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Environmental Assessment
Alder Creek Project

Truckee Ranger District, Tahoe National Forest

Nevada County, California

INTRODUCTION

Background

A Forest Health Protection team from the USFS Pacific Southwest Region recognized the ongoing bark beetle infestation in the project area as a serious forest health problem. Each year, Forest Health Protection funding is available for insect and disease suppression/prevention projects, which are essential to maintain and improve forest health on National Forest System lands. The team selected the Alder Creek Project area as a high priority in the region for suppression/prevention funds to reduce further mortality from insects and disease. The ongoing conifer mortality and associated heavy ground, ladder and standing fuels in the project area prompted the California Department of Forestry and Fire Protection, the Tahoe Donner Association forester, the Town of Truckee, and concerned citizens to approach the Forest Service to voice concern over the threat of wildfire to the local community. Their concerns focus on the interface between the Town of Truckee and the Alder Creek Project area, where three large subdivisions contain over 6,500 homes. In 2005, Doug Cushman of the California Water Quality Control Board Lahontan Region visited the project area and acknowledged the past disturbances in the watershed that have placed one subwatershed over a threshold of concern (TOC). He identified watershed improvement activities that could be incorporated into project design to help restore hydrologic function in the watershed.

Purpose and Need for Action

The purpose of this project is to improve forest health, reduce hazardous fuels, and improve watershed conditions in the Alder Creek Project Area. This action responds to the goals and objectives outlined in the Tahoe National Forest Land and Resource Management Plan, as amended by the January 2004 Sierra Nevada Forest Plan Amendment Final Supplemental Environmental Impact Statement Record of Decision (2004 ROD). The 2004 ROD lays out broad management goals and strategies for National Forests in the Sierra Nevada (2004 SNFPA ROD, pp. 31 to 36). The goals and strategies that apply to the Alder Creek Project Area are those that address: Old Forest Ecosystems and Associated Species; Aquatic, Riparian and Meadow Ecosystems and Associated Species; Fire and Fuels Management; and Noxious Weeds.

Specifically, the purpose and need for the Alder Creek Project are:

To improve the health of conifer stands by reducing stand density

Existing Condition: The Donner Ridge Fire in 1960 burned much of the Alder Creek watershed. Vegetation in the Alder Creek project area is characterized by relatively young conifer stands that did not burn, with a scattered overstory of residual trees that survived the fire. The project area also contains brushfields that developed after the fire, some of which have been planted with conifers. Fire suppression since the Donner Ridge Fire has allowed much of the area to become overstocked with white fir, and lodgepole, ponderosa and Jeffrey pine.

From 1999 to 2001 the Alder Creek Timber Sale thinned saw timber and large non-merchantable timber in upland areas and areas south of Alder Creek, but left a dense understory of natural regeneration that now poses a future forest health risk. As was common practice at the time, the

timber sale avoided treatment in the Alder Creek stream zone. Consequently, the project area, including the riparian corridor is heavily overstocked, and experiencing poor forest health, and increasing conifer mortality.

Overstocking has impacted conifer growth and vigor leaving conifers highly susceptible to attack by insects and disease. Mountain pine beetle, Jeffrey pine beetle and fir engraver beetle have caused extensive conifer mortality, and continue to be active pests. Singularly, drought, overstocking, insects and disease can affect conifer growth and vigor. However, when one or more of these factors occur in combination, conifers are highly vulnerable to attack.

An effective strategy is needed is needed in the project area to reduce the effects of the complex of factors that are impacting conifer growth and vigor. The only factor, which can be managed is stocking. Reducing conifer density through thinning and implementing preventive measures to reduce the spread of root disease are needed to improve conifer growth and vigor, and help prevent further losses to insects and disease.

The need is supported by USDA FS scientists who have visited the project site. A USFS Region 5 Pest Management Team recognized the seriousness of current bark beetle infestation in the project area, and has identified the Alder Creek Project as a high priority for treatment and funding to prevent further conifer losses. Annosus root disease, which is caused by the fungus *Heterobasidion annosum* is also present in the project area. This disease affects all western conifers, and is a particularly serious problem in the eastside pine type of northern California (Kliejunas, 1989). The disease, which spreads through root contact weakens trees and further increases their susceptibility to bark beetle attack or can even result in tree death, particularly in pines. Bill Woodruff, Plant Pathologist from the USFS Pacific Southwest Region visited the project area and found evidence of the disease in white fir stumps. He concurred that stocking control was needed to improve conifer growth and vigor, and reduce susceptibility to insects and root disease. He recommended taking preventative action to reduce the spread of annosus root disease to uninfected trees, e.g. borax treatment of freshly cut stumps. Documentation of his findings and recommendations are contained in the project record.

The need for the project is consistent with the 2004 SNFPA FSEIS ROD (2004 ROD), in which one of the key elements of the Old Forest Ecosystem Strategy is “a proactive approach for improving forest health with management objectives to reduce susceptibility of forest stands to insect and drought-related tree mortality by managing stand density levels.” The project is needed to help the project area progress toward desired condition described in the 2004 ROD.

Desired Condition: Healthy, vigorous conifer stands that can develop into large, fire tolerant trees at densities consistent with the site’s ability to sustain forest health during drought conditions. Conifer spacing is approximately 17 to 20 feet and, the Stand Density Index (SDI) is below the zone of imminent mortality. The spread of annosus root disease is minimized.

To reduce hazardous fuels that threaten private land and the local community

Historically, fire played an important role in shaping the ecosystem. Prior to settlement, fires occurred frequently. Low intensity fires kept the forest fuels to a minimum and maintained a mosaic pattern. Surface fires dominated the area and when fires occurred, less than 25% of the overstory was destroyed. Fire intensity levels were low to moderate and rarely experienced stand replacing fires (Agee 1993).

However, in the 1920's and 1930's heavy urban development in the State of California gave way to a philosophical change that emphasized the suppression of fire. Fire was not allowed to play the same role in the natural ecosystem (Coleman 1994 I-Zone). The once open stands of mature pine have been replaced by stands with more trees per acre, greater mortality from insects and disease, heavier fuel loading, which increase the risk of severe wildland fires.

Today the fire frequency in the Alder Creek analysis area has been significantly altered from its historical range, based on an estimated historical frequency of fire in Jeffrey and ponderosa pine stands of 11 to 16 years (Agee 1993). The project area has not experienced a large fire, since the Donner Ridge Fire, and the analysis area has missed approximately 3 to 4 fire return intervals.

Heavy tree mortality in dense conifer stands in the project area has created both hazardous standing and surface fuel accumulations, similar to the conditions before the Donner Ridge Fire. Understory vegetation, such as shrubs and natural conifer regeneration have created hazardous ladder fuel conditions. Current levels of dead and dying trees and accumulations of downed wood pose an extreme threat to the Tahoe Donner, Stony Creek and Prosser Lakeview Estates Subdivisions. These subdivisions border or lie in close proximity to the project area and contain approximately 6,500 residences. The Tahoe Donner Association Forester, the California Department of Forestry and Fire Protection, the Chief of the Truckee Fire Protection District, and concerned citizens have asked the USFS to take action to remedy the forest health and fuels problem in the project area to protect area homes.

The entire project area is designated as Wildland Urban Interface (WUI). This is a zone where human habitation is mixed with areas of flammable wildland vegetation. The portion of the project area south of Alder Creek lies within Truckee town limits, and is designated as a WUI Defense Zone (approximately 404 acres). The fuels management objectives in this zone, as outlined in the 2004 ROD, are to create defensible space near communities, and provide a safe and effective area for suppressing fire. The northern portion of the project area is designated as a Threat Zone (approximately 374 acres). As directed by the 2004 ROD, fuels management objectives are to establish and maintain a pattern of area treatments that is effective in modifying wildfire behavior in the Threat Zone.

The Alder Creek Project is needed to respond to: public concern over the threat of wildfire, and comply with the 2004 ROD management direction in the WUI. The project is needed, as a cooperative landscape effort with the Tahoe Donner Association that would enhance past and planned efforts on both private and National Forest Lands to increase the efficacy of fire suppression efforts, and reduce the potential for a fire to become catastrophic.

Desired conditions: Improved fire suppression environment and modification of fuels conditions that would result in a very low probability of sustained crown fire. Forest vegetation density and fuel levels allow for the safe application of prescribed fire. Flame lengths during prescribed fire would generally be in the range of 1 to 4 feet with mortality rates of overstory trees in the range of 0 to 10%. Thinning and fuel reduction treatments achieve or trend toward a Fire Regime condition Class of 1 (a low amount of departure from the natural fire regime).

To reduce hazardous fuels to help protect sensitive resources on National Forest land

The project area contains approximately 3 miles of perennial streams; a documented sighting of mountain yellow-legged frog, a Forest Service Sensitive Species, and candidate for federal

listing; a Goshawk Protected Activity Center (PAC), and numerous historic and prehistoric sites. The project area is highly visible from the Alder Creek Road and a heavily used recreational trail, which bisect the length of the project area. If the current fuel conditions are not reduced, a wildfire ignition could lead to a high energy fire that would adversely impact soils, water quality, riparian vegetation, wildlife habitat, archaeology sites, vegetation diversity, recreation use and visual quality. The project would help protect these resources by improving the chances that in the event of wildfire, suppression efforts would be successful and fires would be kept small, and not likely to become catastrophic.

Desired condition: Forest conditions of more open stands of large fire resistant trees with reduced amounts of ladder and surface fuels are present in the project area. The extent and intensity of large wildfires is reduced, allowing for a reduced risk of wildfire damage to forest resources.

To improve watershed conditions

The Alder Creek Watershed has experienced significant disturbances over the past 100 years. Early historic logging and associated railroad construction, the catastrophic Donner Ridge Fire in 1960, and the development of the Tahoe Donner Subdivision, Stony Creek and Prosser View Estates Subdivisions over the past 40 years have resulted in disturbances that have pushed one subwatershed in the project analysis area above the threshold of concern. Improvements can be made in the project area to help restore hydrologic function and reduce further degradation.

Aspen: Riparian vegetation along Alder Creek shows signs of deterioration. For example, aspen stands have greatly decreased in size, vigor and extent along Alder Creek. Aspen are considered an excellent indicator of ecological integrity, as well as, landscape health (Kay 1991 a,b; Woodley and Theberge 1992; Woodley 1993; Woodley et al. 1993). Aspen have also been called a "keystone species" which means that the removal of aspen would cause a substantial part of the community to drastically change (Wilson, 1992). Harper et al. (1981) reported a decrease of 5% and Gifford et al. (1984) predicted a decrease of from 3 to 7 inches in water yields when conifers replace aspen. This loss of water means that it is not available to produce undergrowth vegetation, recharge soil profiles, or increase streamflow which helps moderate summertime baseflow temperatures (Bartos, 2001).

Field surveys conducted in 2005 within the project area indicate that five out of six stands are at high risk of being lost, while the remaining stand has the highest risk of being lost. This decline is attributed in part to the absence of fire, which has permitted conifers to encroach into riparian habitat and replace aspens. The at risk stands are generally overtopped and suppressed by conifers, have a higher percentage of conifers than aspen, and have very little regeneration of aspens, due to shading. Beaver activity has contributed to the decline in the numbers of both large and small aspens. Concurrently, deer are restricting the development of aspen sprouts.

Removal of conifers on selected sites along Alder Creek is needed to allow aspen stands to regenerate and expand to reoccupy former habitat. Optimal conditions for sucker establishment would include full sunlight to the forest floor and soil temperatures at or above 15°C in the root zone. While suckers can establish under partially shaded conditions the best growth and highest sucker densities occur under full sunlight and warm soil temperatures (Shepperd, 2001).

Roads: The project area contains both non-system and Forest Service system roads. Currently portions of these roads are sources of overland flow and sedimentation. The project is needed to

help reduce overland flow and sedimentation by maintaining system roads and decommissioning some non-system roads that are currently used illegally by OHVs.

Desired conditions: The trend in aspen stand decline is reversed, and the Riparian Conservation Areas (RCAs) have improved temperature amelioration and soil water storage. Illegal use of non-system roads would be reduced through decommissioning, thereby reducing overland flow and sedimentation.

Proposed Action

The Forest Service proposes the following action to meet the purpose and need for the project:

Who: The Forest Service, Tahoe National Forest, Truckee Ranger District proposes to:

What: Use a combination of service contracts, commercial timber sales, and Forest Service personnel to improve forest health, reduce hazardous fuels, and improve watershed conditions on approximately 778 acres of National Forest Lands. The project area is designated as a Wildland Urban Interface Zone, and lies partially within the northern limits of the Town of Truckee, California, adjacent to or within close proximity to the Tahoe Donner, Stony Creek Ridge and Prosser Lakeview Estates Subdivisions. (See attached Vicinity map and Project map).

The proposed action would:

1. Apply the following silvicultural prescriptions. See project map for unit location. Treatments are summarized in Table 1.1:
    a. Thinning. Thin conifer stands from below, and retain all live trees greater than or equal to 30 inches diameter at breast height (dbh), except as needed for equipment operability and safety.
    b. Release. Thin conifers and reduce shrubs to improve growth and vigor of young conifer stands.
    c. Borax treatment. Apply borax (tradename Sporax®) by hand to cut stumps of all conifer species greater than or equal to (≥)14 inches stump diameter to minimize the spread of annosus root disease caused by the fungus Heterobasidion annosum. Apply Sporax® within 4 hours of felling, at a rate of 1 pound per 50 square feet of stump surface (approximately 1 pound/acre on average, though up to 2 pounds/acre could occur).

Table 1.1 Summary of Proposed Silvicultural Treatment and Method by Acres				
Silvicultural Treatment	**Approximate Diameter Limit**	**Approximate Tree Spacing**	**Approximate Acres**	**Unit Number**
Thinning in upland units	3-29.9" dbh	17' to 20'± 25% (13'-25')	360	2a, 2b, 3, 4, 5, 8a, 8b, 11, 12
Thinning in units along Alder Creek and Tributaries	0.1"-29.9" dbh	17'± 25% (13'-21')	217	1a,1b,1c,6a,6b, 6d
Thinning/Release-Mastication	0.1"-10" dbh	17'± 25% (13'-21')	201	6c,6e,7, 9, 10
Borax Treatment in thinning units	≥14"at stump	NA	515	1a, 1c, 2a, 2b, 3, 4, 5, 6a, 6b, 8b, 11, 12

2. Apply the following measures to reduce hazardous fuels. During thinning, cut and remove ladder fuels and all snags less than or equal to 15 inches DBH. After thinning, assess fuel loading to determine the need for followup fuels management. Include pre-existing ground fuels in fuels treatment prescriptions to achieve fuel reduction objectives. Implement the following fuels treatments, or combination of treatments, as needed:

    a. Mastication - Reduce ladder fuels and change ground fuel configuration, by grinding and spreading material on site. This method is generally limited to slopes less than 30%, with the exception of short pitches of no more than 35%, or where an evaluation by the District Hydrologist indicates that these limits can be exceeded, based on site conditions.

    b. Underburning – Utilize prescribed fire to reduce hazardous fuels.

        1. Roadside Underburning - Clear fuels through burning in a 200' roadside strip along the Alder Creek Road.

        2. Mosaic Underburning - Reduce fuels, but retain some material in a mosaic pattern to provide habitat diversity. Construct firelines, as needed, and decommission after use with slash or waterbars to minimize overland water flow.

    c. Handpiling and burning- Reduce fuels by hand piling material and burning piles, where access is difficult by other methods. d. Chipping - Reduce ladder fuels and change ground fuel configuration, by chipping and spreading material on site. Hand rake chips, as needed to avoid accumulation of chips in excess of 4" in the floodplain.

    Fuels treatments are summarized in Table 1.2. Note that totals exceed project area acreage, as more than one fuels treatment option is available, and may be prescribed, as needed to reduce fuels.

Table 1.2- Followup Fuels Treatment Summary		
Treatment Method	**Unit Number**	**Approximate Acres**
Mastication	1a, 1c, 6a, 6b, 6d	204
Underburning, Including Mosaic Underburning	All acres, except historic sites	758
Roadside Underburn	2a, 3, 5, 6c, 8a	57
Handpiling and Burning	1a, 1b, 3, 4, 6a and an option in all other units*	18 (*740)
Chipping	1a, 6a	40

3. Restore aspen stands on approximately 22 acres in units where risk of loss are the highest, i.e. stands that are overtopped by conifers, have a higher percentage of conifers than aspen, and have very little regeneration of aspens, due to shading and/or animal consumption or damage. The primary action in aspen stand restoration is to selectively remove conifers, and if needed, protect aspen regeneration from animals. The District Timber Management Officer, East Zone Hydrologist, East Zone Fisheries Biologist and the Wildlife Biologist will determine the conifers to be removed on a site-specific basis, considering size, proximity to aspens, and the condition of the aspen stand. Conifers 30 inches DBH and greater will not be removed to maintain stand diversity. All thinning methods listed below in #4 may be used to accomplish the restoration objectives. Aspen recovery would be monitored, and options to further protect aspens from animal damage would be pursued, if needed. These options could include, but are not limited to exclosures or caging aspens.
4. Implement a combination of thinning methods to meet resource and Riparian Conservation Objectives (RCO), and the requirements of the Lahontan Regional Water Quality Control Board Basin Plan. Though a given treatment unit may have more than one method available to meet resource needs, selection would be based on equipment availability and economic considerations. Thinning methods are summarized in Table 1.3.
    a. Non ground-based methods are intended to minimize soil disturbance within the Alder Creek floodplain, on slopes exceeding 25% in Riparian Conservation Areas (RCAs), and within associated historic sites.
        1. skyline systems - This method is limited to areas where suitable anchors can be located on the north side of Alder Creek.
        2. helicopter systems - Though this method is an option in all project units, its use may be restricted to areas with limited access or watershed concerns, due to economic considerations.
    b. Mechanical thinning over the snow with feller buncher and skidder is another method intended to minimize ground disturbance within historic sites, and the Alder Creek floodplain and RCAs. This method is limited to side slopes less than or equal to 25%, unless an evaluation by the district hydrologist and contract administrator indicates that these limits can be exceeded based on site conditions, while meeting water quality objectives.

c. Mechanical thinning with feller buncher and skidder is intended to treat units outside perennial RCAs. This method is generally limited to slopes less than 30%, with the exception of short pitches of no more than 35%, or where an evaluation by the district hydrologist and contract administrator indicates that these limits can be exceeded based on site conditions, while meeting water quality objectives.

d. Mastication would be implemented to thin conifers and reduce shrubs in units with young trees that regenerated naturally, or were planted after the Donner Ridge Fire.

e. Hand Treatment and chipping would be used to treat sensitive sites. Though this method is an option in all project units, its use may be restricted by economic considerations to only historic sites, or areas where other methods are not feasible due to lack of access.

Table 1.3 – Thinning Method Summary*

Unit Number	Thinning Methods	Approximate Acres
1a	**Skyline, Helicopter, Mechanical Over the Snow and/or Hand (historic sites)**	80
1b	**Hand**	13
1c	**Mechanical Over the Snow and Hand (historic sites)**	5
2a	**Mechanical**	89
2b	**Helicopter**	21
3	**Mechanical and Hand (historic sites)**	98
4	**Mechanical**	48
5	**Mechanical**	31
6a	**Skyline, Helicopter, Mechanical Over the Snow and/or Hand (historic sites)**	89
6b	**Mechanical Over the Snow, Hand (historic sites)**	16
6c	**Mastication**	20
6d	**Mechanical Over the Snow**	14
6e	**Mastication**	3
7	**Mastication**	20
8a	**Hand**	35
8b	**Mechanical**	17
9	**Mastication**	16
10	**Mastication**	142
11	**Mechanical**	7
12	**Mechanical**	14

*some units require more than one thinning method, or have more than one option available to meet project objectives

5. Comply with all applicable state and federal regulations for the safe use of pesticides, including the Sporax® label requirements, e.g., applicators will be adequately trained, medical aid will be available, wash water and eye wash water will be on site or nearby, and personal protective equipment will be used (eye protection, gloves, long-sleeved shirt, and long pants).
6. Close portions of the project area during operations to provide for public safety. A temporary Forest Order would be in effect, and publicized in the local newspaper, describing the areas closed to public access. These areas would be reopened, as soon as operations are completed.
7. Implement traffic control along Alder Creek Road to ensure public safety, if logging activities are required above or adjacent to the roadway, or if logging systems require the use of the roadway.
8. Construct approximately 1 mile of temporary road off of the Alder Creek Road, after obtaining the necessary permits from the Town of Truckee, to provide access to Units 2a and 3, which are currently not accessible by existing roads. Decommission road after operations are completed.
9. Construct up to approximately 1 mile of temporary road to provide access to Units 1a and 6a, which are currently not accessible by existing roads, if skyline yarding methods are used. Decommission road after operations are completed.
10. Maintain approximately 2 miles of existing National Forest System roads to provide access to treatment areas, provide for public and contractor safety, and improve watershed conditions through erosion control and road surface protection.
11. Walk mastication equipment into Unit 6e on the old road adjacent to the Tahoe Donner Association (TDA) Campground.
12. Apply Standards and Guidelines from the 1990 Tahoe National Forest Lands and Resource Management Plan (LRMP), as amended by the 2004 Sierra Nevada Forest Plan Amendment (SNFPA) FSEIS Record of Decision (ROD), including Standards and Guidelines outlined in the SNFPA FSEIS for Riparian Conservation Areas (RCAs).

Resource Protection Measures

13. Implement the following measures to protect sensitive resources, meet Riparian Conservation Objectives and meet the requirements of the Lahontan Regional Water Quality Control Board Basin Plan during thinning:
    a. Non-ground based methods

       Skyline system:

       - Utilize only where anchors are available on the northside of Alder Creek.
       - Require a yarder that is capable of lateral yarding to minimize the number of skyline corridors needed.
       - Require whole-tree removal to minimize ground fuel accumulation.
       - Require full suspension of material across the Alder Creek floodplain to avoid ground disturbance and deposition of material in the floodplain.

- Require at minimum, one-end suspension of material outside floodplain to minimize ground disturbance.
- Space skyline corridors approximately 150' apart at the back end, to limit the number of corridors needed, while minimizing lateral yarding distances.
- Minimize corridor width to meet Visual Quality Objectives.
- Restore slope stability in corridors by raking to the natural contour, mulching, and installing waterbars, as needed.

Helicopter system:

- Require whole-tree removal to minimize ground fuel accumulation.
- Strategically locate landings so that helicopters do not fly with payload across private property, or the Alder Creek, Schussing, and Carpenter Valley Roads.

b. Mechanical thinning over the snow with feller buncher and skidder
   - Require whole-tree removal to minimize ground fuel accumulation.
   - Apply Outside Normal Operating Season Standards (2/21/02) to protect sensitive resources.
   - Implement skidding distances up to ½ mile long in Unit 6b to avoid the need for additional landings.

c. Mechanical thinning with feller buncher and skidder during the normal operating season (non-winter)
   - Require whole-tree removal to minimize ground fuel accumulations.
   - Implement long skidding distances on designated skid trails of up to 3/4 mile to minimize the need for temporary road and landing construction in Units 2a, and 4.
   - Construct a designated skid trail in the RCA in Unit 6b to access portions of Unit 4, and thus avoid the need for additional road construction. The skid trail would be located and approved by the District Hydrologist and Soil Scientist prior to skidding operations, and decommissioned after use.
   - Stabilize soils in designated skid trails by back blading to restore the natural contour, providing drainage, and mulching, where needed.

d. Mastication
   - Exclude equipment from wet areas, but permit equipment to reach into these areas to remove trees, as needed.

e. Hand treatment methods/chipping
   - Hand fall trees and remove as firewood, where access is available.

14. Apply Best Management Practices (BMPs) for water quality protection, and implement contingency measures, if BMP monitoring outlined in the Water Quality Monitoring Plan determines that additional measures are needed to stabilize soil.

15. Minimize risks to water quality when using Sporax® as follows:

a. Implement Best Management Practices (BMPs) for pesticide application, including a spill contingency plan.

b. Do not apply Sporax® within 25 feet of live streams, or riparian vegetation, whichever distance is greater.

c. Do not apply Sporax® during periods of sustained rain.

16. Protect residual trees from damage during thinning and fuels treatment activities, especially logging damage to white fir, which provides points of entry for Heterobasidion annosum, by implementing practices e.g. directionally falling trees, and using bumper trees and lateral yarding when skyline systems are used.

17. Minimize landing construction by utilizing existing landings, where practicable. After use, mulch landings to stabilize soil. Till landings where soil scientist determines that such measures would provide additional stabilization.

18. Remove only downed woody material in the Alder Creek floodplain that has been designated for removal by the East Zone Fish Biologist, East Zone Soil Scientist, District Hydrologist and District Wildlife Biologist, to minimize ground disturbance.

19. Mulch bareground created by logging activities by October 15th, or concurrent with operations after October 15th.

20. Close the following non-system roads to protect historic trail features and/or improve watershed conditions. Currently these roads are a source of overland flow and sedimentation.

    a. Decommission the road paralleling the south side of Alder Creek in Unit 6a by ripping the 1st 200 feet of road and installing barriers at the intersection with Schussing Road, and at the intersection with Road 780-3-3. Construct waterbars, as needed to reduce sedimentation.

    b. Decommission the road in Unit 2a from the Alder Creek Road eastward to the private property line, by ripping the first 200 feet of road and installing barriers at the intersection with the Alder Creek Road.

    c. Decommission the old skid trail in Unit 8b, which is being used as a road and is actively eroding. After thinning operations, install a barrier at the intersection with Road 780-12-2, and waterbar.

21. Remove only trees with overlapping crowns, where the District Hydrologist and East Zone Fisheries Biologist identify a need to maintain shade within the first 100 feet of the Alder Creek RCA. Within the remaining 200 feet of the RCA, retain approximately 40% canopy closure.

22. Plant willows along Alder Creek, where needed to enhance stream shading.

23. Flag and avoid the known occurrence of the sensitive plant Meesia uliginosa during project activities in Unit 6a. Sporax® would not be applied within habitat for this species (See streamside buffer described under #15b).

24. Maintain a mosaic of vegetation to maintain suitable habitat in the Goshawk PAC in Units 1a, 1b, 2a, 2b, 10 and 12. This will be accomplished by having a tighter conifer spacing in

some areas, leaving some clumps of conifers untreated, and feathering treatments so heavier treatment is closer to roads, as designated by the District Wildlife Biologist.

25. Retain at least 3 large logs per acre greater than 12 inches at midpoint, when available to provide wildlife habitat.
26. Retain at least 3 of the largest available snags per acre greater than or equal to 15 inches diameter at breast height (DBH) to provide wildlife habitat. Snags may be clumped or irregularly distributed across treatment units, and need not be located within 200 feet of the Alder Creek Road.
27. Minimize impacts to the Commemorative Emigrant Trail as follows:
    a. Cross trail with mechanical equipment at a 90-degree angle.
    b. Permit only low impact vehicles on trail when needed to remove fuels, e.g. pickup trucks, mobile chipper.
    c. Restore trails following silvicultural and fuels reduction activities to original state, if damaged.
28. Protect Historic Emigrant Trail and trail markers as follows:
    a. Cross trail with equipment at locations designated by the District Archaeologist.
    b. Do not cut trees that are historic trail markers, i.e. trees with marker signs or blazes
    c. Protect trail markers from fire, where underburning is prescribed.
    d. Restore any damage to trail following silvicultural and fuels reduction activities to original state.
29. Protect known archaeological (historic) sites in Units 1a, 1b and 1c, 3, 6a and 6b by implementing the following fuel reduction measures, as needed:
    a. hand removal of fuels from sites
    b. piling and burning fuels outside of sites
30. Minimize scenery impacts to users/travelers along the Alder Creek Road to meet Tahoe National Forest LRMP Visual Quality Objectives by screening landings and skid trails from view; and applying project design features previously described e.g. minimal corridor widths, lateral yarding, full suspension across Alder Creek when using skyline systems, retention of 40% crown closure in thinning prescriptions, and slash treatment.
31. Apply standard management requirements and contract clauses to protect resources during project activities.
32. Implement the following Limited Operating Periods (LOP):
    a. Bald Eagle: Implement a LOP from January 1 through August 31 that precludes project associated helicopter flights within 1 mile of nesting territories at Stampede and Boca Reservoirs, Donner Lake, and the potential new nesting territory at Prosser Reservoir.
    b. California Spotted Owl: Implement a LOP from March 1 to August 31 over the entire project until protocol surveys are finished in 2006. This LOP may be modified by the District Wildlife Biologist, if surveys determine nesting will not be affected within ¼ mile

of the proposed activities. If surveys detect spotted owls within the analysis area, a 300 acre PAC and 700 acre HRCA will be designated as described in the SNFPA (2004). If these land allocations overlap with treatment units, those units would be removed from the project until a new environmental analysis is completed.

c. Northern Goshawk: Implement a LOP from February 15 to September 15 over the entire project until protocol surveys are finished in 2006. This LOP may be modified by the District Wildlife Biologist, if surveys determine nesting will not be affected within ¼ mile of the proposed activities. If surveys detect goshawks within the analysis area, a 200 acre PAC will be designated as described in the SNFPA (2004). If this land allocation overlaps with treatment units, those units would be removed from the project until a new environmental analysis is completed.

