be available for consumption by fire.

fuel strata — this is the vertical and horizontal continuity and arrangement of the fuel bed.

grapple pile — gathering and piling of thinnings, harvest slash, and brush using mechanical equipment.

group selection — a silvicultural system that involves harvest of small areas of trees (generally less than 2 acres). Implementation results in uneven-aged (all-aged) forests consisting of small even-aged (same-aged) groups. Harvest openings must be large enough to allow for sufficient sunlight for regeneration tree seedlings to establish and grow.

grubbing — removal of vegetation at or below ground level with hand tools.

guild — used to group plant species that use similar resources in a similar way. Plant species in the same guild are found in similar habitat types and have similar environmental requirements.

hand piling — piling branches and limbs from tree harvests or thinnings by hand for burning at a later time.

hand line — fire lines created by forest workers using shovels and hand tools to remove organic materials and expose mineral soil. The line width generally ranges between 2 and 3 feet.

hazard quotient — the ratio of the estimated level of exposure to the reference dose or some other index of acceptable exposure.

Home Range Core Area — mapped foraging area.

horizontal arrangement — the horizontal distribution of fuels at various levels and planes.

indirect economic impact — an effect that occurs when supporting industries sell goods or services to directly affected industries.

individual tree selection — a type of tree harvest designed to prevent the spread of insects and disease, reduce overstocking, and generally improve or maintain health of forest stands.

induced economic impact — an effect that occurs when employees or owners of directly or indirectly affected industries spend their income within the economy.

Integrated Pest Management — A process that determines an economic or environmental threshold for managing pest populations and prescribes the management technique to reach desired conditions. An IPM includes four broad categories of techniques: biological, cultural, mechanical, and chemical.

Interdisciplinary Team (ID Team) — The team of Forest Service resource specialists involved in project planning and analysis. The ID Team members for the Slapjack Project are listed in at the beginning of this chapter.

ladder (fuel) — shrubs or trees that connect fuels at the forest floor to the tree crowns

landings — forested openings that are cleared of vegetation, leveled, and graded and used to store (deck) logs and eventually to load log trucks for haul to the mill.

late-successional old-growth ranks 4 and 5 — late mature successional stages of forest trees, as defined by the Sierra Nevada Ecosystem Project (volume II, appendix 21.1).

leave trees — the trees that are purposefully left in a stand that is thinned or harvested.

LC_{50} (lethal concentration) — a calculated concentration of a chemical in air to which exposure for a specific length of time is expected to cause death in 50 percent of a defined experimental animal population.

LD_{50} (lethal dose) — the dose of a chemical calculated to cause death in 50 percent of a defined experimental animal population over an observation period, typically 14 days.

lotic — of, relating to, or living in actively moving water.

mast — the fruit of the oak and other forest trees used as food by wildlife.

mastication — mechanical grinding of harvest residue or thinnings; masticated material is usually left scattered on the harvest site.

matrix — the untreated area between group selections within a stand or treatment unit.

mechanical thinning — the use of tractors, cable systems, or helicopters to remove trees that have been cut by chainsaws; also refers to the use of feller-bunchers—wheeled vehicles with lopping shears or saws that cut and collect trees and carry them to a landing site.

midden — refuse heap, dunghill, or a small pile of seeds, bones, or leaves gathered by a rodent.

multilayer — stand with three or more distinct foliage layers (canopies). Trees in the different layers may or may not be in the same age class.

mycorrhiza — the mutually beneficial association of a fungus and the roots of a plant, such as a conifer or an orchid, in which the plant's mineral absorption is enhanced and the fungus obtains nutrients.

natural fire regime — a general classification of the role fire would play across a landscape in the absence of modern human mechanical intervention, but it also includes the influence of aboriginal burning (Agree 1993; Brown 1995).

No Observed Adverse Effect Level (NOEL) — the dose of a chemical at which no statistically or biologically significant increases in frequency of severity of adverse effects were observed between the exposed population and its appropriate control. Effects may be produced at this dose, but they are not considered to be adverse.

No Observed Effect Concentration (NOEC) — the highest concentration or amount of chemical in the test system that causes no observable biological effect to the target organism.

No Observed Effect Level (NOEL) — the exposure level at which there is no statistically or biologically significant differences in the frequency or severity of any effect between the exposed or control population.

90th percentile weather conditions — hot, dry, and windy weather conditions that are exceeded only 10 percent of the time during fire season; 90th to 97th percentile conditions are considered *high*; 99th to 100th percentile are considered *extreme*.