Where: The proposed project area is located in Nevada County in the northern portion of the Truckee Ranger District, west of State Route 89. Proposed treatment units are located along the north and south sides of the Alder Creek Road in T18N, R16E in Sections 32, 33 and 34.

When: A decision on this project will be made by the winter of 2005. Implementation could begin as early as the summer of 2006. Most proposed treatments would be implemented within the next five (5) years.

Decision to be Made

The decision to be made is whether to implement the proposed action as described above, to vary the location or design of the project to meet the purpose and need while addressing issues raised in public scoping, or to take no action at this time.

Public Involvement

The Alder Creek Project was first listed in the Schedule of Proposed Actions in July 2005. In October 2005, the IDT invited the public to attend a public meeting to discuss preliminary project plans, voice concerns, suggestions and ask questions. The meeting was advertised in the Sierra Sun newspaper and on the local radio station, and posted on the Tahoe Donner Association website. Four members of the public attended the meeting on October 26, 2005, and were generally supportive of the project. On November 18, 2005, a Public Notice was placed in the Sierra Sun newspaper to solicit public comments on the Alder Creek Project proposed action. One hundred and fifty-five (155) scoping letters for the Alder Creek Project were mailed to interested parties and landowners within approximately 500 feet of the project area. Seventy-eight (78) letters were sent to other potentially interested groups and individuals advising them that scoping documents were available upon request. The Alder Creek Project was included in the Tahoe National Forest Schedule of Proposed Actions dated July 2005. Five (5) letters were received in response to the public scoping for this project.

Public notices, letters inviting public participation in the Alder Creek Project, and notes from meetings or conversations with the public are contained in the project file and available for review upon request.

Issues

The Interdisciplinary Team evaluated the scoping comments received to determine whether any significant issues were raised by the public. Significant issues were defined as those directly or indirectly caused by implementing the proposed action. Non-significant issues were identified as those: 1) outside the scope of the proposed action; 2) already decided by law, regulation, Forest Plan, or other higher level decision; 3) irrelevant to the decision to be made; or 4) conjectural and not supported by scientific or factual evidence. The Council on Environmental Quality (CEQ) NEPA regulations require this delineation in Sec. 1501.7, "…identify and eliminate from detailed study the issues which are not significant or which have been covered by prior environmental review (Sec. 1506.3)…"

The ID Team determined that no significant issues were raised in the scoping comment letters. A list of non-significant issues and reasons regarding their categorization as non-significant is documented in the *Scoping Comment Summary for the Alder Creek Project* in Appendix F.

ALTERNATIVES, INCLUDING THE PROPOSED ACTION

This section describes the alternatives for the Alder Creek Project and displays them in comparative form. It also presents a description of alternatives suggested by the public during project scoping, and summarizes the reasons why these alternatives were eliminated from detailed study. A more detailed analysis of why these alternatives were eliminated from further evaluation is contained in the project record.

Alternatives Considered in Detail

Alternative 1- The Proposed Action

This alternative is identified and described in Sections I and II-A.

Clarification & Further Definition of Proposed Action

Since project scoping, minor changes have been made in the proposed action (PA) to clarify and further define the proposal, as follows.

PA Item #3-Additional wording is incorporated that states that the District Timber Management Officer, East Zone Hydrologist and East Zone Fisheries Biologist would assist in designating trees to be removed during aspen restoration.

PA Item #15-Additional wording is incorporated, that states that Sporax® will not be applied during periods of sustained rain.

PA Item #21-Additional wording is incorporated that states that the District Hydrologist and East Zone Fisheries Biologist would designate trees that would be retained.

PA Item #32- The Limited Operating Periods (LOPs) have been added to the proposed action as Item # 32 to protect wildlife from disturbance.

Alternative 2 - No Action

Under the No Action alternative, the proposed action would not be implemented in this area at this time.

Alternatives Considered but Eliminated From Detailed Study

Alternative 3

Implement the 2001 ROD, which would effectively maintain trees 20 inches in diameter or greater and a canopy closure of 50% or greater (FIG).

This alternative was considered but eliminated from detailed study for the following reasons.

This alternative would continue management consistent with the January 2001 SNFPA FEIS Record of Decision (2001 ROD), and would be similar to Alternative 1 (Proposed Action) with the following exceptions.

- The upper diameter limit in all treatment units would be 20 inches DBH and residual canopy closure would be 50%.
- No mechanical treatments and only limited hand treatments would take place inside goshawk PACs.

Cost Efficiency: Cost efficiency is an important factor in the SNFPA 2004 ROD, which on page 9 states: "Modifications to some of the diameter size limits imposed by the SNFPA 2001 ROD will improve the cost-effectiveness of projects." Also on page 9, the 2004 ROD states: The emphasis in the SNFPA 2001 ROD to focus on removing small fuels, outside the threat and defense zones, effectively precludes most commercial options for removing fuels. The potential supply of raw material for biomass far exceeds regional market demand and is costly to get to market. We're losing the capacity to remove larger diameter fuels." Page 4 of the 2004 ROD states: "This decision also addresses the need to retain industry infrastructure by allowing more wood by-products to be generated from fuels treatments and dead and dying trees to be harvested during salvage operations. It acknowledges that the Forest Service has a role to play in providing a wood supply for local manufactures and sustaining a part of the employment base in rural communities. In some cases, these wood by-products will also help to offset the cost of fuels treatments."

Timber Sale Economics –A Comparison of 20-inch and 30-inch Diameter Limit Treatments: A portion of the Alder Creek project treatments are expected to be accomplished through timber sales embedded in a service contract. This means that the work would be performed by service contracts, but sale of products would help offset the cost of the contract. The embedded sales would involve approximately 577 acres of thinning and 22 acres of aspen restoration harvest. A timber sale value analysis was completed to analyze the costs and values generated by thinning under Alternatives 1 and 3. However, aspen restoration would not be included in the analysis under Alternative 3, as the 2001 ROD would restrict activity in the goshawk PAC. The results and assumptions made in this analysis are found in the *Timber Sale Value Analysis for the Alder Creek Project*, which is included in the project record and summarized below.

The analysis compares the value of a timber sale with a 20-inch diameter limit with the value of the same sale with a 30-inch diameter limit. This analysis is based on the estimated sawlog and biomass volume and value that would be obtained from that timber sale. Timber values are based on weighted average value per 1000 board feet (MBF) and costs are based on Forest averages for similar work.

The costs associated with embedded timber sales are higher than average, due to the high costs of logging systems designed to minimize soil disturbance and protect water quality. The costs associated with a 20" diameter limit are similar to those associated with a 30-inch diameter limit. However, the commercial volume and value are noticeably different. The 20-inch diameter limit timber sale yields less in total sale volume, net value/MBF and total timber sale value, compared to the 30-inch diameter limit. Additional information about how the costs and values in Table 1.4 were determined can be found in the *Timber Sale Value Analysis* in the project file.

Table 1.4

Timber Sale Value Comparison

Predicted Timber Sale Value and Cost	20" Diameter Limit	30" Diameter Limit
Timber Sale Sawlog Volume MBF	865	1,442
Sawlog Value / MBF of Sawlog Volume	$421.20	$430.42
Biomass Value / MBF of Sawlog Volume	$189.85	$189.90
Total Sawlog & Biomass Value / MBF of Sawlog Volume	$611.05	620.32
Total Cost to Purchaser / MBF of Sawlog Volume	$18.01	$10.80
Net Sawlog & Biomass Value / MBF of Sawlog Volume (Value – Costs)	-$406.84	-$132.92
Total Timber Sale Value (Net Value X Sale Volume)	**-$351,915**	**-$191,669**

Based on this analysis, total timber sale value with either a 20 inch or 30 inch diameter limit is negative, due to the high costs of treatment. However, the additional value added by a 30-inch diameter compared to a 20-inch diameter would be approximately $273.92/MBF or a total of $160,246, which would help offset the high harvest costs. In comparison to the 20-inch limit, the 30-inch limit would help make the entire Alder Creek Project more desirable to prospective bidders, thus improving the chances that the service contracts would be cost efficient, more economically feasible, and likely to be awarded. Raising the diameter limit to 30 inches would have a greater contribution to maintenance of the local timber industry infrastructure, while causing little if any additional adverse effects to forest resources. A 20-inch diameter limit on thinning treatments would not meet the economic objectives, and the stand density and forest

health objectives discussed outlined in the 2004 SNFPA ROD on page 4. For these reasons, Alternative 3, which would implement a 2001 SNFPA FEIS ROD alternative, with a 20-inch DBH limit and 50% canopy retention in thinning treatments is not considered in detail.

Stand Density and Forest Health – To assess the difference in effects between a 20-inch diameter and a 30-inch diameter limit on residual stand density and forest health, the District Silviculturist analyzed stand exam data collected in four stands that represent the general stocking conditions and eastside pine and eastside mixed conifer vegetation types in the Alder Creek project area.

Stand data was used to compute a Stand Density Index (SDI) that would help assess relative susceptibility of conifer stands in the project area to attack by bark beetles based on stand density (Oliver, 1995). SDI is relatively insensitive to stand age and site quality, making it very versatile in application. In ponderosa pine stands, Oliver (1995) identified a SDI in the range of 230-365 as the zone of "imminent mortality". Oliver reports that at a SDI of 230 represents the beginning of the zone in which beetle kills from endemic populations can begin (Ibid). Oliver also notes that bark beetle epidemics often continue to reduce stand density to levels far below the density that triggered the epidemic and well into the zone of imminent mortality (Ibid). Stands that approach SDI 365 usually suffer large losses from bark beetle epidemics, that equal or exceed periodic growth. The stand data and worksheets, which display SDI calculations are found in the project record.

For mixed conifer stands, the beginning of the zone of imminent mortality varies by species. A guide for mixed stands that equates to Oliver's zone of imminent mortality is 55% to 85% of the maximum SDI calculated from normal yield tables for various species. The beginning of this zone or 55% of maximum SDI is 415 for white fir, 315 for ponderosa and Jeffrey pine, and 355 for sugar pine. A range of SDIs that would promote stand health would likely range from approximately 165 to 355 for eastside mixed conifer stands. At the lower end of this range, inter-tree competition is minimized, and individual tree growth is optimized; while at the upper end competition between trees increases. Depending on management objectives, as long as the stand is maintained somewhere in this range, forest health can be maintained.

Trees growing within the zone of imminent mortality face an increased probability of bark beetle mortality as the SDI increases. At the lower end of the range, mostly intermediate and suppressed trees are attacked. As density increases, the likelihood of larger trees succumbing to attack also increases. Significant attacks are usually associated with drought. SDI can be used as an indicator of forest health because it identifies stand densities in which trees grow well, risks of mortality are reduced and a greater likelihood exists that a stand will survive and grow into a larger size class.

The analysis of stand data indicates that the predominantly pines stands within the project area have a pre-harvest SDI of 228 to 248. These values indicate that either the stands are approaching the approaching or are within the zone of imminent mortality. Similarly, in the eastside mixed conifer type, pre-harvest SDI are 330 to 440, which approach or are within the zone of imminent mortality depending on species. The analysis shows that regardless of vegetation type in the project area, management strategies that limit thinning diameter to 20 inches would reduce the amount of time in which SDI levels are below the zone of imminent mortality, than if a 30 inch diameter limit were implemented. Thinning to a 30 inch diameter

limit would allow residual trees room to grow for a longer period of time, before the SDI again approaches the threshold for mortality.

Current Management Direction- Finally, considering an alternative that would implement the previous 2001 ROD is outside the scope of this project decision. In January 2004, the SNFPA FSEIS ROD (2004 ROD) replaced the 2001 SNFPA FEIS ROD in its entirety, and as a result, the Alder Creek Project is subject to the standards and guidelines and management direction contained in the 2004 ROD. The rationale for the decision is found in the 2004 ROD on pages 5 through. Implementing the 2001 ROD would not meet the Alder Project purpose and need, and the current management direction in the Tahoe National Forest Land and Resource Management Plan as amended by the 2004 SNFPA FSEIS ROD.

In a comparative analysis between a 20-inch thinning diameter limit and a 30-inch thinning diameter limit for thinning projects on the Sierraville RD (Tahoe NF) in 2004, the results indicated that the effects on fire behavior and wildlife habitat would be similar, i.e. thinning to both diameter limits would reduce ladder fuels and open the canopy cover to a similar condition. The general type of forest that would remain would be similar because both treatments would thin from below and would follow the Standards and Guides in the SNFPA FSEIS ROD (2004) on page 51, which requires the retention of 30 percent of the existing basal area "generally comprised of the largest trees", with no canopy cover restriction in the eastside pine type. A 30-inch diameter limit thinning would remove about 2 additional trees/acre or 15% of existing trees compared to a 20-inch diameter limit thinning. Approximately 85% of the existing trees between 20 inches and 30 inches DBH would remain after the thinning to a 30-inch diameter limit. A moderate amount of mortality can be beneficial to wildlife by providing snags and downed logs. However, the quality of snags and downed logs depends on tree size, i.e. larger trees provide higher quality habitat components for wildlife, than smaller trees. As stated previously, thinning to a 30 inch diameter limit is more likely to result in stand density that would favor vigorous tree growth for a longer period, which would help move stands toward old forest conditions and provide high quality habitat components in less time, than under a 20 inch thinning dbh limit.

50% Canopy Closure: If thinning prescriptions were to retain a 50 percent canopy closure, tree spacing would have to be tighter and residual stand density would be correspondingly higher. Though SDI was not calculated for a 50 % canopy closure, silvicultural objectives would not likely be met, as post-thinning SDI would be closer to the zone of imminent mortality. Reduced equipment operability would be a concern, as spacing tighter than 17 feet would likely result in increased damage to residual trees, and in white fir would lead to increased susceptibility to root disease. Thinning from below while retaining 50% canopy closure would reduce cost efficiency by making it more difficult to maneuver mechanical equipment, particularly in areas of high existing ground fuel, and would likely make it difficult or infeasible to remove those fuels. The commercial volume yield would be lower, which would reduce the potential for the cost of the thinning to be offset by timber sale revenues, and reduce the economic benefits to the local economy. With a 50% canopy closure, the forest health benefits derived from the reduction in stand density would be lost sooner, when compared to a reduction to a 30 to 40% canopy cover.

As a result of all of the factors discussed above, an alternative that implements the 2001 SNFPA ROD would not meet the objectives of current management direction, nor meet the purpose and need for the Alder Creek Project.

Alternative 4

Limit aspen restoration activities to no more than 10 acres, and limit conifer removal to a maximum of 20 inches dbh, with the exception that trees up to 30 inches may be removed, if needed to effectively release aspens. No conifers larger than 30 inches should be removed under any condition (FIG).

This alternative was considered but eliminated from detailed study for the following reasons.

Based on the experience of Wayne Shepperd of the Rocky Mountain Research Station, (Shepherd, 2003), an open canopy is required to provide the necessary solar heating of the soil to initiate aspen suckering. If the criteria with which to consider removing trees from 20 inches up to 30 inches dbh is the efficacy of aspen release, effectively all trees in this size class up would need to be removed, based on Shepperd's findings. This is essentially consistent with the proposed action. However, restricting aspen restoration to only 10 acres would not meet the purpose and need for the project, since field surveys determined that 22 acres of aspen are at high risk of loss from conifer encroachment.

Alternative 5

Reduce the amount of borax used, the total acreage treated, cost, and environmental risks as suggested below (CATs):

- Treat only stumps of a diameter greater than 18 inches.
- Treat the stumps of only the most susceptible species, or only desired species such as True Firs (in danger from present S strains), or just desired pines (in danger from present P strains) within one mile of infection centers.

This alternative was considered but eliminated from detailed study for the following reasons.

18 inch diameter limit-Restricting treatment to only stumps greater than 18 inches diameter would not be consistent with current Region 5 recommendations to reduce the spread of *Heterobasidion annosum* in the eastside pine and mixed conifer type. Previous recommendations for stump treatment in the eastside pine type comes from the R5 Supplement to FSH 3409.11 (Chapter 60)(USDA Forest Service 1994a): "R-5 FSM 2303 requires treatment of all conifer stumps in recreation sites. The same direction shall apply to other high value areas, such as progeny test sites, seed orchards, and areas of high value trees, such as giant sequoia groves. In eastside pine or mixed conifer type stands, where surveys have indicated high levels of annosus root disease, treatment of conifer stumps 12 inches or greater in diameter is highly recommended during chainsaw felling. When mechanical shearers are used, the minimum diameter should be reduced to 8 inches. These areas include the eastside pine and eastside mixed conifer types on the Modoc, Lassen, Plumas, Tahoe, Sequoia and Inyo National Forests; the Goosenest Ranger District, Klamath National Forest; and the McCloud Ranger District, Shasta-Trinity National Forests."

In 2004, Kliejunas and Woodruff, plant pathologists for the USDA Forest Service Pacific Southwest Region revisited the 12 and 8 inch diameter recommendations for the eastside pine and mixed conifer types (Kliejunas and Woodruff 2004). They evaluated several stands that had been harvested 1-2 decades previously. Based on this evaluation, they recommended modifying

the direction in FSH 3409.11 to say that within the eastside pine and mixed conifer type, that all stumps 14 inches in diameter or larger be treated.

Raising the diameter limit above the 14 inches recommended by Kliejunas and Woodruff (2004), as suggested by FIG would increase the risk of infection in the Alder Creek Project area, and is not supported by research conducted within California.

Treating only susceptible or desireable species- The purpose and need for the project is to improve forest health, which includes maintaining a species mix of Jeffrey, ponderosa, sugar and lodgepole pine, white fir and incense cedar in the project area. The silvicultural prescription for the project provides guidance when selecting leave trees. The factors to be considered during leave selection are crown class, tree from, tree condition (disease and damage), and crown form. Objectives are to leave the healthiest, well-formed trees at desired spacing levels to promote favorable growth and vigor, regardless of species. However, if two adjacent trees have the same approximate characteristics, species will be considered in the following order of preference: sugar pine/western white pine, Jeffrey/ponderosa pine, incense cedar, red/white fir and lodgepole pine. As an example, Jeffrey/ponderosa pine would be favored over white fir, particularly on the dry south facing slopes. Although certain species would be favored in marking prescriptions, species conversion is not the objective of stand treatment and is not desired.

As reported in the literature, two strains of annosus root disease exist, which are generally host-specific. The S strain infects true fir, while the P strain infects pine (Schmitt et al, 2000). During project planning, the Interdisciplinary Team requested that Bill Woodruff, R-5 forest pathologist, examine the project area and provide recommendations to prevent further spread of annosus root disease. Based on his on-site assessment of stand conditions, evidence of annosus root disease, and known annosus root disease centers in close proximity to the project area, he determined that all conifer species were susceptible to infection. He recommended that we treat all cut stumps greater than 14 inches to prevent further spread of the disease. Restricting borax treatment to stumps of only certain species would leave other desireable species vulnerable to infection and would not meet the need to improve overall forest health in the project area.

Alternative 6

Evaluate non-pesticide alternatives for control of annosus root rot disease as part of the NEPA analysis for this project as suggested below:

- *The Forest should consider cutting/thinning only when reproductive basidiospore populations in the air are at their lowest (cold winter or hot dry summer months) (Schmitt et al. 2000; Ammon and Patel 2000; Flip and Morrison 1998). Spores are not produced in extreme cold, very high heat, or during prolonged droughts, and stump colonization is unlikely when stump temperatures are high and relative humidity is low (Schmitt et al 2000). The Forest should only cut in sensitive areas (those near annosus infection centers) during these times and thus eliminate the need for borax applications and reduce the potential spread of annosus disease.*
- *Removing injured trees in high-risk areas is also effective (Schmitt et al. 2000). This would still allow for the Forest to produce commercial timber and also reduce risk of annosus spread at the same time.*

- *Heterobasidion annosum can be eradicated or reduced by a couple of simple pre and post harvest techniques. One is using prescribed burns. Two pre-thin burns (one at least six months before thinning) and one or more post-thin burns will destroy reproductive basidiocarps and eliminate litter and other favorable annosus habitat and basidiocarp development environments (Ammon and Patel 2000, Flip and Morrison 1998). The Forest should utilize prescribed burns in an attempt to eliminate Heterobasidion annosum in the project area.*
- *Another eradication and reduction method is simply mechanically removing and burning stumps and attached roots in already infested sites (Schmidt et al 2000., Ammon and Patel 2000, Goheen and Otrosina 1998). This can be followed by cultural control. For example, species manipulation, replanting and retaining more resistant species is a great way to prevent annosum disease spread (Schmitt et al 2000, Goheen and Otrosina 1998).*
- *Apply Phlebiopsis gigantean to cut stumps, as a non-pesticide alternative for the control of annosus root disease. Phlebiopsis gigantea, an aggressive, highly competitive fungus is recommended as a borax alternative, as it colonizes stumps to the exclusion of the annosum root rot fungus (Annesi et al. 2005; Pratt et al. 2000; Ammon and Patel 2000; Pratt 1999; Flip and Morrison 1998; Rishbeth 1963). It has been utilized as a biological control agent for annosum root rot for approximately 40 years in Europe (Pratt et al. 2000).*

This alternative was considered but eliminated from detailed study for the following reasons.

Cut/Thin when annosus spores are lowest Cutting when annosus spores are lowest has been suggested, but there are no data or studies to support the efficacy of such a treatment in California. Several studies indicate that there is some benetfit from logging when annosus spore production is believed to be lowest. According to Filip and Morrison (1998) and Stambaugh (1989), cutting in the summer (April thru August) in the SE US, south of latitude 34°N appears to reduce losses caused by annosus root disease. Although Schmitt et al (2000) state that restricting cutting to summer months may reduce potential of stump and wound colonization, they give no data to evaluate, nor do they state that this would eliminate the need for Sporax. Similarly, Ammon and Patel (2000) recommend thinning during dry, hot months in the SE US or during winter months in the NE US, but also give no data to evaluate, nor do they state that this would eliminate the need to treat the stumps otherwise. Phelps et al (undated) demonstrated that in the SE US, summer thinning only slightly reduced infection over controls and that borax treatment was much more effective.

Others found that seasonal logging has not been particularly advantageous in reducing spread of annosus root disease. Morrison (1999) determined there was no significant difference in season of cutting in coastal British Columbia. Filip and Morrison (1998) state that seasonal logging has not been demonstrated in the interior west to be effective. A factor to consider in the efficacy of seasonal logging is spore deposition trends, which vary by season and by location. In Russell et al (1973), monthly spore patterns in Washington and Oregon peaked in the fall, with a lesser peak in the spring, but airborne spores were present in large numbers nearly year-round. James and Cobb (1984) studied seasonal trends in spore deposition in California forests, and also found that spores are produced on the Stanislaus and San Bernardino National Forests throughout the year. James and Cobb found that spore deposition was highest on the SBNF from November to January and apparently was not substantially reduced by snow cover. They report that similar observations have been reported elsewhere (p. 247).

Based on the data in James and Cobb (1984) and Russell et al (1973), it is likely that in the relatively mild climate of California where spores are produced throughout the year, restricting logging to a certain season would not be effective in reducing annosus root disease infection. Filip and Morrison (1998) state that although many materials have been tested, in the western US only borax is recommended and used operationally.

Remove injured trees in high-risk areas- Since annosus root disease is evident within and outside the project area, and is considered a serious problem in the eastside pine type stands of northern California (Kliejunas et al, 2004), the entire project area can be considered "at high risk". It has been demonstrated, especially in white fir, that logging damage provides points of entry for *Heterobasidion annosum* (Schmitt et al, 2000). Aho et al (1983 p. 7) recommend logging practices that can help minimize damage to residual crop trees e.g., matching equipment to topography and size of material, spacing of crop trees, use of bumper trees, directional felling, skid trail layout, marking leave trees or the use of feller/bunchers. As a matter of standard practice, the FS designs projects and includes contract provisions to minimize injury to residual trees during harvest. Removal of injured trees is a standard FS contract requirement that can help minimize colonization of wounds by *H. annosum*. Although careful logging practices and removal of injured trees can reduce the spread of *H. annosum* in true fir, these practices are only part of an effective strategy. They cannot be relied on solely, as preventative measures, since basal wounds are only one point of entry in true fir. Aho et al, (1983) also recommend stump treatment to minimize the spread of annosus root disease.

Use prescribed fire as a pre and post treatment technique - It appears that a study by Froelich et al, (1978) is the basis for the particular recommendations on using prescribed fire. In this study, underburns were set in 10-24 year old loblolly and slash pine plantations in the southeast US. Two pre-harvest burn prescriptions were tested: a fall burn, about a year before thinning, followed by either a late summer/early fall burn about a month before thinning, or a winter burn about 9 months before thinning. Post-thinning fires were in the winter. Results showed that in most plots, there was a reduction in infected trees as a result of burning. Many plots still showed substantial infection levels after burning, although lower than the controls. Ammon and Patel (2000) and USDA Forest Service (1977) recommend the particular sequence of burning as tested in Froelich et al (1978), but they don't state that this would eliminate the need to treat the stumps otherwise. Filip and Morrison (1998) reference the study by Froelich et al (1978) yet they make no mention of prescribed fire for annosus disease prevention anywhere else in North America. Otrosina et al (2002) found no significant difference in annosus levels in a 40-year old longleaf pine plantation underburned during the winter. Schmitt et al (2000) recommend prescribed burning as a treatment to reduce white fir in mixed conifer stands that naturally would have been dominated by ponderosa pine, but say nothing about prescribed burning as a prevention treatment for annosus root disease.

There is no literature supporting prescribed burning as a control of annosus in California ecosystems. Froelich et al, 1978, p. 98 state that prescribed burning to reduce Heterobasidion annosum may not have practical application outside Coastal Plain of Southern U.S. or on soils with heavier texture than those in study (sandy). They conclude that borax, when applied to freshly cut stumps has proved to be most effective treatment in preventing losses. In the Southeast US, where the burning method was developed, conks are formed in the duff at the base of trees and could be killed by prescribed fire. However, in the western US, annosus conks are most often found inside stumps or under the bark. Prescribed burning would not be feasible as a

control method for annosus because of the need to destroy the stumps. In 1994, a field trial was attempted in which fire would be used to destroy infected stumps (Pronos 1994). This trial was unsuccessful because the stumps were still too wet to burn, even three years after harvest.

Lastly, prescribed burning would not be a feasible strategy to reduce the spread of annosus root disease, due to existing hazardous fuels in the Alder Creek Project area, i.e. ground, ladder and standing fuels, which preclude burning as a pre-treatment technique. Use of prescribed fire, as a pretreatment under these circumstances would be extremely difficult to control, and could pose a serious threat to nearby residences, as detailed in Chapter 3, and in the Fuels/Fire Report, which is found in the project file, and available upon request.

Remove stumps and infected roots- Mechanically removing and burning stumps and attached roots is not a practical, effective or desireable method to reduce the spread of *H. annosum* in the project area for a number of reasons. Not only is removing and burning stumps not practical but it is not practiceable, as well, due to the numbers of stumps that would be created. Kliejunas et al (2005), and other references on stump removal, state that stump removal is expensive and "although direct control appears feasible in some situations, prevention remains the preferred and least costly method of annosus root disease management in recreation areas." According to the Forest Service Handbook in part 3409.11- (USDA Forest Service 1994a) stump removal as a suppressive method for *H. annosum* is being tested in several recreation sites, and its efficacy has not yet been demonstrated." Lastly, Kliejunas et al (2005) and other authors found that stump removal is disruptive to the site. The Alder Creek Watershed is considered impaired from past disturbances including, the Donner Ridge Fire in 1960, construction of the Tahoe Donner Subdivision, and past activities on National Forest lands. The Alder Creek project is designed to minimize soil disturbance, and improve the condition of the Alder Creek watershed. Removing stumps, would cause significant soil disturbance and is likely to further impair the watershed.

Cultural control: Converting the species composition and structure of existing conifer stands through reforestation is outside the scope of the project. Improving forest health through thinning overstocked stands is the needed action, not reforestation, and maintaining a species mix of Jeffrey, ponderosa, sugar and lodgepole pine, white fir and incense cedar in the project area is desired. As described previously, silvicultural prescriptions favor certain species, and species conversion is neither the objective of stand treatment nor desired. Again, as recommended by a R5 forest pathologist, borax treatment of multiple species is required to help prevent the spread of annosus root disease in the project area. As discussed previously, cultural controls alone would not be practical or effective in preventing disease spread. Even if species conversion were desireable, borax treatment would still be highly recommended.

Use biopesticides: Lastly, the use of Phlebiopsis gigantea as a biocontrol for annosus root disease has been known since the mid-1950's, based on experiments conducted in England on Scots pine and Corsican pine by John Rishbeth. This particular agent is not as consistent as borax. In Rishbeth (1963) and Rose et al (1980), there are discussions of how *P. gigantea* is not as effective on some conifer species, including western hemlock and Douglas fir. Laflamme and others report promising results in red pine in Ottawa, Canada (Roy et al 2003). There is experience with this fungus in Europe on Scots pine, Norway spruce, and Corsican pine (Annesi et al 2005; Pratt 1999; Pratt et al 2000). In the past, P. gigantea was recommended and used by private forest landowners and the USDA Forest Service in the SE US (USDA Forest Service 1977). However, its use was discontinued when US EPA determined it needed to be registered (Cram, undated).

Ammon and Patel (2000) state that Sporax may aggravate the annosus problem if applied to stump surfaces in already diseased plantations, because Sporax will prevent natural competitors to annosus from establishing themselves on the treated stumps. They recommend using P. gigantea fungus within already infected sites. There is no definitive data that the use of Sporax exacerbates an annosum problem. This may occur when residual roots of cut trees are severely damaged and infection may occur thru the damaged roots. There is no experimental evidence of this theory mentioned in Ammon and Patel (2000) that originated in the SE US. On the other hand, one may apply the reasoning that decomposing fungi would quickly colonize the outlying, dead and dying roots of cut stumps and thus isolate infected tissue to small enclaves within roots. Again, there is no experimental evidence other than our knowledge of the competitive capacity of *H. annosum* to enter dead roots, which is quite low.

Though Ammon and Patel (2000) strongly support use of P. gigantea as " inexpensive, safe and easy to apply, its use would not be legal at this time as it is not registered as a biopesticide either with US EPA or California. There are no efficacy data for California forest conditions, and in fact, there are data suggesting that P. gigantea would not be efficacious in California because it is too dry in summer and fall (Rishbeth 1963; Blakeslee and Stambaugh, 1974). This method of control may be feasible in the future if efficacy can be demonstrated in California, and if they are registered as biopesticides by both US EPA and California. However, until such time as both efficacy and registration are met, this biological agent remains an untenable option.

Standard Management Requirements

Standard management requirements are project design elements, which include project specific mitigation measures for the action alternatives considered in detail. Standard management requirements developed to reduce and avoid adverse impacts are described in Appendix A - *Standard Management Requirements* of this document.

Comparison of Alternatives Considered in Detail

A general comparison between Alternative 1 (the Proposed Action) and Alternative 2 (the No Action alternative) is made in Table 1.5. Information in the table is focused on activities and effects where different levels of effects or outputs can be distinguished quantitatively or qualitatively among the two alternatives.

Table 1.5. Comparison between Alternatives

	Alternative 1	Alternative 2
FOREST HEALTH IMPROVEMENT		
Thinning (Acres)	778	0
Susceptibility to Bark Beetles [Stand Density Index (SDI)]	SDI <228 [1]	SDI 228-248[2]
FUELS REDUCTION/FIRE SUPPRESSION		
Reduction in Surface and Ladder Fuels (Acres)	778 acres	0 acres
Crown Base Height	6 feet	4 feet
Flamelenghts	3.4 feet	6 feet
Transition to Crown Fire	Less likely	Likely
Rate of Spread (chains/hour)	9.6 chains/hour	9.5 chains/hour
Fire Intensity Level	1-2 (low)	3-4 (moderate and rising)
WATERSHED IMPROVEMENT		
Aspen Restoration	22 acres	0 acres
Decommissioning Non-System Roads	1 miles	0 miles
Maintaining System Roads	2.4 miles	0 miles
ECONOMICS		
Timber Sale Volume	1,442 MBF	0 MBF
Timber Sale Value (does not include burning costs)	-$177,671	0

[1] Below the threshhold for imminent mortality from bark beetles

[2]Currently at or approaching the threshhold for imminent mortality from bark beetles, and expected to increase

General Comparison of Alternatives

Alternative 1 (Proposed Action) – Alternative 1 responds to the purpose and need for the project, and proposed thinning, fuels reduction, and watershed improvements represent progress toward improving conifer stand health; reducing the severity of future wildfires; improving hydrologic function of the Alder Creek Watershed; protecting private property; protecting

wildlife, sensitive plants and their habitat; protecting cultural resources; creating pre-conditions necessary for prescribed fire, restoring fire to its natural role in the local ecosystem, and supporting rural community economic stability. Because of the low commercial value of the material to be removed, the project would likely be implemented through service contracts. A portion of the harvested material would be sold through timber sales embedded in the service contracts. As displayed in Table 1.5, the timber sale value is negative, due to the high costs of harvest methods that are designed to minimize soil disturbance and watershed impacts. However, these embedded timber sales would help offset the costs of these service contracts. Additional information about how the costs and values in Table 1.5 were determined can be found in the *Timber Sale Value Analysis* in the project file. Aspen restoration activities would revitalize at risk stands, which would improve soil water storage, and enhance wildlife habitat. Decommissioning non-system roads would deter illegal use by OHVs and reduce sedimentation.

Alternative 2 (No Action) – Poor stand health due to inter-tree competition; heavy fuel loading from dead and dying trees; pervasive ladder fuels; and impaired watershed conditions; all combined with the fire history in and around the project area, indicate an urgent need to take corrective action. The No Action Alternative does not respond to the purpose and need, and does not help the project area progress toward desired condition. As conifer stands remain untreated, conifer mortality is expected to continue at or above current levels due to insects, disease, and periodic drought. Untreated, these stands would remain unsuitable or marginally suitable for species that depend on late-seral vegetation. Correspondingly, the fuel hazard would continue to build. The area would remain vulnerable to high intensity wildfire and this vulnerability would only increase over time. In the event of a fire, the effects would likely be catastrophic in nature, resulting in: stand replacement to early seral habitat, threat to nearby homes, further degradation of the watershed, significant impacts to wildlife and sensitive plants and their habitat, and degradation in visual quality and recreational opportunities. Illegal use of non-system roads by OHVs would continue to contribute to sedimentation. Aspen stands would continue to be at risk of loss, as would important habitat for over 180 species. The No Action alternative would not be consistent with the goals and objectives of the 2004 SNFPA FSEIS ROD for Old Forest Ecosystems and Associated Species, Aquatic, Riparian and Meadow Ecosystems and Associated Species, and Fire and Fuels Management in the WUI.

Comparison of Predicted Forest Health

Alternative 1 (Proposed Action): Proposed thinning would increase overall conifer stand growth and vigor, reducing the susceptibility of trees to the effects of drought, insects, and disease. Individual tree growth rates are expected to increase, and conifers would develop large size, and fire resistant characteristics in a shortened period of time, than without treatment. This alternative would accelerate progression toward old forest desired conditions identified in the 2004 ROD.

Alternative 2 (No Action): No effort would be made to improve forest health. Conifer stands would continue to suffer from the effects of overstocking. Trees would continue to lack vigor and be susceptible to attack by bark beetles and disease, particularly under drought conditions. As discussed under Stand Density and Forest Health on pages 16 and 17, Stand Density Index (SDI) is already approaching or within the zone of imminent mortality. As stand density remains high, and as tree mortality persists, stands would continue to self-thin, which could leave some areas understocked. The No Action alternative would make no appreciable progress in the Alder

Creek Project area toward achieving desired conditions defined in the 2004 ROD for forest health, WUI, or the watershed in the Alder Creek Project area.

Comparison of Predicted Fire Behavior

The following discussion summarizes the fire history, present fuels condition and analysis of expected fire behavior under proposed alternatives that are described in detail in the *Alder Creek Project Fire and Fuels Analysis*, which is hereby incorporated by reference and available upon request. Fuels modeling worksheets are included in the project record.

Fire History/Occurrence

The project area falls within the 12,166 acre Alder Timber Compartment on the Tahoe National Forest. The historical fire data compiled for the compartment was used for this analysis. According to historical data was gathered from the Personal Computer Historical Analysis (PCHA) database and the Tahoe National Forest GIS database, there have been a total of 102 fires within the compartment, which average out to 1.5 fires per year since 1936. Most (98% or 100 fires) were small, averaging less than 10 acres in size and consuming about 1% of the compartment's total acres. The remaining 2% (2 fires) were categorized as large fires. These two fires consumed nearly 61% of the compartment's total acreage. The largest was the 1960 Donner Ridge Fire that consumed 44,800 acres, of which 7,220 acres were within the compartment. Though large fires account for less than 2% of the total fires within the Alder Compartment, they are responsible for nearly 99% (7372) of the acres burned within the compartment, and have consumed over 60% of the compartment itself.

On a national level the average annual number of acres burned by wildfires has risen over the past five years, however, the number of fires has decreased (Wildland Fire Statistics National Interagency Fire Center). This rise in acreage is attributable to the increased occurrence of catastrophic large fires.

Fire Risk

Of the 102 fires, 71% (72) have been human caused and 29% (30) were caused by lightning. The percentage of human caused fires has increased in the last 20 years compared to the previous 40 years. This trend is most likely due to the increased recreational use and urban development of the area. Due to the increased use of the area, the continued growth of urban development and growing populations, the number of human caused fires is likely to rise.

Specific fire risk factors in and near the analysis area include high recreational use along the Commemorative Emigrant Trail and Alder Creek Road, and in the nearby; Prosser OHV area, and State Route 89 North corridor. Another major source of fire risk are the Tahoe Donner, Stony Creek Ridge and Prosser Lakeview Estates subdivisions, which combined, consist of over 6,500 residences.

Fire Behavior

The potential for a severe wildfire event to occur within, or to move into, the Alder Creek stands is linked to the fuel load condition of the area. The effects of fire exclusion plus the mortality from insect infestation have caused woody fuel loading to reach unacceptable levels. In addition, the fuel profiles have changed in structure. Current composition reflects an increase in small diameter ladder fuels coupled with lower surface crown height development throughout the area.

The rapid fuel accumulation has increased the likelihood that a wildfire will burn with a greater fire intensity level. Higher fire intensity levels are directly linked to more complex wildfire suppression scenarios that create a higher degree of difficulty to control wildfire events.

Comparison of Alternatives

Modeling: Fuel conditions were analyzed to compare the effects of the alternatives on fire behavior. Industry standard fuel models and modeling programs were used to predict the effects of Alternatives 1 and 2 on fire behavior in the project area. Expected fire behavior was modeled under extreme fire weather conditions that represent 90th percentile burning conditions, which approximate the low fuel moisture and high wind speeds that occur 15 days of the average fire season. Over 30 years of weather information from the Stampede weather station was used in modeling fire behavior, and wind speeds were adjusted to model pre-treatment and post-treatment canopy conditions.

Table 1.5. Comparison of Predicted Fire/Fuels Conditions: Alternative 1-Proposed Action (predicted) and Alternative 2-No Action (current)

	Fuel Model	Flame Length (ft)	Rate of Spread (chain/hr)	Fire Intensity Level	Canopy Base Ht. (ft)	Transition Ratio	Transition to Crown
Alternative 1 **Proposed Action**	9	3.4	9.6	1-2 (low)	6	0.58	Less Likely
Alternative 2 **No Action**	10	6	9.5	3-4 (mod.)	4	3.8	Likely

Alternative 1, Proposed Action

Direct Effects: Thinning would reduce the density of crown and ladder fuels and disrupt the continuity of fuels both vertically and horizontally. By thinning from below, the smaller, suppressed trees would be removed, which would increase overall crown base height to 6 feet, effectively separating tree crowns from a surface fuels, as shown in Table 1.5. Mechanical thinning with a feller buncher would change the structure of surface fuels by re-arranging the fuel bed. Surface fuels would become more compact, reducing the depth of the fuel bed. In some cases, thinning can cause an increase in wildfire rates of spread due to increased fuel temperature and increased exposure to wind, as the canopy is opened. However, thinning would greatly reduce the intensity of any future wildfire that would occur within the project area.

Mastication is a mechanical fuel treatment that would change the structure and size of fuels in the stand. Trees and under story vegetation (ladder fuels) would be chopped, ground, or chipped, and the resulting material would be left on the soil surface. Where proposed, mastication would result in approximately 5-26 tons per acre of masticated material for a depth of approximately 0.5 to 1.25 inches per acre. Though total fuel loading is not affected immediately, the vertical height of the fuels is lowered, ladder fuels are reduced, and more fuel volume is shifted into 1-

and 10-hour size classes. (RMRS-RN-20-1 Fuels Planning: Science Synthesis and Integration 2004). Essentially, mastication would compact fuels and break-up the horizontal continuity of fuels, which would reduce torching, crowning and spotting during a wildfire event.

The controlled use of low intensity fire to burn under thinned mature forest canopy would reduce surface fuel loading and ladder fuels, and raise the crown base height of the stands. Where prescribed, underburning would further separate the vertical continuity between trees crowns and a surface fire thus reducing the likelihood of a crown fire. Under burning would employ both mosaic and uninterrupted burn patterns. Each burn pattern would disrupt the horizontal continuity of fuels, encourage vertical variability in fuels, and reduce the fire intensity levels of future wildland fires.

Indirect Effects: Fuel modeling indicates that after thinning and followup fuels treatment, the FIL would be lowered to 1-2 (Table 1.6). A FIL of 1-2 burns with low intensity. Flame lengths would be less than 4 feet high, and fireline intensity would be less than 100 Btu/ft/s. The predicted transition to crown ratio would lower to 0.58, in which the possibility of a surface fire developing into a crown fire would be much less likely than under current conditions, or under the No Action Alternative.

Although proposed thinning would slightly increase the rate of spread of surface fires, thinning would greatly increase the effectiveness of fire suppression efforts. Improvements in the efficacy of fire suppression would outweigh higher rates of spread. Fires could generally be attacked at the head of the fire by persons using handtools, and handline should be able to hold the fire. Fireline production rates would increase because lesser amounts of ground fuel and small diameter trees would need to be cleared for fire line construction. Aerial retardant application would also be more efficient. The more open canopy would allow retardant to penetrate and be more effective at slowing the fire spread.

Mastication where prescribed would effectively reconfigure and compact fuels thereby further lowering fire intensity and disrupting fuel continuity, and increasing fire suppression efficiency. Flame lengths of less than 4 feet, and reduced fire intensity would make suppression efforts more efficient. Aerial retardant application would be more effective. The more open canopy would allow the retardant to penetrate and be more effective at slowing the fire spread. While suppression efficiency would increase there would remain a potential for biological damage from soil heating during a surface fire following mastication, particularly in dry soil with a mulch depth of 7.5 cm (3 inches) or greater. Research indicates that up to one-fourth of treated areas with dense mastication vegetation would surpass lethal soil temperatures experienced in the form of increased residence time, (the total length of time that the flaming front of the fire occupies one point), during a surface wildfire (Wildland Fire, Lethal Soil Temperatures During Burning of Masticated Forest Residues, M.D. Busse, et.al.). In the Alder Creek project masticated fuels will produce approximately 5-26 tons per acre of mulch for depth of approximately .5 to 1.25 inches. This depth of mulch is not expected to create enough heat to surpass lethal soil temperatures, via increased residence time, and would reduce overall fire intensity. Mulch depth would diminish over time through the natural decomposition process.

Under burning, where prescribed, would reduce surface fuel loading and lower wildfire intensity. Again, lower wildfire intensity would result in lower flame lengths, slower rates of spread, and generally improve the efficiency of suppression actions. Expected flame lengths would be less

than 4 feet, which would allow persons using hand tools to generally attack the fire at the head or flanks, and a hand line should hold the fire.

As future fires burn with less fire intensity, the effects of fire across the landscape would be reduced. Fire fighter safety would be improved, suppression efforts would be less difficult, and fires would be smaller and less severe. The risk of severely impacting or losing key ecosystem components from fire e.g., sensitive species and their habitat, large trees, riparian vegetation, soil productivity and hydrologic function in the project area would be greatly reduced.

Alternative 1 is consistent with Forest wide standards and guidelines as stated in the 2004 Sierra Nevada Forest Plan Amendment. A fire burning under 90th percentile weather conditions within in the project area would burn at low fire intensity levels. Flame lengths would be less than 4 feet high, fires could generally be attacked at the head of the fire by persons using handtools, and handline should be able to hold the fire. The possibility that a surface fire would transition to a crown fire would be unlikely.

Alternative 2 (No Action)

Direct Effects: As conifer stands remain untreated, the Alder Creek project analysis area would continue to experience tree mortality at or near the current rate, due to insects, disease and periodic drought. Surface fuels would continue to accumulate faster than the decay rate. Trees that are already dead but still standing would fall to the forest floor and would be followed by trees that are currently alive but are weakened by drought, disease and insects. Ladder fuels in the form of shrubs, seedlings and saplings persist. Fuel modeling indicates that most of the analysis area is currently categorized as a moderate fire hazard with a Fire Intensity Level (FIL) of 3-4, as displayed in Table 1.5. FIL is a measure used to determine how difficult suppression would be and the amount and types of personnel and equipment that will be needed to suppress a fire. It is based on rate of spread and heat output and is expressed as a relationship to flame length. A FIL 3-4 burns with moderate intensity with flame lengths 4-8 feet high and a fireline intensity of 100 - 500 BTU/foot/second. Fires would be too intense for direct attack on the head of the fire by personnel using handtools. Handline could not be relied upon to hold the fire. Equipment such as dozers, pumps and retardant aircraft could be effective.

Without treatment FIL is expected to increase in the next 5 to 10 years, as surface and ladder fuels increase, as average crown base height of the stands remain low, and as the likelihood of a crown fire increases (Table 1.5). Modeling results in Table 1.5 predict current flame lengths of 6 feet and a crown transition ratio of 3.8, in the event of a fire. In other words, under current conditions the area is vulnerable to high intensity wildfire, with a high likelihood that a surface fire would become a crown fire under 90th percentile weather conditions. This vulnerability would increase without treatment, as fuel conditions are only expected to worsen over time.

Indirect Effects: The fire regime and condition class of the Analysis area would remain significantly altered from the historical range. “Many dry forests have now missed 7 to 10 fire-return intervals, compared to their historical fire regimes. With heavy ground fuels and high tree densities, these dry forests are now much more likely to have severe fires- and they are also the most common forest type near people’s homes on the east side.” (PNW Science Update, Fire Risk in East-Side Pine Forests, 2002).

Without fuels reduction strategies in place, fire suppression would become increasingly difficult. Surface and ladder fuels would increase, raising the rate of spread, and the resistance to control

of any fire that may start in the project area. As hazardous fuels increase, homes in close proximity to the project area would be placed at an increasingly higher risk, as would firefighter safety.

Based on historic fire occurrence, the analysis area has missed approximately 3-4 fire return intervals. A high energy fire that could rival the intensity of the 1960 Donner Ridge Fire is highly probable. The effects of a high energy fire on ecosystem components in the project area could be catastrophic. Adverse impacts could include, stand replacement, loss of large trees, soil erosion, loss of soil productivity, further reduction in hydrologic function of the Alder Creek Watershed and impacts to aquatic species and their habitat, and degradation in recreational opportunities and visual quality. The high probability of high intensity or stand destroying fires under Alternative 2 are likely to impact existing suitable habitat for sensitive plants and wildlife within the analysis area. Additionally, this alternative has a low probability of providing later-seral habitat in the same projected timeframe as the Proposed Action Alternative and in general over the long term, due to the probability of future wildfires.
Alternative 2 is not consistent with the management objectives and standards and guidelines of the 2004 Sierra Nevada Forest Plan Amendment to reduce the intensity of future wildfires, and improve the efficacy of fire suppression and firefighter safety in the WUI. This alternative would do nothing to reduce fire intensity levels, flame lengths, and the likelihood of crown fire under 90th percentile weather conditions.

Hydrology

The *Alder Creek Cumulative Watershed Effects* (CWE report) analyzes the watershed effects of Alternative 1 and Alternative 2. The CWE report is hereby incorporated by reference and available upon request, and summarized herein.

Analysis area

The Alder Creek Project cumulative watershed effects analysis area is approximately 4,860 acres, of which 1,558 acres have private ownership and 3,302 acres are property of the National Forest System Lands (NFS). Silvicultural treatments would occur on approximately 778 acres of NFS land, of which approximately 261 acres are within Riparian Conservation Areas (RCA) for ephemeral, seasonal and perennial streams. Alder Creek, a perennial stream flows through the length of the project.

The analysis area includes three sub-watersheds. Two of the sub-watersheds are in the Alder Creek drainage (H0952; 1535 acres and H0953; 1644 acres) and one sub-watershed is a portion of the Prosser Creek drainage (H0901; 1535 acres). Each sub-watershed drains into Prosser Reservoir and then into the Truckee River. The temporal scale for this analysis is the past 30 years and foreseeable actions within the next five years.

Watershed characteristics

The majority of precipitation in the analysis area occurs between October and April. Some precipitation comes in the form of late spring and summer thunderstorms, which can produce short duration, high intensity precipitation events that can rapidly increase the rate of runoff and the potential for erosion. Average annual precipitation ranges from 35 to 45 inches (Rantz, 1969) which falls mainly as snow. Although most of the analysis area is located above the typical rain on snow zone, the potential still exists for a particularly warm storm to produce rain on snow at higher elevations. Depending on intensity and duration, this type of storm would have the

potential to cause scouring and sediment loading in the stream channels. Severe flooding occurred as result of such a storm in January 1997, when 10.0 inches of rain was reported in Truckee (National Weather Service, 1997).

An analysis of the existing watershed disturbances and predicted disturbances was conducted using the ERA model, which is described in detail in the Environmental Consequences section of this document under Intensity Element #7, Cumulative Watershed Effects. The ERA model assesses watershed activity-related disturbances and equates the disturbances to that which would occur from an equivalent roaded area (ERA). The ERA for a disturbance is then compared to the threshold of concern (TOC). The TOC is determined by estimating the natural sensitivity of the watershed using inherent characteristics such as soils, drainage density, and elevation, and is further modified to incorporate stream health ratings. As the ERA index approaches or minimally exceeds the threshold of concern (TOC), the ERA/TOC ratio approaches or exceeds 1. The TOC is an index that approximates risk, and when land disturbance exceed that index, elevated awareness and care must be applied within the cumulative analyses area to ensure cumulative effects do not result.

According to this analysis, existing conditions in Subwatersheds H0901 and H0953 are below the TOC. Currently, conditions in Sub-watershed H0952 exceed the TOC. The greatest amount of past disturbance in sub-watershed H0952 is due to residential development and road construction. Residential and road development increase the presence of impervious surfaces (roofs and paved surfaces), which prevent infiltration and increase runoff. These two elements alone account for over 80% of the existing disturbance. These disturbances are considered constant features and do not recover within the ERA model.

Alternative 1 - Proposed Action

Direct and Indirect Effects: Though vegetation management activities can increase the risk for localized compaction, ground disturbance, erosion and stream sediment, the proposed action is designed to maintain long-term soil productivity and meet forest plan direction as identified in the Tahoe National Forest Land and Resource Management Plan (TNFLRMP).

The ID Team designed the project to minimize effects to soil productivity by developing harvest methods and prescriptions that would minimize soil disturbance. When more than 15 percent detrimental compaction may occur across an activity area, the soil scientist, as part of the interdisciplinary team, must develop site specific management prescriptions to ensure maximum protection of soil quality. In the Alder Creek project area, results from monitored transects suggest low to moderate existing compaction, this implies that most units would be at 15 percent, and a few units could exceed 15 percent. The soil scientist was involved in cases where risk of exceeding the 15 % compaction in a unit is high, and developed site-specific management prescriptions to maintain long term soil productivity and to meet the intent lined out in the Tahoe National Forest Land and Resource Management Plan (TNFLRMP).

No compaction above 15 percent would be observed in the RCA, due to the implementation of harvest methods and management requirements that are designed to minimize soil disturbance and compaction. Within the Riparian Conservation Areas (RCA) along Alder Creek and perennial tributaries, only low-impact harvest systems are prescribed to minimize the potential for compaction, and sediment movement. These systems include: skyline, over-the-snow mechanical, helicopter or hand treatment. In upslope units, mechanical methods would be used

with special design features to minimize soil disturbance and compaction, e.g. equipment exclusion zones, long skidding to avoid the need for new road and landing construction. Fuels reduction methods are also designed to minimize ground disturbance by using: low-impact equipment, such as masticators; hand piling and burning; or low-intensity prescribed fire that retains ground cover.

The ID Team developed site-specific Best Management Practices (BMPs) for the Alder Creek Project to control sediment in areas affected by the proposed action, and to maintain or improve background levels of sediment delivery. These practices are designed to ensure that project activities would maintain the beneficial uses and water quality objectives for sediment that are specified in the 2000 Water Quality Control Plan for the Lahontan Region (CRWQCBLR Basin Plan). A monitoring plan is included in the Alder Creek project proposal, as required by the Basin Plan which would further reduce risk to the watershed. The plan will monitor the efficacy of BMPs to ensure that proposed activities do not trigger a cumulative effect that would significantly impact aquatic habitat, exceed water quality objectives or impair beneficial use.

By design, management practices would ensure adequate groundcover to protect the soil. Some localized changes in soil ground cover (duff and litter), and small areas of reduced infiltration could result from burn prescriptions, if hydrophobic soils result from overheating. General experience on the Truckee Ranger District is that prescribed burns meet or exceed ground cover. However, by design, the project burn prescription and burn plan would reduce the risk of high intensity burn to a level of non-significance.

Other off-setting factors that protect the site from detrimental disturbances include increased ground cover in mastication units. Sub-soiling on landings, skid trails, and roads would improve existing conditions, especially where soils have been compacted by previous timber removal activities. While it is accepted that components of the hydrologic cycle and the microclimate would be locally changed, these changes would not result in significant impacts on the watershed.

Indirect Effects: The creation of canopy openings during thinning and aspen restoration in the RCA would enhance riparian species that require more sun. In the aspen treatment areas it is anticipated that there will be a flush of aspen sprouts, and rejuvenation of the associated riparian understory. There may be a risk of increased sediment during the operating period, and from 1 to 3 years following implementation; however, BMPs requiring ground cover retention, and implementation of the monitoring plan should greatly reduce the risk. Soil water availability would increase, as conifers are removed and replaced by aspen suckers, which have lower transpiration rates than conifers. This process can last from 10 to 20 years, until the stand fully matures (N.V. DeByle and R.P. Winokur 1985). The aspen stand may be more efficient at regulating water discharge because of higher transpiration rates when water is available in the spring and in the fall and lower rates when moisture is limiting. Aspen overall have lower transpiration rates, when compared to conifers, by three to seven inches of soil water per year. Relatively quick decay process under aspen stands create soils with a higher water holding capacity, than soils that develop beneath conifers stands. The aquatic environment may benefit due to more efficient water cycling. Overall the treated aspen stand and the physical and biological characteristics for aquatic and riparian species should be improved over existing conditions. Fuels treatment in aspen restoration units would utilize methods that would limit root damage. As a result, aspen clones would rapidly and successfully regenerate while providing enhanced riparian habitat for aspen associated aquatic and riparian-dependent species, and more

efficient soil water storage. Restoration of aspen stands would also reduce the fire hazard in these riparian areas, by removing hazardous fuels and conifers, which would allow less flammable riparian vegetation, such as aspens to become re-established.

The development of temporary roads would cause short-term disturbance and an increased potential for sediment movement. Best management practices would be implemented to control off-site sediment movement. When these roads are decommissioned, the potential for sediment transport to drainages is reduced to a level of non-significance.

The proposed action would help lead the project area toward desired conditions by reducing conifer stocking to a level that would be more typical of historic condition, and by reducing hazardous fuels in the WUI. The indirect benefit to the watershed is that these treatments would improve the chances that fire suppression efforts would be successful in keeping fires small, as previously discussed under Fire/Fuels. This reduces the likelihood of a high-energy stand replacing fire, and the associated catastrophic effects on the watershed and associated beneficial uses.

Through project design features, including BMPs, no significant direct or indirect impacts to the watershed are expected. The Alder Creek Project fully complies with the water quality requirements of the *Water Quality Control Plan for the Lahontan Region*, as discussed in detail in Appendix E-*Compliance with the Water Quality Control Plan for the Lahontan Region,* which is summarized in the next section of this environmental assessment under Environmental Consequences, Intensity Element # 10, Compliance with the Water Quality Control Plan for the Lahontan Region.

Monitoring – To further ensure that water quality objectives are met, the State of California Regional Water Quality Control Board for the Lahontan Region requires the USFS to submit a monitoring program prior to the commencement of vegetation management operations when the cumulative watershed effects analysis: (1) indicates that the project may cause any sub-watershed to exceed a threshold of concern or (2) indicates that the project may increase risk values in any sub-watershed that already exceeds a threshold of concern prior to project implementation. The *Alder Creek Project Cumulative Watershed Effects (CWE) Analysis* reveals that sub-watershed H0952 meets the second criteria. A monitoring plan was developed in response to this requirement, and is located in the Appendix C-*Monitoring plan, Alder Creek Project.* This monitoring plan provides specific details concerning the monitoring that will be established within Sub-watershed H0952, and is focused on selected areas within the sub-watersheds where the risk for adverse effects may be higher than in other areas. Implementation and effectiveness of BMPs throughout the Alder Creek project would be monitored by day-to-day examination of site conditions that is coordinated by sale administrators and watershed staff, and site-specific monitoring will be done, as well as the random Regional BMPEP monitoring. The Monitoring plan would ensure that water quality protection is accomplished.