Off Base and Deferred Lands — federal lands identified in the Herger-Feinstein Quincy Library Group (HFQLG) Forest Recovery Act from which timber harvest and road construction are excluded during the term of the HFQLG Pilot Project.

operability — the ability to conduct vegetation management operations, which include construction of access roads and log landings, use of cable logging systems, clearing of central skid trails for tractor logging, and removal of trees that pose hazards to forest workers.

particulate matter — the general term used for a mixture of solid particles and liquid droplets found in the air. Some particles are large enough to be seen as dust or dirt. Others are so small they can be detected only with an electron microscope. $PM_{2.5}$ describes the "fine" particles that are less than or equal to 2.5 µm in diameter. "Coarse fraction" particles are greater than 2.5 µm, but less than or equal to 10 µm in diameter.

passive crown fire — the movement of fire through groups of trees; it usually does not continue for long periods of time.

phylogenetic — the development of a species, genus, or group as contrasted with the development of an individual.

piling and burning — piling harvest or thinning residues (branches and limbs) and burning them when moisture content has been reduced through evaporation, wildfire hazard is low, and atmospheric conditions are favorable for dispersal of smoke.

prescribed burning — fire purposefully ignited to achieve a beneficial purpose, such as reducing fuels on the forest floor or fuels generated by logging or thinning forest trees.

present net value — includes only the benefits and costs of producing primary outputs, excluding secondary benefits.

primary skid trails — skid trails over which equipment has skidded or will skid logs three or more times.

production rates — the amount of fireline distance expressed in chains that a suppression resource can establish in a given time period.

quadratic mean diameter — the upper story diameter of a tree of mean basal area within dominant or codominant positions in the stand. In other words, instead of being an arithmetic average of tree diameters, it is a weighted average based on the basal area of each tree in the upper story within the stand.

rate of spread — the relative activity of a fire in extending its horizontal dimensions. It is expressed as rate of increase of the total perimeter of the fire. For this document, it is expressed as rate of forward spread of the fire front and is measured in chains per hour.

reconstruction — rebuilding of an existing road in or adjacent to its current location to improve capacity and/or correct drainage problems.

regeneration — tree seedlings and saplings that have the potential to develop into mature forest trees.

release — in the context of this environmental impact statement, giving large, old pines more space to grow—to "release" them from crowded conditions.

residual trees — trees that are left to grow in a stand following treatment or fire.

resistance to control — the relative difficulty of constructing and holding a control line as affected by resistance to line construction and fire behavior; also called "difficulty of control."

RfD, reference dose — a daily dose which is not anticipated to cause any adverse effects in a human population over a lifetime of exposure. These values are derived by the U.S. Environmental Protection Agency.

Riparian Habitat Conservation Areas — zones of specified widths along streams and watercourses and around lakes and wetlands that vary according to stream or feature type, as described in the Scientific Analysis Team guidelines.

sanitation — tree removal or modification operations designed to reduce damage caused by forest pests and to prevent their spread.

Scientific Analysis Team (SAT) Guidelines — This is a report written in 1993 on the viability assessments and management considerations for species associated with late-successional old-growth forests of the Pacific Northwest. These guidelines were adopted into the HFQLG final supplemental EIS.

scorch-to-kill height — the maximum vertical height at which lethal scorching of foliage occurs. Below this height, all foliage is brown and dead; above it, live and green.

serpentine substrate — a dull green or brownish mineral consisting of hydrous magnesium silicate. It is often used as an ornamental stone.

seral — relating to a series of ecological communities formed in ecological succession.

shade intolerant — species (such as ponderosa pine) that require full, open sunlight on the forest floor to establish and grow.

silviculture — a branch of forestry dealing with the development and care of forests.

size class — a classification of forest stands based on the average diameter of trees in the stand.

snag — a dead standing tree.

stocking level — the number of regenerated trees per acre in a tree-harvest unit.

subsoiling — performed after vegetation treatments, wherein mechanized equipment is used to till compacted soil to reduce soil compaction and consequent soil erosion.

surface fire — a fire that burns surface litter, debris, and small vegetation.

thinning from below — the process of thinning a conifer stand by removing the smallest diameter trees and successively removing larger diameter trees until a canopy cover or basal area retention standard is met for the stand.

Threshold of Concern — describes the amount of disturbance when detrimental responses may begin to occur. Estimates of watershed "tolerance" to land use may be established based on basin-specific experience, comparison with similar basins, and modeling of watershed response. These indices of allowable levels of disturbance are called Thresholds of Concern. The tolerance of a watershed is used to prescribe mitigation measures to prevent detrimental responses. The Threshold of Concern does not represent an exact level of disturbance above which cumulative watershed effects will occur. Rather, it serves as a "yellow flag" indicator of increased risk of significant adverse cumulative effects occurring within a watershed. It is compared to the equivalent roaded area score, and its units of measure are expressed as percent disturbed and percent of Threshold of Concern.

torching — (1) the envelopment in flame of live or dead branches on a standing tree or group of trees; (2) fire burning a single or very small group of trees.

tree mortality —is the probability that a live tree will die expressed in percent.

ultramafic — extremely basic; very low in silica and rich in iron and magnesium minerals.

underburning — a prescribed fire in fuels on the forest floor that is intended to generally remain on the forest floor without consuming significant portions of the forest canopy.

uneven-aged — a stand of trees of three or more distinct age classes, either inter-mixed or in small groups. Uneven-aged silvicultural systems are a planned sequence of treatments designed to maintain and regenerate a stand with three or more age classes.

vertical arrangement — is the arrangement of fuels above the ground in their relationship to one another.

whole tree removal — the whole-tree harvest method is where trees are felled at the stump and skidded to the landing for de-limbing, bucking, and processing. Large trees may be bucked in the treatment unit to facilitate removal to the landing and reduce skidding damage to residual trees. Most activity slash would be removed to the landing.

Wildland Urban Interface (WUI) — the area, or zone, where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels. It generally extends out for 1.5 miles from the edge of developed private land into the wildland.

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