The implementation of BMPs and other required mitigations can reduce the potential for off-site sediment movement when ground based systems are used. By ensuring that the BMPs and additional mitigations are effective in keeping soil in place and maintaining water quality, the water quality requirements of the primary regulatory agencies would be met. Implementation of these measures reduces the potential for significant effects to be triggered by the proposed actions. It is therefore concluded that there would be no irreversible or irretrievable water quality impacts from the proposed action and the requirements for the maintenance of water quality as

established by the Lahontan Water Quality Control Board and the Federal Clean Water Act would be met.

Compliance with Riparian Conservation Objectives (RCOs): The 2004 ROD requires that a site-specific project-level analysis to determine whether activities proposed in the Riparian Conservation Areas (RCAs) meet RCOs. This analysis is contained in Appendix D- *Riparian Conservation Objective Analysis for the Alder Creek Project* and summarized herein.

The 2004 SNFPA ROD on pages 42 and 43, designates land allocations referred to as Riparian Conservation Areas (RCAs) for perennial, intermittent, ephemeral streams and other wetlands. As defined in the Sierra Nevada Forest Plan Amendment Record of Decision (ROD), RCAs "are land allocations that are managed to maintain or restore the structure and function of aquatic, riparian, and meadow ecosystems. RCA buffer widths are 300 feet measured from the bank full edge of perennial streams, or from the edge of meadows, lakes, springs, and ponds or riparian vegetation, which ever is greater. The RCA buffer width is 150 feet measured from the bankfull edge of seasonally flowing streams. The intent of management direction for RCAs is to (1) preserve, enhance, and restore habitat for riparian- and aquatic-dependent species, (2) ensure that water quality is maintained or restored, (3) enhance habitat conservation for species associated with the transition zone between upslope and riparian areas, and (4) provide connectivity within the watershed." The ID Team designed all treatments in the RCAs to meet Riparian Conservation Objectives (RCOs). Treatment type and mitigation measures for each RCA were carefully selected in a site-specific manner to minimize adverse effects within RCAs.

The Alder Creek project proposes a total of 261 acres of thinning and fuels reduction within RCAs. Of this total, 247 acres of treatment would be accomplished using a combination of harvest methods including: mechanical, mechanical over-the-snow, skyline or helicopter yarding, and hand thinning. By design, non-ground based systems and over-the-snow mechanical methods have been proposed in Units 1a, 1b, 1c, 6a, 6b, 6d to minimize ground disturbance within the RCAs along Alder Creek and tributaries. 14 acres within the RCAs have activities proposed that may result in some ground disturbance during thinning, 6 of these acres are within RCA buffers associated with ephemeral drainages, where mechanical treatments are proposed. These drainages show little to no annual scour and have little to no riparian vegetation associated with them. The remaining 8 acres are along the outer edge of the Alder Creek RCA buffer and are located at least 150-200 feet from the perennial channel. The project does not propose treatment in the small meadows in Units 6b and 6c.

The *Riparian Conservation Objective Analysis for the Alder Creek Project* finds that proposed Best Management Practices and Management Requirements for the project provide sufficient assurance that the risk of activity-related sediment entering aquatic systems, and the risk to aquatic or riparian dependant plant and animal species in the RCA would be reduced to a level of non-significance. The RCO Analysis finds that the Alder Creek Project, as proposed, is in compliance with the 6 RCOs outlined in the 2004 ROD. A more detailed analysis of compliance with RCOs can be found in Appendix D. Restrictions on management activities within the RCAs and uplands are provided in Appendix A- *Standard Management Requirements*. A detailed description of the BMPs is found in Appendix C-*Watershed Monitoring Plan for the Sub-watershed over TOC, Alder Creek Project* (Monitoring Plan). These practices are designed to return the disturbed areas to as close to background conditions as possible.

Cumulative Effects: A detailed discussion on expected cumulative effects of Alternative 1 (Proposed Action) is found under Intensity Element #7- Cumulative Watershed Effects and summarized herein. No cumulative effects would be expected in sub-watershed H0901, primarily because of the small scale of proposed actions in this sub-watershed. Sub-watershed H0953 is located downstream of Sub-watershed H0952, and also remains under threshold.

However, in Sub-watershed H0952, the existing ERA/TOC ratio is 1.06, of which constant features such as residential development and roads account for 80 % of the ERA index. The proposed action would increase the ERA/TOC ratio in Sub-watershed H0952 from 1.06 to 1.32 in 2006. The risk of a cumulative effect based on the ERA method, would be considered moderate. As discussed under the Cumulative Watershed Effects, the ERA methodology does not account for drainage routing and attenuation of peak flows from sedimentation retention ponds or other measures that may be associated with reducing impacts from the private land development in that watershed. The stability of the watershed downstream was tested under the 1997 flood. Although channel conditions are not at maximum stability, they seem to be more resilient than what might be expected coming from a watershed with a high percentage of constant features. For these reason it seems plausible that the ERA methodology may overestimate the impact from residential development.

In addition, actual recovery would be likely to be much faster than anticipated under the assumptions used in the analysis. The ERA methodology assumes a 30 year recovery, which is based on the harvest of large trees and under older logging practices. Since the current methods for most logging practices may actually have an approximate recovery of 10 to 20 years, the risk of cumulative effects would not last as long as is predicted. Unlike the residential disturbance, the effects of the proposed action would recover, and once recovered would improve the overall watershed conditions and riparian health in the project area. The ID Team has incorporated rigorous design features into the proposed action to minimize effects to a level of non-significance. Proposed activities would not trigger cumulative effects to the watershed. Future residential development could increase impacts on the sub-watershed, though the magnitude of these effects would depend on the efficacy of mitigation required by the Tahoe Donner Association, state and county regulations.

Alternative 2 - No Action

Direct and Indirect Effects: With no action, the processes that are occurring now in the watershed would continue. These processes are affecting watershed health and include: increased carbon loading particularly in drainages that have a high density of conifers, and downed woody debris; concentrated flows from unmaintained roads and non-system roads; and continued over crowding of aspens by conifers. There would be a continuation of sediment production from roads that would otherwise be reduced under the proposed maintenance of system roads and decommissioning non-system roads.

Indirect effects of the no action alternative are continued tree mortality, and resulting fuel accumulation of both ground and standing fuels. As fuel loading increases, the potential for a higher severity burn in the drainages and draws would increase. This, in turn could lead to greater watershed disturbances from erosion, hydrophobic soils and loss of vegetative ground cover. A reduction in the health and vigor of aspen stands would continue.

Cumulative Effects: A detailed discussion on expected cumulative effects of Alternative 2 (No Action) is found in the discussion under Intensity Element #7-Cumulative Watershed Effects.

The no action alternative would result in steady watershed recovery rates. The existing conditions in Sub-watershed H0952 would remain over threshold, with a heightened sensitivity, and could respond negatively to an extreme precipitation event. The actual risk is somewhat reduced from Alternative 1, primarily because recovery would occur sooner. However, the benefits to watershed health from road maintenance, road decommissioning, and aspen restoration and improved fire suppression environment would not occur.

ENVIRONMENTAL CONSEQUENCES

Effects Relative to Issues

No issues were identified, thus discussion of effects will focus on those relative to FONSI Significance Elements below.

Effects Relative to FONSI Significance Elements

In 1978, the Council on Environmental Quality promulgated regulations for implementing the National Environmental Policy Act (NEPA). These regulations (40 CFTR Parts 1500-1508 include a definition of "significantly" as used in NEPA. The eleven elements of this definition are critical to reducing paperwork through use of a finding of no significant impact when an action would not have a significant effect on the human environment, and is therefore exempt from requirements to prepare an environmental impact statement. Significantly as used in NEPA requires considerations of both Context and ten elements of Intensity.

Context:

The local context of the proposed action is limited to the northeastern portion of the Tahoe National Forest, as described in the proposed action. There are no unique geographic characteristics in the Alder Creek project area that would indicate an increased potential for significant effects.

The Alder Creek Project proposes treatments that would improve forest health, provide a safer and more effective fire suppression environment, and improve watershed conditions and contribute to local community economic stability.

Proposed thinning activities could take place year round, depending on the logging system used, over a period of up to 5 years. Any follow up mechanical treatment of ground fuels would take place primarily from June through October, depending on weather and soil moisture conditions. Underburning and pile burning of ground fuels would take place in dispersed locations on an infrequent basis during the Spring and Fall seasons, after completion harvest activities. In the context of seasonality and duration of activities, the analyses that support the findings of this EA (Biological Evaluations and Assessments, Management Indicator Species Assessment, Weed Risk Assessment, and Watershed Cumulative Effects Analysis, hereby incorporate by reference, and available upon request), have determined that the Proposed Action would not pose significant short- or long-term effects. There would be no irreversible or irretrievable water quality impacts from the proposed harvest. The project would meet the requirements for the maintenance of water quality as established by the Lahontan Regional Water Quality Control Board, and the Federal Clean Water Act. When the effects to threatened and endangered species,

sensitive species, and management indicator species are considered, the determinations for the Alder Creek Project are *No effect,* or *May affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability within the planning area of the Tahoe National Forest.* These determinations are consistent with the determinations made by the SNFPA FSEIS (2004). A Weed Risk Assessment determined that the Alder Creek Project has been designed in a way to ensure that there is a low risk of increased spread of noxious weeds.

The scale of the Alder Creek Project is not indicative of significant effects beyond those already considered in the SNFPA FSEIS (2004). The proposed treatment acres represent approximately 0.3% of the Truckee Ranger District and less than 0.1 % of the area of the Tahoe National Forest. Upon completion of the Alder Creek Project, a forest canopy of the largest trees would remain, and the health and sustainability of the forest would be improved.

Intensity:

(1) Impacts both beneficial and adverse.

All analysis prepared in support of this document considered both beneficial and adverse effects, but all effects determinations were made on the basis of only adverse effects. Effects determinations are summarized in supporting analyses and in the remaining sections of this assessment. Some short-term adverse effects to plant and animal species may result from ground and noise disturbance and minor changes to some habitat conditions. However, Tahoe National Forest LRMP Standards and Guidelines, as amended by the 2004 SNFPA FSEIS ROD and project specific management requirements have been designed to reduce these effects. None of the adverse effects of this project would reach a significant intensity, even when considered separately from the beneficial effects that occur in conjunction with adverse effects. Long-term benefits to the Alder Creek Project landscape, would include improved forest health, a reduction in high fire hazard conditions, and improved watershed conditions.

Based on extensive experience planning and implementing similar projects, the interdisciplinary team has confirmed that Standard Management Requirements and mitigation measures (listed in detail in Appendix A of this EA) would ensure that the Alder Creek Project would result in no significant impacts. These include:

- Implement Best Management Practices to protect water quality (see Appendix A Standard Management Requirements (SMR #1).
- Minimize soil compaction and an increase in soil hydrophobicity, to maintain long-term soil productivity (SMRs: 1, 2, 3, 4, 7, 8,10,11,12,13,15, and C6.4200#, C6.3150#, C6.6060, C607#).
- Adhere to all federal and state regulations, and product label requirements for the safe use of Sporax® during stump treatment (SMRs: 1, 2, 16).
- Reduce non-point water quality pollution, by avoiding and reducing accelerated erosion (SMRs: 1, 2, 3, 4, 6, 7, 8, 10, 11, 12, 13, 14, 15, 24, and C6.4200#, C6.3150#, C6.6060, C6.607, B6.65, B6.67, B6.61).

- Protect streamcourses and other Riparian Conservation Areas (RCAs) such as meadows and ponds, to provide for water quality and riparian habitat protection (SMRs: 1, 2, 3, 7, 8, 9, 10, 11, 12, 13, 14, 15, and C6.3150#, B6.61).
- Proposed treatments in RCAs are designed to meet the Riparian Conservation Objectives (RCOs) found in the 2004 SNFPA FSEIS ROD by: implementing logging systems that minimize disturbance to riparian vegetation and soils (skyline, over the snow, hand or helicopter systems), removing fewer trees, selectively removing downed woody material in the floodplain under the guidance of the East zone Fisheries Biologist, Wildlife Biologist, Fuels Specialist, restricting equipment use, and underburning at lower intensities in the RCA (SMRs:1, 2, 3, 7, 8, 9, 10, 11,12, 13, 14, 15, 16).
- Ensure adequate retention of fine and medium woody material for erosion control and organic matter cycling (SMRs: 15).
- Provide for maintenance and improvement in coarse woody debris in perennial stream channels (SMR 9).
- Avoid and minimize adverse impacts to sensitive plants (SMRs: 3, 15, 16,18).
- Reduce the risk of the spread of noxious weeds (SMRs: 5, 18, and C6.35).
- Avoid the encouragement of cheatgrass, to protect important shrub communities that contribute to beneficial forage production (SMR: 18).
- Avoid and minimize impacts to California spotted owl, northern goshawk (SMR 19).
- Protect Cultural and Historical Resources (SMR: 3,24,25, and C6.24#).
- Maintain air quality (SMR: 30).

(2) Public health or safety

All units proposed for treatment in the Alder Creek Project area are in areas designated as WUI. Approximately half of the project area (~404 acres south of the Alder Creek Road) is considered Defense Zone, while the other half (~374 acres north of the Alder Creek Road) is designated as Threat Zone. Reducing surface and ladder fuels, as proposed under Alternative 1 (Proposed Action) would improve public health and safety by providing a safer and more effective fire suppression environment. The *Alder Creek Project Fire and Fuels Analysis* (incorporated by reference and available upon request), discusses the fire history of this area, and explains how thinning and subsequent fuels treatments can reduce the severity of wildfires and create forest conditions that allow firefighters to stop the progress of wildfires more effectively and under safer conditions. This analysis is summarized in the Comparison of Alternatives, Fire and Fuels.

To provide for the health and safety of members of the public that use the Commemorative Overland Emigrant Trail, a Forest Closure would be in effect during harvest treatment activities. The forest closure would be announced in area newspapers, and other media, e.g. the local radio station, and the Tahoe National Forest Website. The area would be reopened to public use upon completion of harvest activities.

During borax application to freshly cut stumps, all applicable federal and state pesticide use regulations, and Sporax® product label requirements will be strictly adhered to, to ensure the health and safety of workers and the public. The Forest Closure that will be enforced during harvest activities would also serve to minimize public exposure to borax during stump treatment, and reduce potential impacts to human health and safety. Site-specific BMPs and Standard Management Requirements listed in Appendix A provide further assurance that the risks of borax treatments are reduced to a level of non-significance. A more detailed discussion in the potential effects of Sporax® use on human health and safety, and project design features to minimize risk is found under Intensity Element #5 -Degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks, and in Appendix B, *Human Health and Safety and Ecological Risk Evaluation for Borax Stump Treatment, Alder Creek Project.*

Thinning, aspen restoration harvest, mastication, borax application, and removal of surface and standing fuels would be carried out by contracts that include standard and project specific optional clauses that provide for worker and public safety. OSHA regulations apply to proposed woods operations and would help prevent accidents and injuries in the course of woods operations. The Tahoe National Forest and the Truckee District have extensive experience in implementing similar types of contracts in a manner that results in no significant impacts to public health or safety.

Burn Plans are prepared prior to the implementation of prescribed fire activities that include: a job hazard analysis to identify risks to the workers and the public; contingency plans to identify fire suppression resources required to be available in case of an escape fire; and a smoke management plan to reduce adverse effects to the public. Prescribed fire would only be ignited when fuel moisture, air humidity, wind, and staff and equipment available are favorable to control of the fire, and the risk of adverse effects to public and worker healthy or safety is at an acceptable level. Public notices are put into local newspapers and signs are installed on roads accessing the burn to inform the public about when and where these projects are taking place.

All of these procedures and safety measures included in the proposed action would result in no significant impacts to the health and safety of the public and workers.

(3) Unique characteristics of the geographic area

No parklands, prime farmlands, wild and scenic rivers, or ecologically critical areas would be affected by any proposed treatments under Alternative 1, the Proposed Action.

Heritage Resources

This project area has been analyzed and surveyed for historical and cultural resources. There are 31 archaeological sites within the Area of Potential Effect (APE). The majority of these sites in the APE are historic sites/linear features related to the extractive logging industry. Two sawmills are known to have operated in the area. At the east end of the project area on private land, near the intersection of Highway 89 and Alder Creek Road, was the Roberson and McChomick Sawmill. This sawmill opened in 1872 and closed in 1880. A V-flume, built in 1873, extended 5 miles from the sawmill to a lumber yard at Prosser Creek Station, a loading station along the Central Pacific Railroad at Prosser Creek and the Truckee River. The V-flume was used from ca. 1881-1885 for fluming cordwood. Another sawmill, located in the center of the project area on

Forest Service system managed land, is the Alder Creek Mill, established and operated by the Sierra Nevada Wood and Lumber Company (SNWLC) ca. 1901-1905. This sawmill was serviced by a 2 mile long railroad spur that extended off of the Hobart Southern Railway. The railroad grade was later reused by the Crown Willamette Paper Company (CWPC) beginning in 1924. Logging operations were carried out until the early 1930s and the railroad grade was abandoned. Portions of this former grade have been reused as a 4-wheel drive road. This road was closed by the Forest Service and is currently used by recreationists as the Commemorative Overland Emigrant Trail.

By implementing the Standard Resource Protection Measures (Attachment B) of the First Amended Regional Programmatic Agreement among the *U.S.D.A. Forest Service, Pacific Southwest Region, the California State Historic Preservation Officer, and the Advisory Council for Historic Preservation regarding the process for compliance with Section 106 of the National Historic Preservation Act for Undertakings on the National Forests of the Pacific Southwest Region* (Regional PA), the proposed action has been determined to have no effect on the historical or cultural resources listed or eligible for inclusion in the National Register of Historic Places, nor cause the loss or destruction of any significant cultural or historical resources.

Wetlands

The impacts of the Alder Creek Project proposed action on wetlands have been analyzed in detail and disclosed in the Cumulative Watershed Effects, Alder Creek Project analysis, which is incorporated by reference and available upon request. This analysis is summarized in this EA under Comparison of Alternatives, Hydrology; under Intensity Element #9, Cumulative Watershed Effects, and under Intensity Element #10, Compliance with the Water Quality Control Plan for the Lahontan Region. These analyses find that the proposed action would not significantly affect wetlands in the Alder Creek Project area, and fully complies with the requirements in the Water Quality Control Plan for the Lahontan Region, and the Riparian Conservation Objectives of the 2004 SNFPA ROD.

The implementation of BMPs and other required mitigations can reduce the potential for off-site sediment movement when ground based systems are used. By ensuring that the BMPs are effective, and that additional mitigations are effective in keeping soil in place and maintaining water quality, the water quality requirements of the primary regulatory agencies are met. Implementation of these measures ensures that significant effects are unlikely. It is therefore concluded that there would be no irreversible or irretrievable water quality impacts from the proposed action, and the project would meet the requirements for the maintenance of water quality as established by the Lahontan Water Quality Control Board and the Federal Clean Water Act.

(4) Highly controversial

The design of the Alder Creek project is subject to extensive standards and guidelines required by Tahoe National Forest LRMP as amended by the 2004 SNFPA ROD, and project specific mitigation measures developed by the Interdisciplinary Team (IDT). This has resulted in a focused proposed action that protects forest resources, improves forest health, reduces fuel hazards, improves watershed conditions, and is not likely to be highly controversial.

While some opposition to portions of the proposed action was raised by two groups during project scoping, the IDT identified no significant issues raised in the scoping comments. The

opposing views do not involve substantial scientific controversy over effects at the project specific level. No substantial questions were raised as to whether the Alder Creek Project proposed action might cause significant degradation of some human environmental factor, and there was no substantial dispute identified about the size, nature, or effect of the proposed action. Even though the project area lies adjacent to or in close proximity to three large residential subdivision with over 6,500 residences, the scoping process did not identify any substantial controversy over the proposed action.

In their scoping comment letter, CATs questioned the need to use borax in the project area. Citing several studies, CATs suggested that reducing the spread of annosus root disease can be accomplished through reduced borax use or through non-borax methods. As previously discussed under Alternatives Considered but Eliminated from Detailed Study, past experience in Region 5, and pertinent scientific literature support borax use as a highly effective and necessary preventative strategy to reduce the spread of annosus root disease, particularly in the eastside pine type in California. According to available scientific literature, there is no scientific controversy, regarding the need for and efficacy of borax to reduce the spread of annosus root disease in the eastside pine type in California.

Many comments that FIG expressed about the proposed action are focused on the recent SNFPA FSEIS ROD (2004). FIG questioned the need to cut trees greater than 20 inches dbh and reduce canopy closure below 50%, and suggested that the Alder Creek project implement the 2001 SNFPA FEIS ROD, primarily to provide for the needs of wildlife. Such an alternative would effectively limit harvest to trees less than 20 inches dbh and would retain more than 50% canopy closure. As discussed under Alternatives Considered but Eliminated from Detailed Study, the 2004 SNFPA FSEIS ROD replaced the 2001 SNFPA ROD, and the controversy over national forest management issues in the Sierra Nevada has been extensively addressed at the programmatic level by the SNFPA FSEIS and ROD (2004). The 2004 SNFPA FEIS addressed the impacts of proposed management alternatives in the Sierra Nevada on wildlife and sensitive plants. The 2004 ROD provides the rationale for the decision, and outlines the management goals, land allocations, and standards and guidelines to meet the needs of wildlife and sensitive plants. Alternative 1, the Alder Creek Proposed Action is consistent with the Standards and Guidelines of the Tahoe National Forest LRMP, as amended by the 2004 SNFPA FSEIS ROD. The impacts on wildlife are analyzed in the BEs for Terrestrial and Aquatic Wildlife, and Sensitive Plants, and in the MIS Analysis for the Alder Creek Project, which are incorporated by reference, and available upon request, and summarized under Intensity Element #10. These analyses find that implementation of Alternative 1, the Proposed Action provides for the needs of terrestrial and aquatic wildlife, and sensitive plants, and would result in no significant impacts to these species and their habitat.

(5) Degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

The SNFPA FSEIS ROD (2004) in the section titled *Diversity and viability for Fish and Wildlife* on page 21 states: “In this planning context, absolute certainty is not possible. This has led to a planning process that involves projections regarding the distribution and abundance of ecological conditions needed to maintain viable populations of species well distributed throughout their range, in the planning area, over the next 50 years. ……Based on my review of the record, including the Final SEIS, Biological Assessment (BA), Biological Evaluation (BE) and

Biological Opinion (BO), I believe that the management approach embodied in this ROD represents a balance of wildlife habitat conservation measures that considers the available science and the risks associated with wildfires. It will provide the fish and wildlife habitat and other ecological conditions necessary to maintain well-distributed viable populations of vertebrate a species in the planning area, and maintain the diversity of plants and animals."

The SNFPA SFEIS ROD (2004) in the section titled *Adaptive Management and Monitoring* on page 12 states: "One key finding in the science consistency review was that there is a degree of uncertainty in a number of areas, especially related to the relationship between management activities and their effects on wildlife habitat and populations. A strong recommendation in that report was to use an adaptive management approach to move forward with some level of management coupled with experimentation and learning. I adopt that recommendation."

This acknowledgement of uncertainty at the programmatic level resulted in the programmatic management direction contained in the SNFPA FSEIS ROD (2004) that will contribute to a reduction in the possible effects on the human environment that are highly uncertain or involve unique or unknown risks.

Surveys were conducted in the Alder Creek Project area to support the analysis of site-specific effects on wildlife (both terrestrial and aquatic), sensitive plants, noxious weeds, heritage resources, and the watershed. Extensive survey information was available for the Alder Creek Project EA and in analysis documents incorporated by reference. Fuel condition and expected fire behavior were modeled using methodology that is based on scientific studies, and is widely accepted as an industry standard.

These documents find that implementation of the Alder Creek Project would have no significant impacts on wildlife (both terrestrial and aquatic), sensitive plants, noxious weeds, heritage resources, watershed and other sensitive resources in the analysis area. As a result, site-specific project effects are not highly uncertain and do not involve unique or unknown risks.

Borax Treatment:

As previously described, the *Human Health and Safety and Environmental Risk Evaluation for Borax Stump Treatment*, *Alder Creek Project* (Risk Evaluation) was completed for the proposed application of borax on freshly cut stumps, and is included in this document as Appendix B. The evaluation is based on a review of the existing scientific literature on borax use, including references directly pertinent to forestry applications. The existing literature documents the efficacy of borax use as a preventive measure to reduce the spread of annosus root disease within Region 5, with minimal risk to humans and the environment. Much of the information in the Risk Evaluation is from the *Assessment of human health and environmental risks associated with the use of borax for cut stump treatment,* which was written in 1996 by Dost et al, who are professional toxicologists. They acknowledge that uncertainties are inherent when predicting risk. However, the information in the risk assessment is based on a large body of scientific literature and technical reports from public agencies.

The Alder Creek Project risk evaluation contains a detailed description of borax toxicity, persistence, bioaccumulation, likely routes and amounts of exposure, and the risk to human health and safety and the environment from proposed stump treatment. The risk evaluation determined that treatment of cut stumps with borax, at the proposed use rates, and proposed

method of application would have no significant direct, indirect or cumulative impacts on human health and safety and the environment, as summarized below:

Human Health and Safety

Toxicity: Borax is considered relatively non-toxic to humans with low oral and dermal toxicity (Appendix A, Risk Evaluation, p. 2). Laboratory studies of mutagenicity with borax have been negative (USDA, 1994, p. 4). In a 2 year feeding study in rats, borax was not found to be carcinogenic. EPA classifies the related compound boric acid as a Group E carcinogen (evidence of non-carcinogenicity for humans). Feeding studies in rats have indicated that chronic exposure to borax may cause reproductive damage and infertility (USDA, 1994, p. 4). No developmental effects were reported in other feeding studies, when boric acid was given to rats and mice during pregnancy (USDA, 1994, p. 4).

Routes of Exposure: There are few potential routes of exposure for humans that might result from application of borax to cut stumps (Dost et al et al, 1996 p. 54-56). These are described below:

Dermal**-**The most likely exposure of humans should be during handling. Exposure of skin should result in virtually no absorption, unless borax contacts broken skin. Human exposure from handling borax or contact with treated stumps is not likely to result in acute or chronic toxicological effects (Dost et al et al, 1996 p.).

Ingestion: Contact through the digestive tract can only arise from extreme carelessness, or intent. Human exposure from contact with treated stumps is not likely to result in acute or chronic toxicological effects (Dost et al et al, 1996).

Inhalation**:** In an industrial setting, workers have reported bronchial irritation after chronic exposure to borax dust (USDA, 1994, p. 5). However, Dost et al conclude that inhalation of significant amounts during typical forestry application is highly unlikely (Dost et al, 1995).

Risk to workers and forest users: Evidence indicates that workers who apply borax to cut stumps are not at risk of adverse effects due to boron exposure (Dost et al, 1996 p. 61). Boron is excreted very rapidly without change by humans and other species, regardless of the route of intake (Dost et al, 1996 p. 57).

Dost et al (1996) conclude that due to low toxicity of borax to humans, the relatively low use rates proposed, the limited routes of borax exposure to forestry workers and forest users, coupled with very little absorption through the skin any doses incurred are expected to be inconsequential to human health and safety (Dost et al, 1996 p.59). To minimize human exposure to hazardous levels of borax, the proposed action requires strict adherence to applicable state and federal regulations regarding safe use of pesticides, and to the Sporax label requirements, i.e., proper worker training, use of required personal protective equipment, washing hands after handling and before eating, and BMPs, including spill contingency planning. These measures provide additional assurance that workers or forest users would not be exposed to hazardous levels of borax through dermal contact, ingestion or inhalation. Because a heavily used recreational trail bisects the project area, a forest closure would be in effect during harvest activities to ensure public safety. Although the closure is not specifically prescribed for Sporax® use, the closure would effectively reduce potential exposure of the public during borax treatment of cut stumps. The Sporax® formulation is exempt from the Worker Protection Standard because it is applied to stumps, which are not used for food, feed, or fiber. A restricted entry interval is not required.

Environmental Risks

Water Quality: Measures that would reduce the risk to soil productivity and beneficial uses of water include: hand application methods which target the stump surface, 25 foot no treatment buffers along live stream courses and riparian vegetation, cessation of application under periods of sustained rain, and spill contingency planning. A more detailed evaluation of the risks to water quality from proposed Sporax® use is included in Appendix B, the *Human Health and Safety and Ecological Risk Evaluation for Borax Stump Treatment*, and which is summarize in Intensity Element #10 under Compliance with the Water Quality Control Plan for the Lahontan Region.

As discussed in detail in the Risk Evaluation in Appendix B, borax is relatively non-toxic to mammals, birds, fish, amphibians, plants and aquatic and terrestrial invertebrates. Implementation of project design features that have been described previously would ensure that effects to these species would be reduced to a level of non-significance. The following is a summary of effects to aquatic and terrestrial wildlife, plants and invertebrates.

Wildlife: According to the Risk Evaluation in Appendix B, Dost et al conclude that adverse effects on wildlife from stump treatment with borax are improbable (Dost et al, 1996 p.61). Proposed use of borax in the Alder Creek Project is not expected to adversely impact wildlife for the following reasons:

- Relative non-toxicity of borax to wildlife.
- Relatively low rates of use
- Low probable risk of exposure, particularly since wildlife is not attracted to borax
- Rapid rates of excretion and low rates of bioaccumulation

Project design features, including spill contingency planning would reduce the risk of accidental exposure. If a spill were to occur, individuals may be affected, but effects to populations would not be expected.

Aquatic Species: Surface waters naturally contain low levels of boron at an average concentration from 0.001 mg/L to 0.1 mg/L (USDA, 1994). Although borax is highly soluble in water (Eisler, 1990), it has a low potential for surface water contamination (USDA, 1994). Although no data has been obtained on movement of borax to water after stump treatment, movement into surface or groundwater is unlikely, since borax is adsorbed to mineral particles in the soil, and plant uptake would probably scavenge any boron moving through soil (Dost et al, 1996). Dost et al report that although borates do not adsorb tightly to soils, attachment is such that only large amounts of rain or other water moving through the soil would be required to produce the leaching necessary to move boron to a water body (Burns and Collier,1980). Dost et al (1996) suggest that the migration of boron away from the site into water sources is unlikely.

USDA (1994) concludes that borax is practically nontoxic to fish, amphibians and aquatic invertebrate animals. The bioconcentration factor for boron for salmonids is less than one (Dost et al, 1996, p. 35), which indicates that borax does not build up (bioaccumulate) in fish (USDA, 1994). Dost et al report that amphibians are considerably less sensitive than trout, based on studies, in which leopard frog was exposed to boric acid (Dost et al, 1996, p. 32).

Application of borax to cut stumps is not expected to result in significant impacts to aquatic species, due to the low toxicity of borax to aquatic animals, and the low potential for borax to leach or enter surface water (USDA, 1994, p. 3). Measures incorporated into the project design,

provide additional assurance that the potential for adverse impacts to aquatic species would be reduced to a level of non-significance. These measures include 25 foot no treatment buffers along live stream courses and riparian vegetation, spill contingency planning. There is a possibility that an amphibian on land can be exposed to borax outside the 25 foot buffer, which could lead to adverse impacts. Though an individual may be affected, effects to populations would not be expected.

Plants: As discussed in the Risk Evaluation in Appendix B, boron is an essential nutrient for plants, and boron compounds, including borax occur widely in nature. Boron is taken up by plants in proportion to the amount of boron in the soil. Borax is used in fertilizer formulations to supply boron. However, borax at high levels may kill plants, and may be used as a nonselective herbicide (USDA, 1994). Dost et al (1996) found through limited monitoring of stump treatment data that no treatment-related increases in boron content occurred in adjacent foliage, litter, or soil. By implementing project design features, vegetation in close proximity to treated stumps would not be routinely exposed to Sporax®, or at risk. These design features include the careful application onto the stump surface and the prompt cleanup of spillage which would reduce the risk to plants to a level of non-significance. Additional project design features that would reduce the risk to the sensitive plant *Meesia uliginosa* and its habitat to a level of non-significance include the 25 foot no treatment buffer along live stream courses and riparian vegetation and flag and avoidance.

Insects and Microorganisms: Relatively high concentrations of boron compounds are toxic to insects, and in some cases, borax is used for insect control. While these compounds are effective insecticides, the target organisms must come into direct contact with the powder (Grace, 1991). USDA (1994) concludes that borax is relatively non toxic to bees.

At high levels, borax could be toxic to many soil microorganisms (USDA, 1994). However, Dost et al reason that in the highly variable medium of forest soil and litter, with substantial organic matter in the upper layers, both binding to organic material and leaching would tend to make borax unavailable to fungi. It is unlikely that application of Sporax® during stump treatment would increase boron or borates in the soil above background levels (Dost et al, 1996).

Based on available research data on the potential distribution of borax around treated stumps, proposed treatment would have no effect on invertebrates or microorganisms. If spilled, or misapplied, localized effects on microorganisms could occur, however any effects would be restricted to a relatively small portion of the environment. Though individuals could be affected in the event of a spill, or if individuals are in contact with treated stumps no detectable effects to populations would be expected (Dost et al, 1996). Proposed project design features, including hand application methods that target stumps only, and spill contingency measures described previously would further reduce the risk to these organisms.

Cumulative Impacts

The Truckee Ranger District has implemented borax treatment of freshly cut stumps for years, without significant impacts. The Forest Service Handbook requires in FSH 2109.14 (USDA Forest Service, 1994b) that all pesticide incidents must be reported to the Regional Office. To date, there have been no reported spill incidents to streams.

The Alder Creek project would be implemented over approximately the next 5 years. The Truckee Ranger District has no vegetation management projects in the foreseeable future that

prescribe borax use in the Alder Creek watershed. Several heavily used recreational sites lie in close proximity to the Alder Creek project area, but outside the watershed analysis area. Region 5 policy requires borax treatment of cut stumps in recreational sites to prevent potential spread of annosus root disease to residual, highly valued trees. Removal of hazardous trees has been ongoing within these local sites. However, in the recent past, use of borax was unwarranted, as only dead trees were removed. Borax treatment would only occur, if the hazardous tree removal program proposes to include green trees. The risk of cumulative effects from such use in combination with the proposed action would be low, as these recreational sites lie in sub-watersheds outside of the analysis area, and low annual use rates would be expected on these limited sites. Furthermore, all applicable federal, state regulations and label requirements and standard management requirements would be followed to minimize risk and ensure safe use.

The Tahoe Donner Association (TDA), an adjacent landowner is actively managing conifer stands on association lands to protect the homes in the TDA subdivision from catastrophic fire. According to Bill Houdyschell, TDA forester, the TDA has thinned stands to reduced hazardous fuels and improve forest health over the past 10 years, but does not utilize borax in their management program. It is not known whether borax is used on any other private forest land in the vicinity of the Alder Creek Project area. According to the California Department of Pesticide Regulation (DPR), Nevada County pesticide use records indicate that approximately 134 pounds of borax were used on 108 acres for forestry (stump treatment) in 2002 county-wide. It is likely that similar borax use rates within the county would continue. Given the relatively low borax usage county-wide in forestry applications on private land additional effects are not expected to be cumulatively significant.

The Alder Creek project lies adjacent to or in close proximity to three residential subdivisions that total well over 5,400 homes. If residents use borax, such use is likely in the form of household cleaning agents or insecticides. It is difficult to speculate how much this use may be. Only formulated insecticides would be registered as pesticides and regulated by product label requirements. If label instructions are followed, it is unlikely that cumulative adverse impacts to the Alder Creek Watershed from residential use of borax would occur. Borax, when used as a cleaning agent by area residents would likely end up in the Truckee Sanitation District sewer system, and would thus not add cumulative impacts to water quality in the Alder Creek watershed.

The combined effects of the Alder Creek Project, and past and foreseeable future use of borax would not lead to cumulative effects to human health and safety, terrestrial and aquatic wildlife, plants, invertebrates or microorganisms, based on the following:

- No significant impacts from routine use of borax in past timber management projects on National Forest Lands.
- Low expected future use rates on private and National Forest Lands within the analysis area
- Relatively low toxicity of borax to humans and other species
- Alder Creek project design features, including BMPs and other management requirements to minimize exposure.

Summary:

The Alder Creek Project proposed action is similar to projects involving thinning and borax treatment of cut stumps, aspen restoration harvest, and fuels reduction that have been implemented on the east side of the Tahoe National Forest, including the Sierraville and Truckee Ranger Districts for the past 10 years without significant impacts.

The Alder Creek Project Interdisciplinary Team that developed the Alder Creek Project proposed action has extensive experience planning, implementing and monitoring similar projects on both ranger districts. Interagency public field trips have reviewed many of these past projects, which included members of the US Department of Fish and Wildlife, California Water Quality Control Boards, local Fire Safe Councils, and other members of the public. The overwhelming response of the participants on these field trips has been positive, and no significant impacts resulting from completed projects have been identified.

The risk to human health and safety and the environment during borax treatment of freshly cut stumps was analyzed in a risk evaluation, based largely on a risk assessment by professional toxicologists Dost et al in 1996. They acknowledge that there are risks to humans and wildlife from borax use, but that in forestry applications, these risks are acceptably low. Project design features, including spill contingency planning further minimize the risks to humans and the environment.

The USFS has implemented aspen restoration treatments on the eastside of the Tahoe National Forest, and on National Forest Lands both within and outside Region 5 for years. The benefits to high risk aspen stands are well-documented, and environmental risk is minimal.

Based on past experience implementing similar projects on the Truckee Ranger District and elsewhere within and outside Region 5, the effects of the proposed action are not highly uncertain nor do they involve unique or unknown risks. Standard Management Requirements integrated into the Alder Creek Project proposed action would reduce and minimize to the point of non-significance any impacts that might have otherwise been uncertain, unique, or unknown (see Appendix A – *Standard Management Requirements,* and discussion under Intensity elements #1 and #7).

(6) Precedent for future actions with significant effects or decisions in principle about future considerations.

Any future actions will be analyzed separately and on their own merits through additional environmental analysis and decision making in compliance with NEPA. For that reason, these proposed actions would not establish a precedent for any future action, nor would it represent a decision in principle about a future consideration.

(7) Relationship to other actions with individually insignificant but cumulatively significant impacts.

The ID Team has designed the Alder Creek Project proposed action so that site-specific adverse cumulative effects to sensitive resources would be unlikely. The proposed action would protect the Alder Creek Watershed, plants, wildlife, aquatic species, and other sensitive resources to the extent that any residual effects would not be cumulatively significant.

The cumulative effects from past, present and future forest management on vegetation, fuel hazard, watershed conditions and other forest resources have been considered in this EA, and in the BEs and the CWE report which are incorporated by reference, and summarized herein. All of these analyses conclude that no significant cumulative effects would result from implementation of the proposed action based on the extensive resource survey work completed during the planning process, and the way in which the project is designed to protect forest resources in the analysis area.

Project design features include BMPs, contract provisions and other project-specific design elements of the proposed action and are summarized in Appendix A *Standard Management Requirements* (SMRs) and include:

- Guidelines for the location, construction and use of landings, skid trails and temporary roads (SMRs 1, 2, 3, 6, 7, 8, 10, 11, 12, 13, 14, 26, 27, 28).
- Guidelines to protect against accelerated erosion and hydrophobicity, and to maintain long-term soil productivity, during the planning and implementation of fuels treatments (15).
- Generally requiring skid trails 75 feet apart (C6.4200, 6.3150).
- The location of skid trails must be approved in advance (C6.4200, 6.3150).
- Requiring the re-use of well-sited existing landings and skid trails (12)
- For landings that service more than 15 acres of harvest, Purchaser shall stage-log to limit landing size (2).
- Restricting mechanical operations on sensitive sites until after the soil is dry (2).
- In Sub-watershed H0952 that exceeds TOC, additional mitigations would be added to the standard BMPs and standard management requirements used throughout the project area. A monitoring plan will focus on selected areas within the sub-watersheds where the risk of adverse cumulative watershed effects is considered to be the highest. Implementation monitoring will be done during or within the field season of operation and effectiveness monitoring will be delayed until the location has over wintered (1).
- Limiting heavy equipment to slopes of 30% or short pitches up to 35% (3).
- Tilling and mulching temporary roads, landings and main skid trails as needed to reduce erosion and soil compaction (2, 3, 5, 7, 15).
- Restrict the use of mechanical equipment and the construction of skid trails and landings in and around RCAs (1, 2, 3, 4, 7, 8, 10, 11, 12, 26).
- Follow all applicable federal, state regulations and product label requirements for the safe use of pesticides (SMR 1 (BMP 5-8, 5-10)
- Implement a “Special Marking Prescription” to protect fish bearing perennial streams. Require limited operating periods to avoid disturbance of bald eagle, California spotted owl, northern goshawk (8, 9).
- Implement 2.4 miles of road maintenance designed to improve watershed conditions. The location and design of temporary roads is guided by numerous implementation criteria to ensure no significant soil erosion or adverse effects to riparian habitat (2, 6, 14, 26, 27).
- Erosion prevention measures and decommissioning would take place on all temporary roads after proposed treatments are completed (1,2, 14).

- Skid Trails and Landings would be rehabilitated after use to reduce soil compaction and prevent erosion (2).
- During fuels treatment operations, burn plans would be designed to maintain ground cover, protect soil productivity, protect water quality, and avoid effects on RCAs, and aspen stands, and maintain air quality (15, 30).
- All the proposed treatments in RCA are designed to meet the 6 Riparian Conservation Objectives described in the 2004 ROD. A detailed description of site-specific RCA treatments and a discussion of how the treatments respond to the RCOs can be found in Appendix D- *Riparian Conservation Objective Analysis* (1, 2, 3, 7, 8, 9, 10, 11,12, 13, 14, 15, 16).

Cumulative Effects from Timber Management

The current species composition, structure and health of the conifer stands in the analysis area have been shaped by a long history of past modification by humans. Early logging selectively removed the large overstory pines that were characteristic of eastside pine forests before settlement. This was a common practice throughout the east side of the Sierras. Early logging began in the 1870s and continued through the 1930s. During this time two sawmills were built within, or in close proximity to the project area, and were supported by an extensive railroad system. The effects from past logging within riparian zones are well documented, and evident in the Alder Project area. Timber removal contributed to unstable stream banks and fine sediment input, and a deficiency of coarse woody debris in stream channels, especially large wood (diameter >20”). The location of sawmills within the flood plain undoubtedly had affects on the hydrological function of the stream, and the species present. The construction of railroad grades for the purpose of transporting logs, negatively affected stream channels by intercepting intermittent and ephemeral drainages which concentrated water flow resulting in a contribution to stream bank instability/erosion.

Since the Donner Ridge Fire in 1960, over 90% of the Alder Creek analysis area has had some type of timber harvest. From the 1960s through the 1980s, vegetation management on NFS Lands within the analysis area concentrated on further removal of large overstory trees through salvage harvest and restoration of the Donner Ridge burn area. These harvests did not treat the densely stocked understory trees, and avoided the riparian zone. As a result of continued overstocking, conifer growth and vigor declined in the analysis area, and insects, disease, and drought caused widespread mortality. In the 1990s, the objectives of timber harvest began to focus on forest health improvement in the analysis area. Most recently in 1993, a multi-product sale occurred in the southern portion of the project area, which thinned stands from below, but again, did not treat the Alder Creek riparian area. The approximate 10% of the analysis area that has not been harvested occurs in scattered spots and within stream zones. Conifer stands in these areas are currently exhibiting low growth and vigor. Concentrated mortality in some stands is leaving some areas understocked.

Aside from reforestation, and more recent thinning, past timber management has done very little to improve overall forest health. The Alder Creek Project would thin overstocked stands to improve forest health, reduce hazardous fuels and improve watershed conditions in the project area, including the areas along Alder Creek, which have been unmanaged since the Donner Ridge Fire.

The Tahoe Donner Association (TDA) has implemented an intensive fuels management program on subdivision land in the vicinity of the project area. In the late 1990s, timber management focused on removing dead and dying trees and understory ladder fuels to create defensible space around the homes in the TDA subdivision against fire. Reentry into these stands is not expected to be needed for another 15 to 20 years.

One foreseeable new timber management project is planned within the Alder Creek analysis area on NFS lands, within the next five years. The Billy IV Fuel Reduction Project is located approximately one mile north of the project area and would pre-commercially thin approximately 300 acres that were planted following the Donner Ridge Fire. This project would promote large tree development, by improving stand growth and vigor and reducing hazardous fuels in the project area. The Billy IV project is consistent with the Standards and Guidelines in the Tahoe National Forest LRMP, and would include project specific features designed to protect forest resources and minimize adverse effects.

Together, past thinning projects, the Alder Creek Project, and future projects, which aim to improve forest health and reduce hazardous fuels would have positive cumulative effects on the timber resource in the project area. These projects reduce the potential for further mortality from insects, disease and high intensity fire, and help move the project area toward desired condition, i.e., healthy, vigorous conifer stands that can develop into large, fire tolerant trees at densities consistent with the site's ability to sustain forest health during drought conditions.

Cumulative Watershed Effects (CWE)

The *Alder Creek Project Cumulative Watershed Effects* (CWE Analysis*)* contains 1) a description and map of the watersheds and subwatersheds in the analysis area; and 2) an evaluation of the environmental consequences of proposed project activities; including an assessment of compliance with applicable State Water Quality Objectives; and an analysis of cumulative watershed effects. The CWE Analysis and appendices provide in detail: the ERA methodology and assumptions used to assess current and projected disturbances in the subwatersheds; worksheets that display past disturbances on both public and private lands; and the spatial distribution of past disturbances. The CWE Analysis is hereby incorporated by reference, available upon request, and summarized herein.

Equivalent Roaded Area (ERA) Analysis

The ERA model assesses watershed activity-related disturbances and determines its value in terms of the disturbance that would occur under an equivalent roaded area (ERA). Table 1.7 displays the current level of cumulative watershed disturbance using the ERA model as of 2006 for each sub-watershed within the Alder Creek Project analysis area. Figure 1.1 displays the ERA analysis for existing condition in sub-watershed H0901, H0952, and H0953 respectively.

Table 1.7: Existing Equivalent Roaded Area.

	Alder Creek Project Sub-watersheds		
	H0901	H0952	H0953
Area (acres)	1535	1682	1644
TOC %	11%	13%	12%
TOC ERA	168.8	218.6	197.3
Residential Development ERA	0.0	138.3	49.5
Existing Road ERA	22.7	58.7	49.5
Existing Vegetation Management ERA	29.2	34.6	19.8
Existing Wildfire ERA	0.0	0.0	0.0
Total Existing ERA	51.9	231.6	118.8
Existing ERA %	3.4%	15.1%	7.7%
ERA / TOC Ratio*	0.31	1.06	0.60

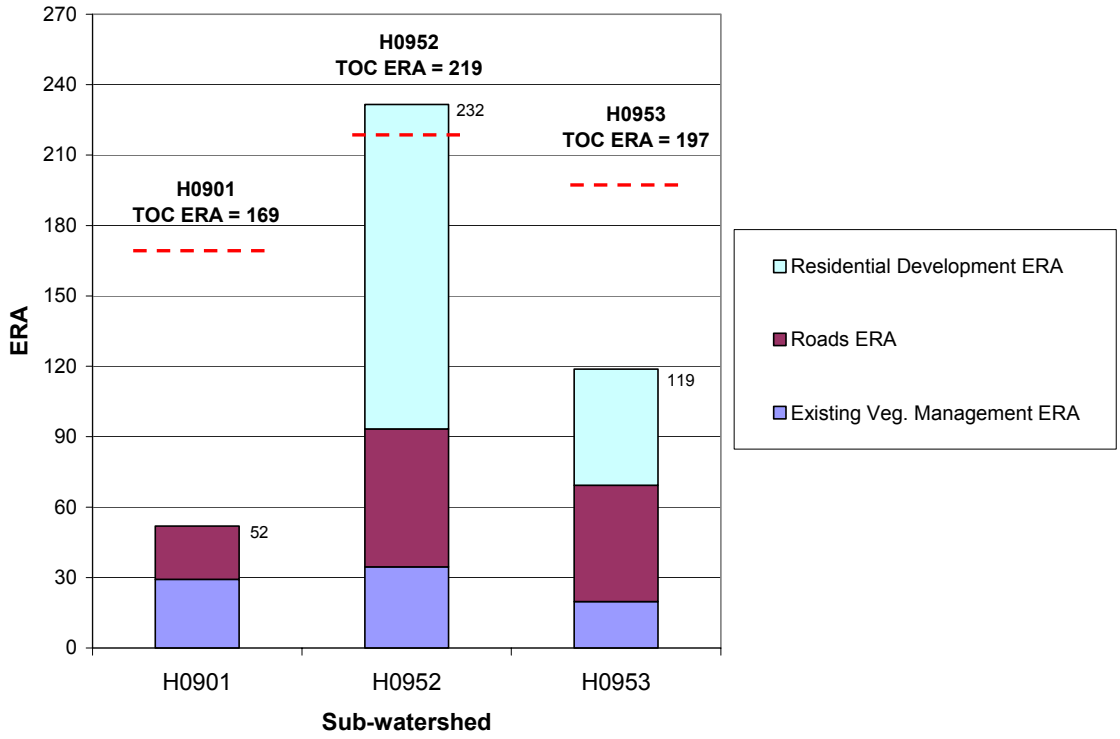
*A ratio of 1.00 would indicate the TOC has been reached.

Threshold of Concern (TOC)

A Threshold of Concern (TOC) for equivalent roaded area has been established for each sub-watershed in the analysis area and is displayed in Figure 1.1 by the dotted lines. The height of each column represents the amount of existing disturbance in each sub-watershed, relative to the TOC. Each column is the sum of the different types of disturbances listed in the legend and drawn to scale. The numbers to the right of each column represent the total existing ERA for each subwatershed.

The TOC is employed as a surrogate to indicate of the amount of disturbance a watershed can theoretically withstand before the disturbance changes water delivery characteristics. The TOC is determined by estimating the natural sensitivity of the watershed using inherent characteristics such as soils, drainage density, and elevation, and is further modified to incorporate stream health ratings. The TOC is an index that approximates risk. When land disturbance exceed that index, elevated awareness and care must be applied within the cumulative analyses area to ensure cumulative effects do not result.

Figure 1.l – Existing ERA and TOC by subwatershed in the analysis area.



The dotted horizontal line on each graph represents the ERA value which is equal to the threshold of concern. For example, sub-watershed H0901 shows that the threshold of concern equals 169 ERA. The sum of the existing and proposed disturbances in H0901 for 2006 (start) equals 52 ERA of which 3 ERA are a result of the proposed action, 29 ERA are from existing vegetation management, 23 ERA are from roads. The total of 55 ERA is below the TOC value of 169 ERA. Not included in these analyses are the impacts from the Billy Fuels Reduction Project. Implementation of this future action could take place between 2006 and 2011, and would include and additional 290 acres of vegetative treatments in H0901(thinning and fuels reduction). It is likely the complete action would occur in one year, and would result in the addition of approximately 4.7 ERA acres. This sub-watershed would continue to maintain the ERA below the TOC. Accordingly, the Billy IV Project, when considered with the Alder Creek Project would not contribute significant cumulative watershed effects to sub-watershed H0901. The disturbance within H0953 is also below TOC, although H0953 has a significant component due to residential development.

Sub-watershed H0952 has an estimated TOC value of 219 ERA. The summed disturbances in 2006 within this watershed are 289, which exceed the TOC. The greatest amount of past disturbance in sub-watershed H0952 is from residential development and road construction associated with this development. These two elements account for over 80% of the existing disturbance. These disturbances are considered constant features and do not recover within the ERA model. Residential developments increase the presence of impervious surfaces (roofs and paved surfaces), which prevent infiltration and increase runoff. The Tahoe Donner Subdivision is regulated by TDA Architecture Standards, as well as, county and town ordinances which govern drainage structures and sediment catch basins. The ERA model does not account for design

factors such as flow routing changes, changes to time of concentration, or peak attenuation achieved from detention ponds, or other mitigations of urban design features. These design features could effectively reduce the impacts to the sub-watershed.

The ERA analysis includes several conservative assumptions, which tend to over estimate the ERA index. These assumptions are:

- A 30 year straight line recovery, which over estimates the impacts from 10 to 20 years following implementation. Actual recovery more closely approximates a curved line.
- An over estimate of impacts from 10 to 30 years following implementation, in situations where actual recovery is less than 30 years. Newer technology has shortened the recovery period for some vegetation management practices.
- Additional influences are from previously closed roads and overgrown road segments. Actual site conditions may indicate that a lower coefficient than the assumed ERA coefficients would be appropriate.

CWE Analysis

Under implementation of Alternative 1, the Proposed Action, sub-watershed H0901 and H0953 would remain below the TOC. However, sub-watershed H0952 would continue to be above threshold. Figure 2 displays the projected ERA relative to TOC for subwatershed H0952.

Figure 1.2. Projected ERA Relative to TOC in Sub-watershed H0952.

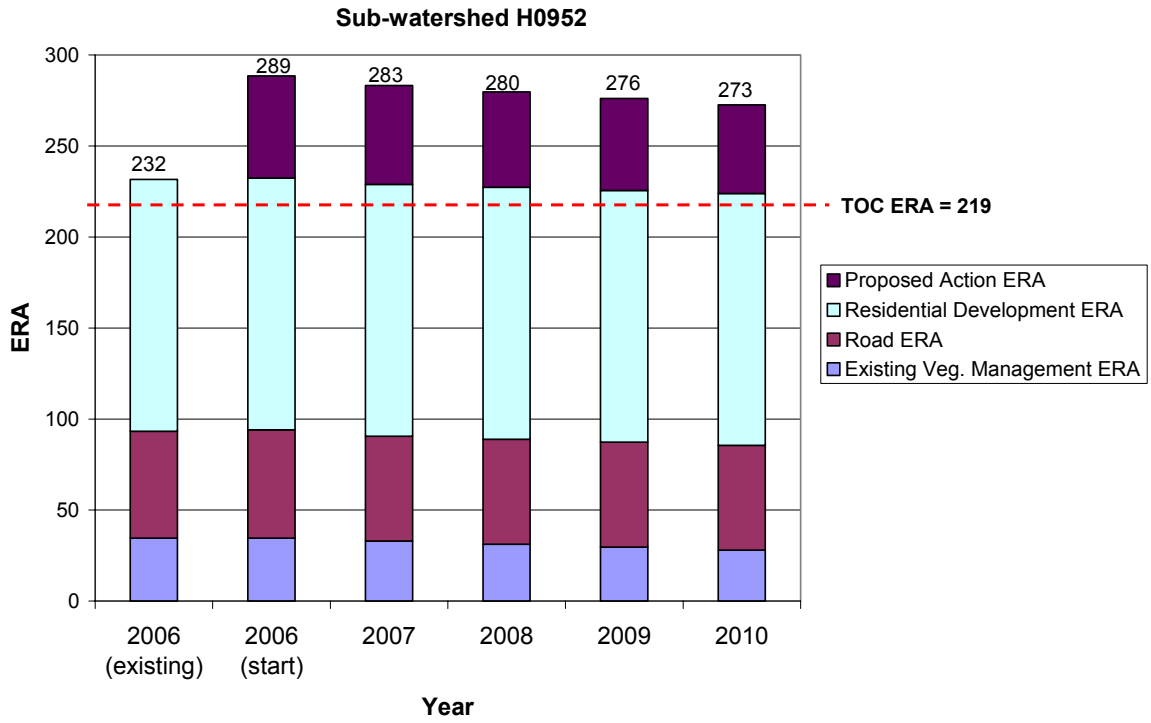


Figure 2 graphically displays the types of disturbance present in Sub-watershed H0952 for each year. Under the proposed action, BMPs and additional management requirements to minimize ground disturbing effects and watershed improvements were included to offset potential effects, and to reduce the risk of adverse cumulative effects, and of adversely affecting water quality. In

accordance with the State of California Regional Water Quality Control Board's requirements additional BMP monitoring will be implemented where the proposed action either pushed the watershed over TOC or elevated the risk value of the watersheds already over TOC. The monitoring plan contained in Appendix C would further reduce risk to sub-watershed H0952, by outlining the management practices to be followed to ensure proposed activities do not trigger a cumulative effect that would significantly impact aquatic habitat, exceed water quality objectives or impair beneficial use.

Summary:

Alternative 1 (Proposed Action): Proposed management activities within the Riparian Conservation Areas (RCAs) are designed to minimize the risk of sediment entering the system and to minimize impacts to aquatic or riparian dependent species. Best Management Practices and Management Requirements provide the mitigation measures to minimize the risk of activity-related sediment entering aquatic systems, and minimize impacts to aquatic or riparian dependent species. The proposed action is consistent with the Aquatic Management Strategy for the Sierran Forests, as required by the 2004 SNFPA ROD, and fully meets the Riparian Conservation Objectives outlined in the ROD. Implementation of BMPs and other Management Requirements are expected to reduce the potential for direct, indirect, and cumulative effects within the project area and within RCAs to a non-significant level.

Water quality objectives established by the Lahontan Water Quality Control Board, and the Federal Clean Water Act would be met, and measures to provide for the maintenance of beneficial uses have been incorporated into the project design. Furthermore, the water quality monitoring plan is designed to meet the anti-degradation policies for sediment.

From the beginning of the planning process, the Alder Creek Project has been designed to protect forest resources, including water quality. Additional watershed restoration actions related to roads and riparian vegetation, including aspen and willow, have been incorporated into the proposed action to further reduce cumulative watershed effects. In addition to the project design features, and standard management practices in Appendix A, implementation of BMPs and BMP monitoring requirements approved by the State and Regional Water Quality Control Boards, is the primary method for meeting the Basin Plan's water quality objectives.

Alternative 2 (No Action)

While the no action alternative would result in steady recovery rates in sub-watersheds, the benefits to watershed health from road maintenance and decommissioning, and improvements in the health of riparian vegetation would not occur under this alternative. Further, with no action taken to reduce conifer stocking, conifer health and vigor would continue to decline, resulting in high rates of mortality. As a result, fuel hazard would continue to increase, and compromise the ability of fire suppression efforts to keep fires small. A high-energy, catastrophic fire would have severe adverse consequences on the stability, water quality, and beneficial uses within the watershed.

Cumulative Effects Wildlife and Aquatic Species

Cumulative effects are discussed in detail in the Biological Evaluation/Biological Assessment Birds, Mammals, Invertebrates (Terrestrial) Alder Creek Project, and the Biological Evaluation and Assessment Amphibians, Reptile , Fish, Invertebrates Alder Creek Project, hereby incorporated by reference and available upon request. The analysis considers past, present and

reasonably foreseeable future effects on the habitat attributes that are essential to the species of concern in the Alder Creek Project area. It considers information from recently completed stream surveys, potential effects of proposed treatments in RCAs, and the effects from proposed actions such as forest thinning, aspen restoration harvest, road maintenance, and temporary road construction, underburning, and the results of the cumulative watershed effects analysis. The analysis and determinations in these BE/BAs supports the conclusion that this project would not cause cumulatively significant effects to Threatened, Endangered or Forest Service sensitive wildlife species because:

- No Endangered wildlife, aquatic or plant species are known to occur in the Alder Creek Project area, except for the Mountain yellow-legged frog which is a "candidate for listing". The Alder Creek Project may affect individuals, and is not likely to result in a trend toward Federal listing or loss of viability.
- The Alder Creek Project would *not affect Lahontan Cutthroat Trout, or potential recovery area habitat* for this Threatened aquatic species. The project would have *no effect* on two Threatened wildlife species, the Bald Eagle, and Valley elderberry longhorn beetle.
- No Threatened plant species are known to occur on the Tahoe National Forest including the Alder Creek Project area, and none were found during plant surveys for this project.
- The Alder Creek Project would have *no effect* on six sensitive wildlife and seven sensitive aquatic species considered by this analysis.
- The Alder Creek Project *may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability* within the planning area of the Tahoe National Forest of seven Sensitive wildlife species, including the Pacific fisher, which is a "candidate for listing"; and one Sensitive aquatic species, the Mountain yellow-legged frog, which is a "candidate for listing" considered by this analysis.
- The Alder Creek Project would have no effect on 18 Sensitive plant species considered by this analysis.
- The Alder Creek Project *may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability* of the sensitive plant *Meesia uliginosa* within the planning area of the Tahoe National Forest considered by this analysis.
- A Weed Risk Assessment determined that the Alder Creek Project has been designed in a way to ensure that there is a low risk of increased spread of noxious weeds.
- The Alder Creek Project would provide the wildlife habitat and other ecological conditions necessary to maintain well-distributed viable populations of MIS species in the planning area, and maintain diversity of plants and animals.

For more discussion on these species, see items #9 and #10 below.

Alternative 1 of the Alder Creek Project would follow the SNFPA SFEIS ROD 2004 Standards and Guidelines to protect those habitat elements most difficult to replace, such as large snags, downed logs, and large trees, now and into the future.

The analysis area, in which potential contributing factors to cumulative effects on wildlife were considered varied by species. For wider ranging species, that are dependent upon forested stands

with larger trees and denser canopies such as California spotted owl, northern goshawk, Pacific Fisher, American marten, Sierra Nevada red fox and California wolverine, the analysis area encompassed an area that extended 1.5 miles from the project area boundary. This totals 13,016 acres, of which 6,660 acres are private land, and 6,356 acres are NFS land. It is believed that the vast majority of project effects would be within this confined area surrounding the project because: 1) the project proposes only 778 acres of treatments in a very compact arrangement, 2) the project area is bounded on 3 sides by private land, and 3) there are no large vegetation management projects in the foreseeable future for at least 4 miles north of the project. For other species that are tied to very specific habitat features, the analysis areas tended to be smaller, and in some cases just focused on the project area. These species include: American peregrine falcon, Great gray owl, willow flycatcher, Greater sandhill crane, pallid bat, Townsend's big-eared bat, and the western red bat. The analysis area for the bald eagle included the entire Truckee Ranger District for potential helicopter activities, but the project area itself for effects to habitat and any potential occupancy. The analysis is bound temporally by the period from the Donner Ridge Fire in 1960 on. This is because the fire was a stand replacing fire that changed a majority of the landscape and habitats to an early seral type.

For aquatic species, the analysis area included the Alder Creek watershed. Although there are approximately 27 acres to be treated within the Prosser watershed, the Aquatic BE determined that in consideration of the location and type of treatment proposed, there would be no measurable effects to aquatic species, since none occur in the treatment area, nor effects to habitat attributes considered important for aquatic species. The temporal scale analyzed for aquatic species spans from approximately the 1870s, since the effects from historic logging within the watershed area still evident to 2012, to allow for full implementation of the project. A detailed discussion on general indirect and cumulative effects to LCT and aquatic species is found under Intensity Element #9

Cumulative Effects to Old Forest Habitat and Connectivity

The SNFPA FSEIS (2004), Volume 1, Chapter 4: Environmental Consequences page 191 in Section 4.1.3. *Cumulative Effects for the Five Problems addressed in the FEIS* states: "The assessment concluded that, under all alternatives, the national forests and national parks will continue to be the primary contributors of old forest conditions in the Sierra Nevada. Most of the old forests will be on the national forests, and the amount of old forest will increase under all alternatives."

As described in detail under Intensity Element #7, Cumulative Effects from Timber Management, the vegetation in the analysis area has a long history of modification by humans. Early logging from 1870s to 1930 removed most of the largest trees in the analysis area. The 1960 Donner Ridge Fire burned much of the project area, setting approximately 50% of the analysis area to early seral vegetation (Wildlife BE). It is estimated that over 90% of the Alder Creek analysis area has had some type of timber harvest since the Donner Ridge Fire in 1960. Salvage harvest and overstory removal further reduced the numbers of large size trees in the analysis area. Currently the analysis area contains no old forest habitat, as displayed in Table 1.8. Only scattered large trees remain in the overstory within the project area. On the 6,356 acres NFS lands in the analysis area, there are no old growth stands one acre or larger, no Old Forest Emphasis Areas (OFEAs). Only 101 acres are at least CWHR size class 4 with at least 60% canopy closure. Treatment is not proposed on these acres, which are classified as CWHR 4M.

The tree stages, and densities preferred by species dependent on late seral vegetation, e.g. spotted owl, fisher, marten and others do not occur within the analysis area, or are too scattered to provide suitable breeding habitat.

Table 1.8. California Wildlife Habitat Relationships (CWHR) Habitat Stages

Habitat Stage (CWHR)	Acres within Analysis Area (NFS land only)	Acres within Treatment Units
NW – open water (Prosser Reservoir)	417	0
GX – grass	56	0
SX – shrub	1251	0
2P – sapling tree 1-6”dbh, 25-39% canopy closure	1842	0
3S – pole tree 6-11”dbh, 10-24% canopy closure	14	14
3P – pole tree 6-11”dbh, 25-39% canopy closure	20	20
4S – small tree 11-24”dbh, 10-24% canopy closure	638	51
4P – small tree 11-24”dbh, 25-39% canopy closure	1224	413
4M – small tree 11-24”dbh, 40-59% canopy closure	507	280
4D – small tree 11-24” dbh, 60-100% canopy closure	101	0
5S – medium tree >24”dbh, 10-24% canopy closure	257	0
5P – medium tree >24”dbh, 25-39% canopy closure	29	0

The majority (87%) of the forested stands within the Alder Creek analysis area have a live canopy closure less than 40%. When non-forested acres are added, only 10% of the NFS land analysis area contains forested stands with greater than 40% canopy closure. Taken one step further, assuming the private lands do not provide suitable habitat for species dependent upon forested stands with greater than 40% canopy closure, only 5% of the entire analysis area provides moderate to dense canopy closure in small to medium trees.

Seral Stage Distribution

The Tahoe National Forest Land and Resource Management Plan stipulates in the Standards and guidelines #25 Diversity, to provide for horizontal diversity by maintaining at least 5% in each seral stage Forest-wide. Seral stages within the analysis area range from grass and brush fields and plantations to second growth stands with a scattered overstory of remnant large trees.

Proposed thinning would reduce stand density on approximately 577 acres, but would not alter existing seral stage classification. Release thinning in plantations would temporarily set shrub density back, however, a sufficient number of acres within the project area that were converted to brushfields following the Donner Ridge Fire in 1960 would remain untreated, thus a significant change in amounts of early seral stage would not occur. The Wildlife BE on page 55 concludes that project implementation is not expected to change the existing structural complexity of later-seral stage habitat over the landscape within the Alder Creek analysis area. Changes in overall horizontal diversity resulting from the Alder Creek Project would be insignificant and would be consistent with the Tahoe National Forest LRMP Standards and Guidelines.

On the private lands within the analysis area, the Donner Ridge Fire and increasing subdivision development over the last 45 years has removed and fragmented most forested stands. Now, and into the future, timber management on private lands would focus on fuels management as

described previously, but reentry into TDA lands would not be needed for another 15 to 20 years. It is expected that trees would continue to be removed as they age and pose hazards to homes. It is also likely that at least a portion of trees removed would be replaced by ornamental or non-native vegetation, thus further modifying vegetation types on private land. Residential development is likely to continue in area subdivisions. These lands do not now nor are they expected to provide habitat for species dependent upon late-seral stage habitat in the future.

The Alder Creek Project would reduce conifer stocking, thereby improving conifer stand growth and vigor. The long-term benefits of treatment would be larger trees and canopy closure that would provide preferred habitat attributes for species dependent on late seral vegetation in a shortened period of time. There is one foreseeable new timber management project planned within the Alder Creek analysis area on NFS lands. The Billy IV Fuels Reduction Project would be located approximately 1 mile north of the Alder Creek project area. This project would not add negatively to the cumulative effects of past harvest on old growth forest and habitat connectivity, since proposed treatment focus on thinning approximately 300 acres of conifer plantations planted after the Donner Ridge Fire. Proposed treatment would increase conifer growth and vigor in these plantations and reduce the time required for these trees to develop large size, and associated habitat components. Another foreseeable future project on NFS land, which lies outside the analysis area is the Sagehen Project, 4 miles to the north. This project would be consistent with the standards and guidelines of the 2004 ROD for Old Forest Ecosystems.

There are larger fragmentation issues around Interstate 80 and the Town of Truckee. Development on private land is extremely extensive and is only increasing in the Truckee area. This trend shows no signs of slowing down. The Tahoe Donner Subdivision is currently at 85% buildout. Even if highly suitable habitat is created or maintained on NFS lands, because large contiguous tracts of private land are present on both sides of Interstate 80 and residential development is occurring on private land, any potential north/south movement of species dependent upon late-seral habitat in and around the Truckee/Interstate 80 area may be hampered.

Summary

Alternative 1 (Proposed Action): Improving overall forest health, including the health of aspen stands and reducing hazardous fuels would create and sustain suitable habitat across the landscape and maintain prey diversity and abundance. These actions would benefit late-seral dependent species over time. This project would not contribute to any further habitat fragmentation, and would not lead to significant cumulative effects to wildlife and their habitat. Thinning treatments would improve conifer stand growth and vigor, and would move these stands more quickly towards old forest conditions. In conjunction with future projects on NFS Lands, the proposed action would increase habitat connectivity over time. Aspen restoration activities would increase habitat diversity and quality in the project area over time.

Alternative 2 (No Action): With no treatment, forest health, fuels reduction measures, and watershed improvements would not occur. As forest health continues to decline in the project area, the development of late-seral habitat would continue to be delayed. Aspen stands would continue to be at a high to very high risk of loss, and riparian habitat would not be improved. Without fuels reduction treatments, the potential for a high-energy, stand-replacing fire would remain high, which would further impact development of late-seral habitat. A high energy fire

would severely impact aquatic habitat components. Effects could include potential loss of shading and sedimentation.

Cumulative Effects from Disturbance Related to Fire

The SNFPA FSEIS (2004), Volume 1, Chapter 4: Environmental Consequences page 191 in Section 4.1.3. Cumulative Effects for the Five Problems addressed in the FEIS states: "All of the alternatives to various degree would contribute to an overall improving trend in fuels reduction and fire protection in the region."

A description of the fire history, fire occurrence, fire risk and analysis of project alternatives within the Alder Creek analysis area is discussed in detail under the Comparison of Alternatives, Fire, and in the *Fire and Fuels Analysis*, incorporated by reference and available upon request. Since the direct and indirects effects from fire have been discussed previously, only cumulative effects, as they relate to fire are addressed here.

The implementation of aggressive fire suppression combined with timber harvest since 1960, has led to substantial increases in the quantity and changes in the arrangement of live and dead fuels on NFS lands. Past timber harvest activities which are described in detail under the Cumulative Effects from Timber Management removed primarily large, older trees in the forest canopy. Following the 1960 Donner Ridge Fire, timber management focused on restoring the burn through salvage logging and replanting. Large brushfields still remain, and live and dead fuels have increased as the majority of conifer stands in the analysis area have developed unchecked by fire or management. The result has been a large increase in the amount and continuity of live forest fuels near the forest floor that provide a link between the surface fuels and the upper canopy layers. The lack of fire has allowed dead fuels to accumulate in excess of their pre settlement levels. Because of the implementation of fire suppression, the intervals between present-day fires are longer, allowing more time for fuels and vegetation to accumulate. As a result, fires have more fuel to burn and become more severe. Wildfires today kill more of the vegetation, and are difficult and dangerous to control.

The risk of a fire start is influenced by human activities. Fire risk factors in and near the analysis area include high recreational use in the nearby Prosser OHV area, the Commemorative Overland Emigrant Trail, and visitor traffic along Alder Creek. The Highway 89 North corridor lies to the east of the project and Alder Creek road runs east-west through the middle of the project. In addition, wildand/urban interface communities on private land are in close proximity to the project area. The percentage of human caused fires has increased. In the 1990s, 92% of the fires in the area were human caused. Due to the increased use of the area, the continued growth of urban development and growing populations, the number of human caused fires is likely to rise.

Fuels management projects on National Forest System Lands, including the Alder Creek and Billy IV Projects would enhance the efficacy of those project that have already been completed on the adjacent Tahoe Donner land. The Alder Creek Project, TDA fuels reduction projects and the Billy IV project together would produce a landscape effort in reducing the effects of fire within the analysis area on both public and private land. The Alder Creek project would have an overall positive effect across the landscape in terms of increasing the efficacy of fire suppression.

Fuels reduction treatments such as prescribed burning and mastication would have a short-term effect upon prey abundance and diversity by altering existing downed fuels configurations and

amounts, but would benefit prey as a more open stand would encourage vegetation to return to the forest floor. By project design downed wood would be retained to meet the Standards and Guidelines in the 2004 ROD.

Alternative 1 (Proposed Action): The cumulative effects of past fires, and the onset of aggressive fire suppression have been considered in this EA, and in the supporting documents incorporated by reference. All of the supporting analyses conclude that implementation of Alternative 1 (Proposed Action) would have a beneficial impact on forest resources by reducing hazardous fuels, and increasing the effectiveness of fire suppression efforts, and reducing the potential for fires to become catastrophic in size and intensity. The proposed action would comply with management direction outlined in the 2004 SNFPA ROD for the WUI. No significant cumulative impacts would result from the Alder Creek proposed action based on the extensive resource survey work completed during the planning process, and the way in which the project is designed to protect wildlife habitat, heritage resources, riparian habitat and water quality, and other forest resources.

Alternative 2 (No Action): Under implementation of Alternative 2, uncontrolled fire has a much higher likelihood of becoming a high energy, stand replacing fire. At risk of loss would be large downed woody debris, large snags, and ground (and aerial) structure. The SNFPA FSEIS (2004), Volume 1, Chapter 4: Environmental Consequences page 191 in Section 4.1.3. Cumulative Effects for the Five Problems addressed in the FEIS states: "All of the alternatives to various degrees would contribute to an overall improving trend in fuels reduction and fire protection in the region."

Cumulative Effects from Disturbance Related to Recreation

The Commemorative Overland Emigrant Trail bisects the length of the project area and is heavily used by hikers, equestrians, and bicyclists from late spring to fall, and by cross-country skiers in the winter months. Project design features have been included in the proposed action to screen landings from trails, thereby maintaining visual quality. There are no developed recreational sites in the project area. Recreation has been on the increase as communities in the area are expanding. The TDA manages a campground on association land adjacent to the project area. Other recreational activities within the analysis area include fishing. Directly north of the project area lies an area used heavily by OHV users. Thinning and burning activities in Unit 2b would leave a buffer of untreated vegetation, to discourage OHV access into the project area from the north. Decommissioning approximately 1 mile of non-system roads would deter illegal OHV use, which has been a source of overland flow and sedimentation.

The Alder Project proposed action would not significantly change the recreational setting or expand the recreational opportunities or level of recreational use, with the exception of reducing illegal use. The proposed road work would not increase the intended traffic level for any of the roads in the area, and therefore would not contribute to an increase in the intended potential use of the area. The proposed actions would improve public safety by creating a safer and more effective fire suppression environment and the road repair and maintenance would provide some improvement to the driving conditions on those roads where the work occurs. The Alder Creek Project proposed action would not change or add to the recreation-related cumulative effects in this area.

(8) Adverse effects on properties listed or eligible for National Register of Historic Places (NRHP), or loss of significant scientific/cultural/historical resources.

A record search, field survey, resource inventory, and Heritage Resource Report (TNF02003/R2005051700061) have been completed for this project under provisions of the *First Amended Regional Programmatic Agreement among the U.S.D.A. Forest Service, Pacific Southwest Region, the California State Historic Preservation Officer, and the Advisory Council for Historic Preservation regarding the process for compliance with Section 106 of the National Historic Preservation Act for Undertakings on the National Forests of the Pacific Southwest Region* (Regional PA).

As part of the proposed action, non-ground based logging systems are proposed for Units 1a, 1c, 6a, 6b, and 6d. There are 21 sites or linear features within these units (there are no sites within Unit 6d). In the proposed action, there is an identified need to remove hazard trees from within the boundaries of the sites; however, the non-ground based vegetation management activities would not affect the characteristics of these sites that qualify or may qualify them for inclusion in the NRHP. This work would be completed pursuant to Regional PA, Attachment B, Standard Resource Protection Measures, Stipulation II.A which allows for the removal of hazard and salvage trees from within historic properties. Monitoring will be conducted by the Sale Administrator and the District Archaeologist during the course of harvesting activities as well as after their completion (Stipulation IV.A of the Regional PA and Attachment B, Stipulation I.E).

Pursuant to Stipulation III.D (3) (a) of the Regional PA and the application of Standard Resource Protection Measures (Attachment B, Stipulation II.A) of the Regional PA, the proposed action has been determined to be a no effect on the historical or cultural resources listed or eligible for inclusion in the National Register of Historic Places, nor would any action alternative cause the loss or destruction of any significant cultural or historical resources.

If any new heritage resources were discovered during project implementation, operations would cease in the area of new discovery until adequate protection measures were implemented following the Standard Resource Protection Measures (Attachment B) of the Regional PA as determined by the District Archaeologist and, if necessary, the Forest Heritage Resource Program Manager.

The execution of agency designated alternatives are not expected to have any direct effects on the present condition of the historical or cultural resources potentially eligible or eligible for the inclusion in the National Register of Historic Places, because of the implementation of the Standard Resource Protection Measures (Attachment B) of the Regional PA. Any agency administered project that is conducted within the analysis area would comply with Section 106 of the National Historic Preservation Act (NHPA), implementing procedures outlined under 36 CFR 800, and related heritage resource laws by following the stipulations in the Regional PA.

(9) The degree to which this action may adversely affect an endangered or threatened species or critical habitat.

The Tahoe National Forest Sensitive Plant Biological Evaluation, Alder Creek Project (Plant BE); the Biological Evaluation/Biological Assessment Terrestrial Species, Birds, Mammals, Invertebrates Alder Creek Project (Wildlife BE); and the Biological Evaluation Amphibians, Reptiles, Fish, Invertebrates Alder Creek Project (Aquatics BE) analyze the potential effects of

the Alder Creek Project on endangered or threatened species and their habitat. These BEs are hereby incorporated by reference and available upon request.

Endangered Species

No direct, indirect or cumulative effects to endangered plant, wildlife, or aquatic species are anticipated for this project, because none are known to occur on the Tahoe National Forest (TNF) at this time.

Threatened Species

Plants

No direct, indirect or cumulative effects to Threatened Plant species are anticipated for this project, because none are known to occur on the Tahoe National Forest at this time. The sensitive plant species *Ivesia webberi* and *Botrychium lineare* have been upgraded as candidate species to be considered threatened. Though the project area contains potential habitat for these species, no occurrences of these species have been documented, and no direct, indirect or cumulative effects are expected. The determination in the Plant BE is that the Alder Creek Project will not impact any Threatened, Endangered, Candidate species.

Wildlife

No Threatened wildlife species are known to occur in the Alder Creek Project area. Surveys have shown that bald eagles are not nesting within the project area, nor do they tend to use the area for wintering habitat. The project area does not provide suitable nesting or foraging habitat for bald eagles, primarily due to a lack of old growth components and large trees adjacent to reservoirs or large streams. Five bald eagle breeding territories have been identified outside the project area, within the Truckee Ranger District boundary. Three territories with active nests are on National Forest System land: two at Stampede Reservoir, nine air miles northeast of the project area and one at Boca Reservoir, approximately seven miles east of the project area. Two territories occur on private land at Donner Lake, approximately 4 miles south of the project area. One potential nesting territory occurs at Prosser Reservoir approximately 2 miles east of the project area, though nesting is not yet documented.

The project design incorporates a measure to protect nesting eagles from disturbance by helicopter flights. A Limited Operating Period (LOP) would be implemented from January 1 through August 31 that precludes project associated helicopter flights within 1 mile of nesting territories located outside the project area at Stampede Reservoir (9 miles to the northeast), Boca Reservoir (7 miles to the east), Donner Lake (4 miles to the south), and a potential new nesting territory at Prosser Reservoir (2 miles to the east). The Wildlife BE finds that there would be no direct, indirect, or cumulative effects to bald eagles from the proposed project. With the implementation of the LOP, no effects to nesting eagles outside the project area would be expected.

Critical habitat has been designated for the Valley Elderberry Longhorn Beetle, but none occurs on National Forest System Lands, including the TNF. Since there is no habitat for this species, implementation of the Alder Creek project would have no direct, indirect, or cumulative effects on this species or its habitat.

The determination in the Wildlife BE is that the Alder Creek Project will not affect the Bald Eagle or the Valley Elderberry Longhorn Beetle or designated critical habitat for these species.

Aquatic Species

Lahontan Cutthroat Trout

Based on basin-wide stream habitat surveys conducted by Tahoe National Forest personnel in 2003 AND 2005, Lahontan Cutthroat Trout (LCT) are not known to inhabit Alder Creek.

On December 13, 2005, the US Fish and Wildlife Service (USFWS) responded by letter to the Alder Creek Project public scoping letter stating that the project was located within a potential metapopulation for the Lahontan Cutthroat Trout (LCT). According to USFWS, the *Short-term Action Plan for LCT Recovery* identified Alder Creek as a priority area, which may be important to LCT recovery. The letter stated that the FS should survey Alder Creek to determine if LCT is present. If LCT is present, the USFWS recommends that the FS review all direct and indirect impacts that the project may have on riparian and aquatic habitats, and consult with the USFWS accordingly.

Since Alder Creek is within the historical range of LCT and may become a location for future reintroduction, potential effects to LCT habitat are included in this analysis. Habitat conditions are relatively desirable for LCT, with the exception of the low amount of large woody debris and the low number of deep pools. The larger, deeper pools which are present are a result of beaver activity. These pools produce a large surface area of standing water and are likely contributing to the temperature increase captured on the thermographs.

Major reasons for the decline of LCT abundance and impacts to habitat throughout its range include: 1) Reduction in and alteration of stream discharge; 2) alteration of stream channels and morphology; 3) water quality degradation; 4) Pyramid Lake level reduction and concentration of chemical components in Pyramid Lake and the Truckee River; 5) non-native fish introductions; 6) commercial fishing of LCT; 7) the construction of dams within the Truckee River watershed blocking migration of the species. Some of the factors that are partly responsible for the decline of LCT are beyond the control of National Forest Management, e.g. Pyramid Lake level reduction, non-native fish introductions, construction of dams, and commercial fishing, and are likely to continue to impact this species. The risk factors that can be addressed in this analysis include stream discharge, channel stability, and water quality.

General Overview of Indirect and Cumulative Effects to LCT and Other Aquatic Species

Habitat attributes important for the LCT and other aquatic species, that could potentially be affected by the project include the amount and size of coarse woody debris recruitment, which in turn can affect pool to riffle ratios and pool depths. Other habitat attributes that may be affected by project activities are: stream bank stability, fine sediment and stream temperature. Project design features, including Management Requirements are proposed to meet Riparian Conservation Objectives (RCOs) outlined in the 2004 SNFPA FSEIS ROD. These design features would reduce to non-significant level the risk of adverse changes to water quality and stream conditions in Riparian Conservation Areas (RCAs), which extend 300 feet from Alder Creek, and 150 feet from its tributaries.

Coarse woody debris: Currently, the wood that is within the channel is predominantly in the small size class. Generally, the smaller the size class of the wood, the lesser the retention time in the stream, and contribution to shade and formation of large deep pools. There is a slight risk that conifer removal during thinning and fuels reduction would have indirect habitat effects, particularly on recruitment of coarse woody debris in the Alder Creek RCA in some portions of the project area. However, the project has been designed to retain all trees greater than or equal

to 30 inches dbh, and some of the largest diameter trees adjacent to the stream channel, as designated by the East Zone Fisheries Biologist, East Zone Hydrologist, District Fuels Specialist and District Wildlife Biologist to provide for future coarse, woody, debris recruitment. Thinning overstocked conifer stands would reduce the susceptibility of residual trees to mortality factors such as drought, insects, disease, and would yield healthier and faster growing trees in a shortened period of time, than without treatment. Fuels reduction treatments would increase the likelihood that fire suppression efforts would be able to keep any fires small. In the long term, these treatments would result in larger, more fire resistant trees, which would provide for future recruitment of coarse, woody debris. As a result, the risk of potential reductions in hiding cover for fish, shade, and the number and depths of pools from project activities would be reduced to a level of non-significance.

Sedimentation and Stream Bank Stability: By design, the project would implement low ground disturbing harvest systems, such as over the snow mechanical logging, helicopter logging, skyline logging and hand thinning in the Alder Creek RCA. These systems have lower impacts on soils and aquatic resources, than conventional logging systems, and are prescribed in riparian and sensitive areas to minimize potential impacts. Potential off-site movement of sediment and impacts to bank stability are expected to be reduced to a level of non-significance through implementation of BMPs and monitoring, standard management requirements, and special RCA protection measures, including equipment buffers. Prescribed burning would consist of low intensity burns to protect soils in areas adjacent to stream channels. Backing fire into the RCAs and strict adherence to burn plans during prescribed burning, would minimize the risk of a high intensity or uncontrolled burn and reduce the risk of off-site sediment movement or soil hydrophobicity from overheating to a level of non-significance.

Thermal Regulation: Thinning activities are not expected to result in significant changes in water temperature in Alder Creek. Project design features, resource protection measures and management requirements would help provide thermal regulation, as summarized below. Retention of trees at a 17 foot spacing in the RCA would result in a canopy cover that would provide adequate summer and winter temperature regulation. Where the East Zone Fisheries Biologist and East Zone Hydrologist identify a need to maintain shade within the first 100 feet of the Alder Creek RCA, only those trees with overlapping crowns would be removed, as designated by these specialists. Within the remaining 200 feet of the RCA, a canopy closure of 40% would be retained. Planting willows where needed to enhance stream shading in the RCA would help provide thermal regulation. Reduction in stand density and corresponding reduction in transpiration rates in the RCA may result in a slight increase in water stored in the soil, meadows and wetlands, which may reduce water temperatures along Alder Creek as water is gradually released into the channels. As time progresses, the residual conifer canopy cover would expand and improve thermal regulation.

Aspen Restoration:
The project proposes to restore approximately 22 acres of aspen stands at high risk of loss from conifer encroachment. The intent of the restoration treatment is to remove conifers that have encroached on aspen habitat, with the exception that no conifers greater than or equal to 30 inches dbh would be removed to provide structural diversity. These aspen stands are highly associated with the RCA's and wet meadow areas. It is likely that there would be substantial conifer removal, thereby affecting existing shade conditions. Conifer removal would result in reduced transpiration rates from the sites, and may increase water yield. As described under

thermal regulation, the increased water yield would be stored in the soil and released gradually, which may have an overall cooling effect on stream temperature. This should minimize concerns of an increase in water temperatures associated with the aspen restoration to a level of non-significance.

Due to the sensitive nature (moist ground conditions) of the location of aspen stands, non-ground based systems or mechanical over the snow operations would be used in these areas. Therefore adverse impacts to soil productivity, e.g. soil compaction or off-site sediment movement from these areas are not expected.

Direct Effects: The Forest Service conducted fish surveys along the length of Alder creek in 2003 and 2005, and did not find LCT. The East Zone Fisheries Biologist informed Chad Mellison of the USFWS of the survey results. Mellison was satisfied that no further surveys or consultation would be required for this species. He concurred with the East Zone Fisheries Biologist that there would be no direct effects to the species, since project activities are planned outside of perennial waters containing this species.

Indirect Effects:
As described under General Overview of lndirect Effects to LCT and other species, thinning activities may potentially impact: coarse woody debris recruitment, pool to riffle ratios, numbers of deep pools, stream bank stability, sedimentation, stream temperatures. To reduce potential impacts to aquatic species, the project has been designed to minimize potential treatment-related impacts to aquatic habitat components. Where future recruitment of downed woody material is a concern, project design features include retaining all trees greater than or equal to 30 inches dbh, and retaining some large trees that will be designated by the East Zone Fisheries Biologist and Hydrologist to provide for recruitment of downed woody material and associated pool habitat. Non-ground disturbing harvest methods within the Alder Creek RCA, BMPs and monitoring, equipment buffers, and standard management practices would reduce the risk of adverse impacts to bank stability, and are expected to reduce the risk of sediment input into the stream. By project design, where needed to retain critical shade along streams, only trees with overlapping crowns would be removed to help moderate stream temperatures. Overall, thinning and conifer removal in aspen restoration units are expected to reduce transpiration from residual trees, which has the effect of increasing water yield from the site, and thereby moderating stream temperatures. Proposed borax stump treatment is not expected to impact the prey base for LCT. Research on LCT in streams reveal that they are opportunistic feeders whose diets consist of organisms (typically insects) most commonly found in drift (Moyle 1976). The application of the fungicide Sporax® is not expected to result in significantly impact LCT prey base, due to the low potential for borax to leach or enter surface water, and the low toxicity of borax to the aquatic invertebrates (Information Ventures, 2004).

Project design features, which are intended to minimize the risk to aquatic organisms and their habitat from borax use include: hand application of Sporax® onto stumps, a 25 foot no treatment buffer along live stream courses, cessation of application during periods of sustained rain, spill contingency planning and other BMPs described in Appendix C, and standard management requirements described in Appendix A. A more detailed discussion on the relatively low risk of borax use to aquatic organisms is found in Appendix B, *Human Health and Safety and Ecological Risk Evaluation for Borax Stump Treatment*, and under Intensity Element #5..

All of these project design features, as well as Standard Management Requirements in Appendix A , and BMPs and Monitoring in Appendix C, provide assurance that indirect impacts to LCT, i.e., to potential habitat and prey base would be reduced to a level of non-significance, as discussed in detail in the Aquatics BE and the Cumulative Watershed Effects Assessment.

Cumulative Effects

General cumulative effects to aquatic species are discussed in detail under Intensity Element #7, and summarized here for LCT.

As stated previously, some of the factors that are partly responsible for the decline of LCT are beyond the control of National Forest Management, e.g. Pyramid Lake level reduction, non-native fish introductions, construction of dams, and commercial fishing, and are likely to continue to impact this species. Another risk factor in the Alder Creek Analysis area is residential developments on adjacent private land.

On private lands, residential development would continue, which is beyond the control of National Forest Management. Reduced infiltration rates and increased runoff and sedimentation may be expected to affect water quality and aquatic habitat, as more houses are constructed and land is paved.

The Tahoe Donner Association (TDA), which represents the largest private landownership in the analysis area has implemented timber harvest on association land to improve forest health and reduce hazardous fuels. These activities were completed on acres of TDA land in 1997 to help reduce the threat of fire to TDA residences. TDA forester, Bill Houdyschell does not anticipate a need to reenter these stands for approximately 15 or 20 years, unless reentry is needed due to a future insect infestation and/or drought, therefore adverse cumulative impacts are not expected from timber management on private land. The TDA did not apply borax to cut stumps during thinning activities, and use of borax is not anticipated on TDA lands in the near future. Sporax® could be used in developed recreation sites outside the analysis area, if insect infestations warrant use. Cumulative effects from borax use to the Alder Creek watershed or to aquatic species and their habitat would not be expected as such use would likely be limited to a confined area, outside the subwatershed. The Billy IV Fuels Reduction Project within one mile north of the Alder Creek Project area would follow the standards and guidelines outlined in the Tahoe NF LRMP, and is not expected to result in significant watershed effects. The effects of the Alder Creek Project, in combination with the Billy IV project and timber management on private land are not expected to lead to significant cumulative impacts to LCT or its habitat.

Conclusion and Determination

Although there is the potential for a reduction in some habitat attributes considered important for LCT, the existing conditions in Alder Creek could support this species. According to the Aquatics BE, reintroduction of LCT would not likely occur within the next five years. Based on the absence of this species within the project area, and project design features in the RCA that would reduce potential impacts to potential LCT habitat and prey base, the Aquatics BE finds that the project would not have significant direct, indirect or cumulative effects on the LCT, or preclude future recover or survival of this species.

The determination in the BE is that the Alder Creek project will not affect Lahontan cutthroat trout, Oncorhynchus clarki henshawi.

Red-legged frog

The Alder Creek Project area lies outside the range of the red-legged frog, therefore the Aquatic BE determined that the project will not affect this species.

M***ountain yellow-legged frog***

The mountain yellow-legged frog (MYLF) is a "candidate for listing" under the Endangered Species Act. This species is a Forest Service Sensitive species and is discussed in detail under Intensity Element # 9. The most recent documentation of MYLF in the project area occurred in 1997. In 2003 and 2005, surveys were conducted in all habitats suitable for mountain yellow-legged frogs within the planning area, and detected no MYLF.

The combination of project design elements, and the low probability of species occurrence ensures that direct, indirect and cumulative impacts to MYLF would be reduced to a level of non-significance. For a more detailed discussion on MYLF, refer to Intensity element #10, below.

(10) Whether the action threatens a violation of Federal, State, or local law or requirement imposed for the protection of the environment.

Compliance with the Water Quality Control Plan for the Lahontan Region

The Alder Creek Project fully complies with the requirements in the Water Quality Control Plan for the Lahontan Region, as discussed in detail in Appendix E, Compliance with the Water Quality Control Plan for the Lahontan Region, Alder Creek Project, which is summarized herein.

The U.S. Forest Service has a Management Agency Agreement (MAA) and a Memoranda of Understanding (MOU) with the State Board Executive Director in 1981, which waives discharge requirements for certain USFS non-point source discharges provided that the Forest Service implements State Board approved Best Management Practices (BMPs) and procedures and additional provisions of the MAA. Implementation of BMPs, in conjunction with monitoring and performance review requirements approved by the State and Regional Boards, is the primary method of meeting the Basin Plan's water quality objectives for the activities to which the BMPs apply. A site-specific BMP monitoring plan for the Alder Creek Project has been developed to ensure that the project meets the water quality objectives of the WQCPLR to demonstrate that this project meets the intended outcomes.

Appendix E, Compliance with the Water Quality Control Plan for the Lahontan Region (WQCPLR), contains a detailed discussion on how the Alder Creek Project complies with the requirements of the WQCPLR, and is summarized below.

Water Quality

The specific water quality objectives which apply to tributaries of the Truckee River and are applicable to the activities proposed for the Alder Creek Project and the measures that demonstrate compliance with these objectives are summarized below.

1. **Oil and Grease** – Waters shall not contain oil, greases, waxes, or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect the water for beneficial uses.

   Compliance: BMPs 1-8 and 7-4, which would be implemented as part of the Alder Creek proposed action provide for managing of petroleum products to protect beneficial uses of water. Application of these measures would prevent visible film or coating on the surface of water or on objects in the water, and would ensure that activities associated with the use of petroleum products in this project would not adversely affect water quality or beneficial uses.

2. **Pesticides** – For the purposes of Lahontan Basin Plan, pesticides are defined to include insecticides, herbicides, rodenticides, fungicides, pesticides, and all other economic poisons. An economic poison is any substance intended to prevent, repel, destroy, or mitigate the damage from insects, rodents, predatory animals, bacteria, fungi, or weeds capable of infesting or harming vegetation, humans, or animals. (CA Agriculture Code 12753).

   a. Pesticide concentrations shall not exceed those allowable by applicable antidegradation policies (see State Water Resources Control Board Resolution No. 68-16 and 40 C.F.R. Section 131.12.),
   b. Discharges shall not result in pesticide concentrations in bottom sediments or aquatic life that adversely affect beneficial uses
   c. Pesticide concentrations shall not exceed the lowest levels technically and economically achievable.
   d. Concentrations of pesticides in excess of the Maximum Contaminant Levels set forth in California Code of Regulations, Title 22, Division 4, Chapter 15.

   Compliance: The proposed action includes the application of Sporax®, according to label directions to freshly cut stumps. The primary constituent of concern is the element boron. According to the Sporax® label, moisture in the exposed wood from freshly cut stumps, dew or rain, will dissolve the product and leach it into the wood. With timely application to freshly cut stumps (within 4 hours), hand application methods that target only stumps, cessation of use under conditions of sustained rain, and removal of surface debris prior to application, the product is assumed to enter stumps.

   The amount of boron added through the proposed action would be unlikely to exceed the range of natural variation that might be observed naturally in adjacent waters (Dost et al, 1996). The following requirements would minimize the potential for borax to enter watercourses: strict adherence to federal and state regulations for the safe use of pesticides, and product label requirements (BMP 5-8); and other standard management requirements, which include spill contingency planning, a 25 foot no treatment buffer along live streams or riparian vegetation, and project monitoring and evaluation.

   Under proposed use rates, if a small amount of borax were inadvertently spilled, plant uptake would likely reduce the amount that could be transported on soils or by leaching (Dost et al, 1996). Measures will be taken to prevent spills into a water body, and clean up measures for spills that exceed application requirements will further reduce the potential for boron to be present as waste. As reported by Dost et al (1996) and USDA, 1994, boron is practically

non-toxic to fish, amphibians, aquatic invertebrates and aquatic plants, and is not known to bioaccumulate in fish. Boron in small amounts is used to fertilize plants (Dost et al, 1996, and USDA, 1994).

By project design, no impairment to use from the application of Sporax® would occur to the waters of the state. When all project design features are implemented, the proposed use of Sporax®:

- Would not result in boron concentrations that exceed those allowable by applicable antidegradation policies,
- Would not result in pesticide concentrations found in bottom sediments or aquatic life that adversely affect beneficial uses.
- Would not result in concentrations that will exceed the lowest levels technically and economically achievable and would meet the anti-degradation policies,
- Would not result in boron concentrations that exceed Maximum Contaminant Levels.

3. Sediment and Turbidity

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.

Settleable Materials – Waters shall not contain substances in concentrations that results in deposition of material that causes nuisance or that adversely affects the water for beneficial uses. For natural high quality waters, the concentration of settleable materials shall not be raised by more than 0.1 mL/L.

Suspended Material – Water shall not contain suspended materials in concentrations that cause nuisance or that adversely affects the water for beneficial uses. For natural high quality waters, the concentration of total suspended materials shall not be altered to the extent that such alterations are discernable at the 10% significance level.

Compliance: Based on section 13050 (m) the Porter-Cologne Act Water Quality Control Act, amended January 1, 2004.

d. "Nuisance" means anything which meets all of the following requirements:

e. (1) Is injurious to health, or is indecent or offensive to the senses, or an obstruction to the free use of property, so as to interfere with the comfortable enjoyment of life or property.

f. (2) Affects at the same time an entire community or neighborhood, or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal.

g. (3) Occurs during, or as a result of, the treatment or disposal of wastes.

While there is an increased risk that the waters of the state could receive additional sediment from isolated locations over the first three years following implementation, the management requirements, BMPs in Appendix A, and monitoring requirements discussed above, significantly reduce the potential for sediment level increases, and ensure that water quality

objectives would be met and that beneficial use would not be impaired. Numerous BMPs were integrated into the proposed action to reduce potential negative effects and maintain background water quality levels for sediment and turbidity. Mitigation measures, including requirements for ground cover, should prevent increases in turbidity beyond the natural range contributed from these sources.

4. Temperature:

a) The natural receiving water temperature of all waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Board that such alteration in temperature does not adversely affect the water for beneficial uses.
Compliance: The proposed activities would not adversely change water temperatures to a degree where temperature changes would affect local aquatic and riparian species assemblages. Existing processes from stream aspect, orientation, beaver activities and other factors already modify temperature in Alder Creek, along the reach above and below the area of proposed activities. Temperature trends from one season of data express an increasing temperature in the downstream direction. The average downstream increase in maximum temperature was 3.6 degrees Fahrenheit and the average downstream increase in the minimum temperature was 2.8 degrees Fahrenheit. The natural processes are already driving a temperature change, and any measurable increases in solar radiation, from the proposed action, is not likely to be sufficient to significantly effect temperature change already occurring in this system.

While the removal of conifers under aspen restoration may result in larger openings of increased solar radiation, these openings would occur in small groups and other sections along the stream would retain shade. Where the tree canopy cover is reduced it is expected to be discontinuous along the length of the drainage. Increases in ground water levels following forest harvest may promote cooling or at least ameliorate warming (Moore, Spittlehouse, and Story, 2005). Conifer harvest can increase soil moisture and ground water levels due to decreased interception losses and transpiration (Hetherington, 1987; Adams et al., 1991). Aspen restoration has the potential to increase water yields allowing for wetter soil profiles and increased late season water availability which can lead to increased habitat conditions for aquatic and riparian dependent species.

Although, changes in canopy density across upland units can be expected to be reduced to around 30 percent. Canopy density in the RCAs would not be reduced below 40%. Within 5 years of treatment the canopy would be expected to begin to expand increasing the effective canopy and reducing solar radiation to the stream. Additionally, Best Management Practices will limit the areas where timber can be removed within the SMZ. Near bank shade would be maintained and willow will be planted to increase effective habitat cover and near bank shade, thus, beneficial use in Alder Creek would be maintained for aquatic species.

Protection of Beneficial Use

1. Municipal and Domestic Water Supplies

Agricultural (Irrigation) use would be protected as the levels of Boron in water would not be expected to be increased beyond natural variation in background levels. Industrial (power) uses are located outside of the cumulative effects analysis area. These beneficial uses will not be

affected by increased sediment transport from the proposed action alternatives. Due to sediment transport mechanisms, if perceptible increases in sediment from the proposed activities did occur, the effect would be diminished by the time it reaches the point of use.

2. Groundwater

Groundwater-Recharge and Groundwater quality would not be expected to be negatively effected by the proposed activity. Best management practices were developed to minimize compaction along Alder Creek and this would retain recharge capacity in the alluvial system. Improvements incorporated in the proposed action include increased porosity and improved subsurface flow to the alluvial systems from decommissioning roads through sub-soiling and mulching, as needed, and by limiting access in areas already impacted over 1 mile of unclassified roads.

3. Recreation Contact and Non-contact

Recreation (REC1 and REC2) use would be maintained within the effected watersheds. No changes to designated use would result. Improvements within the RCAs would result in improved condtions for some uses. Boron, sediment, oil and grease levels would not affect contact recreation nor would non contact recreation be affected under the proposed activities. The proposed action is complementary to the designated uses in adjacent waters.

4. Cold/Warm and Freshwater Habitat, and Fishing

Fishing commercial and sport, and cold or warm freshwater fisheries would not be expected to be impacted by the proposed activities as no negative effects area expected from the application of boron and sediment levels are designed to maintain or improve background levels. Water temperature would not be significantly affected by changes in canopy cover, with all other factors remaining the same.

Spawning habitat can be impacted by the delivery of fine material and by negative geomorphic changes; therefore, the project is designed to minimize direct effects of sediment and compaction that could influence sediment delivery and the quality or presence of spawning habitat. Potential increases in late season water availability can increase survival of yearlings. Similarly, rare, threatened or endangered species habitat is expected to be maintained.

5. Wildlife Habitat

No changes to accessibility of water would occur from the proposed action, and no changes to water quality or quantity would occur from the proposed action that would impair wildlife habitat. Re-invigorating Aspen stand health could increase diversity and has the possibility of improving wildlife habitat.

6. Additional Uses

None of the activities proposed along Alder Creek would affect the migration of aquatic organisms. Similarly none of the activities proposed in the upper watershed of Prosser Creek would affect navigation.

Other Water Quality Requirements

The Tahoe National Forest will submit an application for a conditional waiver of waste discharge according to the California Regional Water Quality Control Board, Resolution No. R6T-2003-

0001 (Lahontan Regional Board) for actions implemented as part of the Alder Project for timber harvest activities.

Sensitive Aquatic Wildlife Species

As discussed under indirect effects of proposed activities on LCT under Intensity Item #9, specific project design features in the RCA include: residual tree spacing that corresponds to a canopy closure of approximately 40%, or higher where needed to maintain shade; retention of existing coarse woody debris and retention of large trees for future recruitment of coarse woody, as designated by the East Zone Fisheries Biologist and Hydrologist, and District Fuels Specialist and Wildlife Biologist. These design features would adequately provide for thermal regulation, pool to riffle ratios, pool depths, stream bank stability, and thereby result in no significant impacts to aquatic habitat.

Mountain yellow-legged frog: The mountain yellow-legged frog (MYLF) is a Forest Service sensitive species and a "candidate for listing" under the Endangered Species Act. The most recent documentation of MYLF in the project area occurred in 1997. In 2003 and 2005, surveys were was conducted in all habitats suitable for mountain yellow-legged frogs within the planning area. Although no MYLF was not found during either survey, the potential effects of the Alder Creek Project on this species are included in this analysis for the following reasons: 1) the drainage has historically supported the species, 2) detection of the frogs during surveys can be difficult and 3) there is suitable habitat present within the planning area.

Direct and Indirect Effects: According to the Aquatics BE, MYLF use both aquatic and terrestrial environments. MYLF are seldom far from water, although they have been observed moving overland to disperse to other pond habitats (Matthews 1999, pers. comm.). Little data exist on dispersal of this species (Bradford 1991). Occasional movements up to 50 m may be associated with habitat degradation, especially drying (Zeiner et al 1988). When in aquatic habitat, standard management requirements, and RCA protection measures would minimize direct effects to the MYLF to a level of non-significance. As discussed in Appendix B, The Human Health and Safety and Ecological Risk Evaluation for Borax Stump Treatment, application of borax to cut stumps is not expected to result in adverse effects to aquatic species, due to the low toxicity of borax to aquatic animals, and the low potential for borax to leach or enter surface water (Information ventures, 2004, p. 3). Mitigation measures incorporated into the project design, including a 25 foot no borax treatment buffer along live stream courses, and spill contingency planning would provide additional assurance that the potential for adverse impacts to aquatic species, and their prey and habitat would be below a level of significance.

MYLF could potentially be affected by project activities when on land, especially heavy equipment use within the RCA, e.g. if mastication is needed to reduce fuels. There is also the possibility that a frog on land could come into direct contact with Sporax®. However the risk direct contact with frogs is low. Though an individual may be affected by equipment use in the RCA, or by Sporax® use, effects to populations would not be expected.

Again, project design features, e.g., hand application of borax to stumps only and cleanup of any spilled material would ensure that potential direct impacts to MYLF on land would be reduced to a non-significant level. For more information on Borax, refer to the Appendix B-*Human Health and Safety and Ecological Risk Evaluation for Borax Stump Treatment for the Alder Creek Project*.

Cumulative Effects: General cumulative effects of the project on aquatic species are discussed in detail under the Intensity Element #7. That discussion focuses on the indirect effects of loss and alteration of aquatic habitat components from logging and associated railroad systems, roads and residential development, fire, grazing, recreation, dam construction and severe climatic events. Cumulative effects more specific to Mountain yellow-legged frogs include: 1) loss of habitat, 2) altered habitat, 3) introduction of salmonid fishes, 4) grazing, and 5) other environmental problems such as increased ultraviolet radiation, pesticides, viruses, and acid rain. Future cumulative effects are considered through the year 2012 to encompass the implementation of the Alder Creek Project and the continued development of the residences.

Historic logging and associated railroads had the greatest direct and indirect impacts to MYLF within the Alder Creek drainage. The effects of past logging within riparian zones and road and railroad networks contributed to unstable stream banks, fine sediment input, and a deficiency of coarse woody debris in stream channels, especially large wood 20 inches in diameter. The location of sawmills within the floodplain undoubtedly had effects on stream channels by intercepting intermittent and ephemeral drainages, which concentrated water flow, and contributions to stream bank instability/erosion. These impacts are expected to diminish over time, and the intense level and impacts of these activities are not expected to occur in the future. Though more recent timber management resulted in less activity in riparian zones, than during historic logging, roads and tree removal has contributed to streambank instability/erosion and sedimentation.

Further housing development would increase impervious surfaces, e.g., roofs and pavement, which prevent infiltration and can result in increased runoff and sedimentation. This runoff is outside the control of National Forest Management and is controlled by Tahoe Donner Association Architecture Standards, as well as, county and town ordinances which govern drainage structures and sediment catch basins intended to prevent sediment from reaching the stream and degrading water quality.

Any future activities which occur on National Forest Lands would be designed to comply with the SNFPA, 2004 ROD, and be evaluated to comply with the Riparian Conservation Objectives. Foreseeable new timber management project planned within the Alder Creek analysis area on NFS lands include the Billy IV Sale, to be located approximately 1 mile north of the project area and would precommercially thin 300 acres of overstocked stands and plantations; and the Sagehen Project located approximately 4 miles north of the analysis area within the Sagehen Basin, which would thin overstocked stands and create Strategically Placed Fuels Treatments (SPLATs) on up to 3,500 acres (Wildlife BE, p. 20). Though project activities may have short term impacts to habitat attributes considered important for Mountain yellow-legged frogs, project design standards would lead to an improvement to riparian conditions in the long term.

Cumulative effects from borax use are not expected, as no foreseeable use of borax is proposed in the analysis area. The Tahoe Donner Association, does not apply borax to cut stumps during thinning activities, and the next harvest entry is not expected for another 15 to 20 years. Treatment of stumps may occur as needed within developed recreational sites, on National Forest System Lands, but these sites lie outside the analysis area.

According to the Wildlife BE, the project area was historically grazed and the larger analysis area has a long history of grazing. Historic grazing practices were much less restrictive than the current standards and guidelines implemented by the 2004 SNFPA FSEIS ROD. The TNF has

implemented more restrictive grazing practices over the past ten years. Now, combined with the implementation of the SNFPA (2004), the grazing Standards and Guidelines have been designed and implemented to increase riparian health and vigor. As a result, meadow and riparian conditions (that are influenced by grazing) are improving in the analysis area and also on the larger Truckee Ranger District. The Alder Creek Project does not propose any changes to the grazing practices, and therefore would not add cumulatively to this effect.

Non-native salmonids and environmental problems such as pesticides, uv radiation etc., would likely continue to be a threat to Mountain yellow-legged frogs throughout its range.

Determination: Implementation of the Alder Creek *may affect individuals, and is not likely to result in a trend toward Federal listing or loss of viability* of the mountain yellow-legged frog.

Hardhead, Northwestern pond turtle, and Northern leopard frog: The Biological Evaluations and Assessment for aquatic wildlife (Aquatics BE) finds that the Alder Creek project lies outside the range of, and therefore *will not directly, indirectly, or cumulatively affect* the following sensitive species: Hardhead, Northwestern pond turtle, or Northern leopard frog.

Great Basin rams-horn snail and California floater mussel: The project area contains potential habitat for Great Basin rams-horn snail and California floater mussel. These species are known to inhabit aquatic habitat with abundant fine sediments. Currently these mollusks have not been sighted or surveyed for within the project area. No direct effects to these species are expected, as a result of project activities, since no operations would occur within perennial bodies of water. The potential for indirect and cumulative effects to these species is very minimal due to standard management requirements and RCA protection measures incorporated into the project. Alteration of current potential habitat or other negative effects on these species would be unlikely.

Determination – The Alder Creek Project *will not affect* the following aquatic species: Hardhead, Northwestern pond turtle, Northern leopard frog, Great Basin rams-horn snail or the California floater mussel.

Lahontan Lake Tui Chub: The project area contains potential habitat for the Lahontan Lake Tui chub. Various surveys on the Tahoe NF (snorkeling, seining, trapping, and electro-fishing) conducted by the FS personnel between 2000-2005 have not found Lahontan Lake tui chub in lake habitat. However, known populations of plankton-feeeding chub occur in Stampede, Prosser, and Boca Reservoirs, and nearby streams, which may be Lahontan Lake tui chub, due to morphological similarities (Marrin and Erman, 1982, Moyle et al., 1995). It is possible that Lahontan Lake tui chub are using stream habitat in Alder Creek, which flows into Prosser Reservoir, where Lahontan Lake tui chub are reported to occur. If using stream habitat in Alder Creek, this species would most likely be outside of the project area, downstream from the culvert at Highway 89, which would likely act as a barrier to upstream migration.

The combination of project design features, including standard management requirements and RCA protection measures, and the low probability that this species occurs in the project area should minimize direct, indirect or cumulative impacts to the Lahontan Lake tui chub to non-significant levels.

Determination: The Alder Creek Project *will not affect* Lahontan Lake tui chub.

Sensitive Terrestrial Wildlife Species

Wildlife habitats within the Alder Creek analysis area range from pure eastside pine, pure lodgepole pine and eastside mixed conifer. Eastside pine stands are comprised of a more open overstory, and the ground vegetation consists of mountain big sagebrush and bitterbrush. Within these stands, Jeffrey pine is the dominant tree species. Seral stages within the analysis area range from grass and brush fields and plantations to dense second growth stands. Eastside mixed conifer stands are dominated by white fir, Jeffrey pine, ponderosa pine, and lodgepole pine.

Other plant communities occurring within the analysis area include wet and dry meadows, riparian habitat, and shrublands/grasslands not capable of supporting trees. The primary riparian system within the analysis area is Alder Creek. There are two small meadows within Units 6b and 6c (2 acres and 1 acre respectively). The aspen/alder/willow riparian group is characterized by mosaics of this habitat type along the Alder Creek stream course and one unnamed intermittent tributary to Alder Creek. The riparian habitat groups are extremely important for wildlife because of the distribution and quantity of thermal and escape cover as well as a source of high quality forage. Aspen communities are present along Alder Creek and one main intermittent tributary. These aspen stands are generally declining due to conifer encroachment and herbivory. Aspen is well known as a valuable habitat for wildlife, especially where aspen is the only deciduous species interspersed with coniferous forests. Aspen communities are rich and diverse in wildlife species. Debyle (1985) conducted an extensive literature review of wildlife using aspen in the West. Over 134 birds and 55 species of mammals are known to use aspen forests (Debyle 1985). Locally important species that depend upon aspen include mule deer, raptors, owls, mountain quail, and many songbirds. The relative rarity and decline of aspen woodlands within the eastside of the Tahoe National Forest, and the western US makes aspen a priority for restoration efforts.

The analysis area for the project was defined to be a 1.5 mile radius surrounding the project area (see Map 1, Appendix C in the BE/BA). Because the project proposes only 778 acres of treatments in a very compact arrangement, the project area is bounded on 3 sides by private land, and there are no large vegetation management projects in the foreseeable future for at least 4 miles north of the project, it was believed that the vast majority of project effects would be within a confined area surrounding the project. This area totals 13,016 acres, of which 6,660 acres are private land, and 6,356 acres are NFS land. The rationale for slight variations in the analysis area for individual species can be found in the Wildlife BE.

Detailed information on species life history, species status, and other relevant information that was used for this analysis of the effects of Alternative 1 (Proposed Action) to sensitive species, is found in the Wildlife BE, which is incorporated by reference, and available upon request. A summary of the potential effects of the Alder Creek Project on the following sensitive species is included below: American peregrine falcon, California spotted owl, Great gray owl, Northern goshawk, willow flycatcher, greater sandhill crane, Pacific fisher (candidate), American marten, Sierra Nevada red fox, California wolverine, Pallid bat, Townsend's big-eared bat and Western red bat.

American Peregrine Falcon: There are no sightings of peregrine falcons and no suitable habitat for this species, due to a lack of cliff features in the analysis area or within five miles of the

project area. The implementation of the proposed action would have no direct, indirect or cumulative effects on this species or suitable habitat.

Determination: Implementation of the Alder Creek Project *will not affect* the peregrine falcon.

Spotted Owl –The SNFPA is a "Conservation strategy for old forest and associated species…(designed) to provide environmental conditions that are likely to maintain viable populations of old forest associated species, most specifically the California spotted owl, well-distributed across Sierra Nevada national forests. The strategy seeks to maintain existing suitable California spotted owl habitat to stabilize current population declines" (SNFPA ROD 2004, Appendix A page 1).

The analysis area does not provide suitable habitat for this species for the following reasons: eastside pine is not considered to be suitable habitat, though well stocked areas with a white fir understory may provide stand structural components that may be marginally suitable; 90% of the NFS land in the analysis area is open with no trees or has less than 40% canopy closure in trees; private land within the analysis area does not provide suitable habitat for species dependent upon late-seral habitat. On the 6,356 acres NFS lands in the analysis area, there are no old growth stands one acre or larger, no Old Forest Emphasis Areas (OFEAs), no spotted owl PACs, no spotted owl Home Range Core Areas (HRCAs), and only 101 acres are at least CWHR size class 4 with at least 60% canopy closure. These stands are isolated from one another, and none of these acres are proposed for treatment. Other potential, although not preferred, habitat within the analysis area would be 280 acres of CWHR size class 4 with at least 40% canopy closure that are proposed for treatment. The preferred tree stages and densities necessary for breeding do not occur within the project area and are too scattered within the analysis area to make it likely that breeding spotted owls are within the analysis area. At most, it is possible that foraging owls would use the CWHR 4M habitat, but this is considered very unlikely because the closest spotted owl PACs or HRCAs are greater than 3 miles away

Direct: Even though it is unlikely that breeding spotted owls would be present in the analysis area as described above, a Limited Operating Period (LOP) will be imposed on the entire project until protocol surveys are finished in 2006. These surveys give the ability to determine spotted owl absence from a surveyed area. This limited operating period will be in effect from March 1 to August 31, but may be modified by the District Wildlife Biologist if surveys determine nesting will not be affected within ¼ mile of the proposed activities. Although unlikely, if surveys detect spotted owls within the analysis area, a 300 acre PAC and 700 acre HRCA will be designated, and if they overlap with units, those units would be removed from the project until a new environmental analysis is completed. The completion of surveys and the implementation of the LOP, combined with the fact that it is very unlikely that spotted owls would be using the analysis area make it unlikely there would be any direct effects to California spotted owl.

Indirect: The analysis area does not contain the habitat attributes needed for nesting habitat. If such habitat is considered suitable, it will be surveyed to protocol. Forest Service recommendations for reducing direct effects to spotted owls have generally included minimizing disturbances within 0.25 miles of known roosts or nests during the breeding season (March 1 through August 31).

Important attributes for foraging are: 50 to 90 percent canopy closure, and 180 to 220 square feet of total live tree basal area in trees >15"dbh. The latest information in the SNFPA considers a minimum of 40% canopy cover as marginally suitable foraging habitat.The project area contains 280 acres of marginally suitable foraging habitat at best, due to the small size of trees, which average 11 inches dbh. After thinning, these stands would be slightly below the canopy closure and basal area described above, but would remain marginally suitable for foraging. Proposed restoration of aspen stands on 22 acres is not expected to cause the marginally suitable foraging habitat to be further adversely affected. The aspen stands are small and scattered, with the vast majority smaller than ½ acre. Proposed thinning and fuels reduction treatments may alter the species composition and abundance of potential owl prey, since the existing large numbers of small diameter trees and excessive amount of ground fuels provide favorable habitat attributes for owl prey. Project design is consistent with the standards and guidelines for snag and down log retention in the 2004 SNFPA ROD.

Overall, while the proposed treatments would have localized effects on available prey species, effects to spotted owl would be minimal. It is unlikely that spotted owls would enter the Alder Creek analysis area specifically to use these marginal stands as a primary foraging area, especially considering the distance from the nearest nesting territories within PACs is greater than 3 miles away. However, with treatment, these stands would develop larger tree size and increased canopy closure within 10 years, and would provide suitable foraging habitat. The proposed treatments are expected to have long term benefits to owls through maintaining suitable healthy habitat and potential increased prey diversity, abundance and foraging opportunities.

Cumulative: As discussed under Intensity Element #7, Old Forest Habitat and Connectivity of this document approximately 90% of the Alder Creek analysis area has had some type of timber harvest completed since 1960. The more recent (past 10 years) timber harvests on NFS lands and the proposed Alder Creek Project maintains large logs, large snags, and promotes large tree development through selection cutting and thinning from below. Though trees up to 30" dbh may be removed under the proposed action for equipment operability, few trees greater than 24"dbh would be removed per acre. The thinning prescriptions are not expected to substantially change stand characteristics and would not fragment current habitat. Thinning from below would improve forest health in a shortened period of time, and would achieve larger diameter trees, thereby increasing the amount of large logs, large snags, and reducing the risk of loss to catastrophic fire. By improving the chances that fires would be kept small, fuels treatments would have a beneficial cumulative effect on spotted owls. The Billy IV Fuels Reduction Project would improve the efficacy of fire suppression efforts and accelerate conifer growth in plantations established after the Donner Ridge Fire. By improving forest health and reducing forest fuels, these timber management projects speed the development of large size trees and improve the chances that fire suppression efforts can keep fires small. Cumulatively, these projects would have a positive impact over the long term by helping speed the creation of suitable habitat for spotted owl within the Alder Creek analysis area.

Even if highly suitable habitat is created or maintained on NFS lands, because large contiguous tracts of private land are present on both sides of Interstate 80 and residential development is occurring on private land, any potential north/south movement of species dependent upon late-seral habitat in and around the Truckee/Interstate 80 area may be hampered. This project would not contribute to any further habitat fragmentation, but rather is designed to maintain important habitat components and increase habitat connectivity on NFS lands over time.

There would be no significant direct, indirect or cumulative effects to spotted owls because: the Alder Creek Project does not propose treatments within any spotted owl PACs or HRCAs; the analysis area lacks suitable habitat to support nesting spotted owls, and only marginally suitable foraging habitat exists in the analysis area. It is expected that aspen stand treatments will increase foraging opportunities over time with an increase in stand diversity. This project will not contribute to any further habitat fragmentation, but rather is designed to maintain important habitat components and increase habitat connectivity on NFS lands over time.

Determination: Implementation of the Proposed Action Alternative of the Alder Creek Project may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for the California spotted owl within the planning area of the Tahoe National Forest. In the absence of a range-wide viability assessment, this viability determination is based on local knowledge of this species as discussed previously in this evaluation and professional judgment.

Great Gray Owl - There are no sightings of great gray owl, and no suitable habitat for this species, primarily due to a lack of suitably sized meadows for foraging and around which nesting territories could be established within the analysis area, i.e. within the project area and or one mile from the project area. Implementation of the proposed action would have no direct, indirect or cumulative effects on this species or suitable habitat.

Determination: Implementation of the Alder Creek Project will not affect the great gray owl.

Northern Goshawk - There is one 256 acre goshawk Protected Activity Center (PAC) within the Alder Creek analysis area. Although designated as a PAC, creation of the PAC was based on an incidental sighting in 1996, not nesting. The closest known breeding pair of goshawks is approximately 3 miles northeast of the project area, outside the analysis area. A goshawk was seen flying over the trees on the west side of Highway 89 in the vicinity of Donner Camp in 1997. However, multiple surveys in 1998, 1999, 2002, 2003, and 2005 have not detected goshawks in the analysis area. No goshawks have been detected on private land within the analysis area. All potentially suitable goshawk habitat was surveyed within the Alder Creek analysis area to R5 Protocol in 2005. Another year of survey is planned in 2006 to finish the protocol.

As stated under the discussion on spotted owl, the analysis area does not provide suitable habitat for species dependent upon late-seral habitat. Habitat within the Alder Creek analysis area is marginal to unsuitable for goshawk, which requires conifer stands with an average canopy closure greater than 60%. It is believed that the PAC cannot currently support breeding goshawks due to a lack of dense, large treed habitat. 90% of the NFS land analysis area is open with no trees or has less than 40% canopy closure in trees.

Direct: Even though it is unlikely that breeding goshawks would be present in the analysis area as described above, a Limited Operating Period (LOP) will be imposed on the entire project until protocol surveys are finished in 2006. These surveys give the ability to determine goshawk absence from a surveyed area. This LOP would be in effect from February 15 to September 15, and may be modified by the District Wildlife Biologist if surveys determine nesting will not be affected within ¼ mile of the proposed activities. Although unlikely, if surveys detect goshawks within the analysis area outside of the Hobart Mills PAC, a 200 acre PAC will be designated as described in the SNFPA (2004). If the PAC(s) overlap with units, those units would be removed

from the project until a new environmental analysis is completed. The completion of surveys and the implementation of the LOP, combined with the fact that it is unlikely that goshawks would be using the analysis area make it unlikely there would be any direct effects to northern goshawks.

Indirect: As stated above, the Hobart Mills PAC does not meet desired habitat conditions for goshawk. It is primarily one canopy layer, with average tree size less than 24"dbh, canopy closure averaging 55% in the densest stands, and no very large snags. This does not meet the definition of suitable nesting habitat.

The SNPFA allows mechanical vegetation treatments in PACs within Defense Zones, and within Threat Zones, if needed to meet fuels objectives. The Hobart PAC is within these WUI zones. Proposed treatments have the potential to affect habitat within the PAC. However, they have been designed to maintain overall habitat structure and function within the PAC. Of the 256 acre PAC, 159 acres are proposed for treatment, and 67 of those acres are currently CWHR size class 4M. Most of these stands within the PAC fall within the WUI Defense Zone. It is expected that in these stands, basal area of trees would be decreased by approximately 22% and canopy closure would decrease 5-10%.. The remainder of the proposed units are either class 3S or 4P. 3S stands are not expected to have measureable decreases in either basal area or canopy closure as mostly brush and very small trees would be removed. In the 4P stands, basal area of trees would be decreased by approximately 30% and canopy closure would decrease by 5-10% resulting in remaining canopy closures of 30-35%. The proposed thinning prescriptions for the treatment units within the PAC would: maintain tighter tree spacing, retain approximately 45-50% canopy cover where it currently exists, maintain at least 5% of the area with some clumpiness and stand layering, and maintain slightly higher levels of snags and down logs as compared to the rest of the project. This prescription is expected to maintain foraging habitat within the PACs where it currently exists, while reducing the risk of catastrophic fire and increasing the overall forest health.

The thinning prescription for the remaining 213 acres of CWHR 4M stands in the project area would maintain suitable foraging habitat. These stands would have an expected 27% reduction in basal area and a post treatment, canopy closure of approximately 45% canopy closure. Although overall basal area and canopy closure would be reduced, these effects are not considered substantial because the average size of trees is small. By lowering the basal area and canopy closure, it is expected that these stands would more quickly increase tree size and canopy closure, and provide potential nesting habitat 2-3 times faster, than if left untreated.

The proposed vegetation treatments may alter the potential goshawk prey base in species composition and abundance. Overall it is expected that, while the proposed treatments would have localized effects on available prey species, there would be minimal effects to foraging goshawks, if present. This is because retention standards for snags and down logs, as described in the SNFPA ROD (2004) will be met, and higher standards will be imposed within the PAC.

Applicable SNFPA (2004) Standards and Guidelines for mechanical treatments within CWHR type 4M habitat outside of Defense Zones include: 1) retain at least 40% (30% in eastside pine) existing basal area; 2) retain 5% or more of the treatment area in lower layers composed of trees 6-24" dbh; 3) avoid reducing the pre-existing canopy closure by more than 30% ; 4) eastside pine types have no canopy closure retention standards. Inside Defense Zones, these standards do not apply. The proposed project would meet all these standards even within the Defense Zone.

Cumulative: As discussed under the cumulative effects to spotted owl in Section V of this document approximately 90% of the Alder Creek analysis area has had some type of timber harvest completed since 1960. The more recent (past 10 years) timber harvests on NFS lands and the proposed Alder Creek Project maintains large logs, large snags, and promotes large tree development through selection cutting and thinning from below. Though trees up to 30" dbh may be removed under the proposed action, few trees greater than 24"dbh will be removed per acre. The thinning prescriptions are not expected to substantially change stand characteristics and will not fragment current habitat. Thinning from below is expected to achieve a larger diameter older treed forest in the future, thereby increasing the amount of large logs, large snags, increased forest health, and reduced risk of catastrophic fire. Because it is believed that these treatments will reduce the risk of catastrophic fire, they would also have a beneficial cumulative effect to goshawks. The project treatments will help speed the development of preferred suitable habitat for goshawks within the analysis area. The proposed activities would not reduce the total amount of suitable foraging habitat, but may decrease the quality of that habitat in the short term. However, it is believed that these treatments will add positively over the long term by helping speed the creation of older forests within the Alder Creek analysis area.

Though a PAC is proposed for treatment, it is believed that the Hobart Mills PAC has a low contribution to overall species productivity. It is believed that the PAC cannot currently support breeding goshawks due to a lack of dense, large treed habitat. Nesting has never been documented within the PAC and it was set up based on incidental sightings only. In addition, it appears the PAC is unoccupied. Therefore the Alder Creek project will not likely add to cumulative effects of decreased species productivity.

There are larger fragmentation issues around Interstate 80 and the Town of Truckee. Development on private land is extremely extensive and is only increasing in the Truckee area. This trend shows no signs of slowing down. Even if highly suitable habitat is created or maintained on NFS lands, because large contiguous tracts of private land are present on both sides of Interstate 80 and residential development is occurring on private land, any potential north/south movement of species dependent upon late-seral habitat in and around the Truckee/Interstate 80 area may be hampered. This project will not contribute to any further habitat fragmentation, but rather is designed to maintain important habitat components and increase habitat connectivity on NFS lands over time.

The riparian areas have generally been completely avoided during past timber management practices within the analysis area, and have resulted in densely overstocked unhealthy stands. The overstocked conditions combined with insect activity have altered the historical vegetative conditions of these areas. The Alder Creek Project proposes to treat unhealthy overstocked riparian areas on approximately 217 acres (most of these acres are light thinning and/or hand work). The proposed treatments are expected to have long term benefits to goshawks through maintaining suitable healthy habitat and potential increased prey diversity, abundance and foraging opportunities.

Conclusion: It is not expected the Alder Creek Project would have substantial negative effects to northern goshawks because:

Direct: Even though a Goshawk PAC is designated within the analysis area, it is believed that the PAC cannot currently support breeding goshawks due to a lack of dense, large treed habitat.

The completion of surveys and the implementation of the LOP, combined with the fact that it is unlikely that goshawks would be using the analysis area make it unlikely there would be any direct effects to northern goshawks.

Indirect: The proposed thinning prescriptions for the treatment units within the PACs would maintain tighter tree spacing, would maintain approximately 45-50% canopy cover where it currently exists, would maintain at least 5% of the area with some clumpiness and stand layering, and would maintain slightly higher levels of snags and down logs as compared to the rest of the project. This prescription is expected to maintain foraging habitat within the PAC where it currently exists, while reducing the risk of catastrophic fire and increasing the overall forest health.

- The proposed project will meet all the more stringent SNFPA (2004) Standards and Guidelines for mechanical treatments outside of Defense Zones within the Defense Zone.
- With treatment, it is expected that the stands will provide suitable nesting habitat 2-3 times faster than if left untreated.
- It is expected that aspen stand treatments will increase foraging opportunities over time with an increase in stand diversity.
- This project will not contribute to any further habitat fragmentation, but rather is designed to maintain important habitat components and increase habitat connectivity on NFS lands over time. The Hobart Mills PAC has a low contribution to overall species productivity.
- The Alder Creek project would not likely add to cumulative effects of decreased species productivity.

Determination: Implementation of the Proposed Action Alternative of the Alder Creek Project *may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability* for northern goshawk within the planning area of the Tahoe National Forest. In the absence of a range-wide viability assessment, this viability determination is based on local knowledge of this species as discussed previously in this evaluation and professional judgment.

Willow Flycatcher and Greater Sandhill Crane- There are no known sightings and no detections during surveys in 2004 and 2005 of willow flycatcher or greater sandhill crane in the analysis area. Both species are very restricted in habitat use and suitable habitat is not present within the analysis area. The project area does not contain meadows of adequate size or with sufficient densities of riparian shrubs to be considered suitable habitat for willow flycatcher. Greater sandhill crane occupy similar habitat, but require standing water in meadows to protect nest sies from predation. The project design incorporates measures that would effectively protect nesting sandhill cranes, if present, from disturbance. Meadow areas in Units 6b and 6c would be avoided entirely or operations would occur in the winter over the snow, thus there would be no direct effects to cranes. The closest potential habitat for both species lies ½ mile downstream from the project area. No direct, indirect, or cumulative effects to willow flycatcher or greater sandhill crane are expected.
Determination: Implementation of the Alder Creek Project will not affect the willow flycatcher or greater sandhill crane.

Pacific Fisher and American Marten-
Fisher- Historically, fishers were distributed across forested regions of California in the Sierra

Nevada, Klamath Mountains and North Coast Ranges. It is believed extirpated in the northern Sierra Nevada. Pacific fishers occur sympatrically with marten in the southern Sierra Nevada between 5,000 to 8,500 feet elevation in mixed conifer forests. Krohn et al. (1997) suggest that fisher are limited by deep snow, and consequently occupy lower elevations, while marten occupy higher elevations. Vegetation used by fisher is structurally complex. They are found in late-successional coniferous forests (CWHR types 4M, 4D, 5M, 5D, 6), in stands of at least 80 acres with: overhead cover, large-diameter snags distributed across the landscape, downed logs distributed across the landscape (at least 15-inch dbh by 15 feet long), large-diameter (greater than 24-inch dbh) live conifers with decadence such as broken tops or cavities, complex structure near the ground (logs, large downed branches, root masses, live branches), and multi-layered vegetation (vertical within-stand diversity). The preferred tree stages and densities necessary for breeding do not occur within the project area, and potential habitat types are scattered and isolated in nature. Additionally, the project area is likely above the elevational range for fisher in this part of the Sierra Nevada, and receives large amounts of snow and thus may be unsuitable for fisher.

Primary risk factors include: reduction of overhead cover, large-diameter trees, or coarse woody debris from vegetation management, mortality or behavior modification from recreational activities including OHV and OSV use, mortality from vehicles, and behavior modification associated with the presence of vehicles and humans, and habitat fragmentation from roads and/or vegetation alteration.

American Marten - The SNFPA FSEIS, Volume 1, Summary, page 15 states "Environmental conditions important to marten and marten populations would not be expected to change significantly from current condition under any of the alternatives. All alternatives would result in retention and development of large trees at levels sufficient to protect and enhance marten habitat." The SNFPA FSEIS ROD (2004) includes Standards and Guidelines #88 and #89 for Marten Den Sites on page 62. The Alder Creek Project is consistent with these Standards and Guides. The SNFPA SFEIS (2004) determined marten *may be affected, but not likely to lead to a trend towards Federal listing.*

Preferred habitat is characterized by dense (60 to 100% canopy), multi storied, multi species late seral coniferous forests with a high number of large (> 24 inch dbh) snags and downed logs. Studies in the Sierra Nevada indicate martens have a strong preference for forest-meadow edges, and riparian forest corridors (used as travel ways) appear to be important for foraging. Forest stands dominated by Jeffrey pine do not appear to support marten on the Tahoe National Forest (Martin 1987). Preferred forest types include mature mesic forests of red fir, red fir/white fir mix, lodgepole pine, subalpine conifer, and Sierran mixed conifer. CWHR types 4M, 4D, 5M, 5D, and 6 are moderate to highly important for the marten. Marten captures decline as openings in the landscape increase, as edge habitats increase, and where open areas are more closely spaced. Recommendations from studies are to maintain the landscape so that the percentage of non-forested acreage does not exceed 20% of the total (including clearcuts, meadows, and natural openings). In three separate studies which occurred in Utah, Maine and Quebec, the researchers found that landscapes with openings which cover more than 25% of the area were not suitable habitat for marten. Chapin et al. (1997) recommend that conservation practices focus on structural attributes that functionally influence the quality of forested habitats for marten, rather than merely age, species composition, and canopy closure of overstory trees, and that these structural requirements could be maintained in a variety of managed and unmanaged stands.

Sherburne and Bissonette (1994) state that only older growth forests with accumulated coarse woody debris provide the forest floor structure necessary to enable marten to forage effectively during the winter. Suitable and potentially suitable marten habitat exists in the Alder Creek analysis area, however it is scattered and isolated in nature.

As stated under the discussion on spotted owl, the analysis area lacks sufficient habitat for species dependent on late-seral vegetation. 90% of the NFS land analysis area is open with no trees or has less than 40% canopy closure in trees. Additionally, private land within the analysis area does not provide suitable habitat for species dependent upon late-seral habitat. The percentage of openings within the analysis area on NFS lands is currently 27%. Although it is possible that fisher and marten could inhabit the project area, the preferred tree stages and densities necessary for breeding do not occur within the project area.

Historically, there have been widely scattered sightings of Pacific fisher across the Tahoe National Forest. However, few sightings exist for fishers east of the Sierra Crest, and no fishers have been detected on the Sierraville or Truckee Ranger Districts through many survey efforts. Since 1998, the Sierraville Ranger District has conducted 136 camera station surveys to R5 protocol (over 3,808 survey days) for forest carnivores. No fishers have been detected. There were 47 detections of marten; however no martens were detected within eastside pine type habitats. During the winters of 1999 and 2000, the Truckee Ranger District operated 9 camera stations east of Highway 89 (approximately 2 miles northeast of the project area) in eastside pine habitat. No fishers or martens were detected.

In 1992, the Tahoe NF completed a forest wide habitat management plan for forest carnivore species (Pacific fisher, American marten, Sierra Nevada red fox, and California wolverine), the *Recommendations for Managing Late Seral Stage Forest and Riparian Habitats on the Tahoe National Forest* (Chapel et al. 1992). On May 1, 1998, the Regional Forester requested that each forest complete a mesocarnivore network. The Tahoe completed that network on September 29, 1998, incorporating new information that focused the network on the needs of the Pacific fisher and American marten. e.g. CWHR size class 4 or greater and canopy cover greater than 60 percent in a compact arrangement creating the largest, most contiguous blocks available. Although the Alder Creek analysis area does not fall within any areas designated as parts of the mesocarnivore network, the information is useful in making management recommendations at the project level.

Direct Effects: The project and analysis areas do not provide a high enough percentage of habitat and do not provide sufficient habitat connectivity of late-seral habitat to render the area as suitable for fisher and marten. The analysis area is likely to be too high in elevation for fisher. If present, martens may be temporarily displaced during vegetation treatments within the 280 acres of CWHR type 4M proposed for treatment. The likelihood of this is thought to be low. Even though marten are more tolerant of openings than fishers, 90% of the analysis area on NFS lands is open with no trees or has less than 40% canopy closure in trees. Implementation of the Proposed Action is not expected to affect denning fisher or marten. As stated above, denning habitat is not present within the treatment units and the analysis area as a whole is not likely to support denning. It is also believed that the habitat within and directly adjacent to treatment units is impacted by human disturbance. The overall chance of directly affecting martens is low.

Indirect: There is some dietary overlap between the Pacific fisher and marten. Both species prey heavily upon squirrels, other rodents and birds. The proposed thinning and fuels reduction

treatments may alter the potential prey base for fisher and marten in species composition and abundance by removing small trees and ground fuels. While proposed treatments would have localized effects on available prey species, there would be minimal effects to fishers and marten, if present because both opportunistic predators. Fishers are wide ranging predators, and marten would likely forage in more open areas that would not be affected by project activities.

Aspen restoration on 22 acres would reduce the canopy cover and structural characteristics of the existing stands over the short term, but within a few years these released aspen stands are expected to begin to develop a more healthy structure and become a more diverse component of the forest, thus improving foraging habitat for fisher and marten.

Stands with greater than 60% canopy closure would not be entered, larger diameter trees (>30" dbh) would not be removed, and relatively few trees greater than 24" dbh would be removed. Even with some snags and down logs removed, it is believed that the potential suitable, but not preferred, habitat in the 280 acres of CWHR 4M stands would be maintained, as canopy closures would not be dropped below 40%, approximately 75% of the existing basal area would be retained, and retention standards for snags and down logs, as described in the SNFPA ROD (2004) would be met.

There is no new permanent road construction proposed. The small amount of temporary road construction would not further fragment habitats. These temporary roads would be decommissioned immediately post project and an additional 1 mile of existing non-system roads would be decommissioned to improve watershed conditions.

Cumulative: As discussed under Cumulative Effects to Wildlife, and in the Wildlife BE, early logging removed the majority of large trees in the analysis area. Subsequently, the Donner Ridge Fire in 1960 and numerous salvage, thinning and overstory removal projects further reduced the number and density of remaining large trees, which are important habitat components for fisher and marten. The proposed Alder Creek Project would maintains large logs, large snags, and promotes large tree development through selection cutting and thinning from below. Though trees up to 30" dbh may be removed under the proposed action for equipment maneuverability, few trees greater than 24"dbh will be removed per acre. The thinning prescriptions are not expected to substantially change stand characteristics and would not fragment current habitat. Thinning from below is expected to achieve a larger diameter older treed forest in the future, thereby increasing the amount of large logs, large snags, increased forest health, and reduced risk of catastrophic fire. The riparian areas have generally been completely avoided during past timber management practices within the analysis area. As a result, overstocked conditions combined with insect activity have altered the historical vegetative character of these areas. Proposed treatment on approximately 217 would have long term benefits to fisher and marten through maintaining suitable healthy habitat and potential increased prey diversity, abundance and foraging opportunities.

Because it is believed that these treatments would reduce the risk of catastrophic fire, they would also have a beneficial cumulative effect to fisher and marten. Even though the project is high elevation (above the typical range for fisher), and east of the Sierra crest, if the area had not catastrophically burned in 1960, it might have provided potentially suitable habitat for fisher. The project treatments would help speed the development of preferred suitable habitat for fisher and marten within the analysis area.

The Billy IV Fuels Reduction Project would be implemented within the next five years on approximately 300 acres 1 mile north of the Alder Creek Project. This project would help accelerate conifer development by thinning young plantations, and thereby speed development of habitat components for fisher and marten.

It is unknown if fisher would be able to colonize the area even if suitable habitat was present. The elevation of and prevalence of important habitat features such as large tree sizes, dense canopy closures, and landscape habitat connectivity are all greater on the west side of the Sierra Nevada as compared to the eastside. If fisher were to recolonize the central or northern Sierra Nevada, it would like occur on the west side. In addition, there are larger fragmentation issues around Interstate 80 and the Town of Truckee. Development on private land is extremely extensive and is only increasing in the Truckee area. This trend shows no signs of slowing down. Even if highly suitable habitat is created or maintained on NFS lands, because large contiguous tracts of private land are present on both sides of Interstate 80 and residential development is occurring on private land, any potential north/south movement of species dependent upon late-seral habitat in and around the Truckee/Interstate 80 area may be hampered. This project would not contribute to any further habitat fragmentation, but rather is designed to maintain important habitat components and increase habitat connectivity on NFS lands over time.

Summary - Alternative 1 (Proposed Action) is not expected to substantially adversely affect fisher or marten for the following reasons:

- There are no old growth stands one acre or larger, no Old Forest Emphasis Areas (OFEAs), and no areas designated as part of the TNF mesocarnivore network within the analysis area.
- Only 101 acres of CWHR size class 4 or greater with at least 60% canopy closure exists in the analysis area and it is not proposed for treatment.
- Even though marten are more tolerant of openings than fishers, 90% of the analysis area on NFS lands is open with no trees or has less than 40% canopy closure in trees.
- Preferred tree stages and densities necessary for breeding do not occur within the project area.
- Habitat within and directly adjacent to treatment units is impacted by human disturbance.
- It is recognized that the proposed vegetation treatments may alter the potential fisher and marten prey base, but also that the project proposes 22 acres of aspen stand improvement that would increase foraging habitat for these species.
- Other important habitat components for fisher and marten would not be reduced. Stands with greater than 60% canopy closure would not be entered, larger diameter trees (>30" dbh) would not be removed, and relatively few trees greater than 24" dbh would be removed (due to small average stand size).
- Habitat in the 280 acres of CWHR 4M stands will be maintained - canopy closures would not be dropped below 40%, approximately 75% of the existing basal area would be retained, and retention standards for snags and down logs, as described in the SNFPA ROD (2004) will be met.

- The project treatments would help speed the development of preferred suitable habitat for marten within the analysis area.
- This project would not contribute to any further habitat fragmentation, but rather is designed to maintain important habitat components and increase habitat connectivity on NFS lands over time.

Determination: Implementation of the Proposed Action Alternative of the Alder Creek Project *may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability* for Pacific fisher and American marten within the planning area of the Tahoe National Forest. In the absence of a range-wide viability assessment, this viability determination is based on local knowledge of this species as discussed previously in this evaluation and professional judgment.

Sierra Nevada red fox –
No documented sightings exist for this species within the analysis area. Typically, Sierra Nevada red fox are believed to inhabit high elevation meadows in the Sierra Nevada Mountain Range, and occur at elevations 7,000 feet and seldom below 5,000.. The analysis area has a few small meadows and riparian areas that could support Sierra Nevada red fox. This species was not detected in camera station surveys on the Sierraville Ranger District since 1998, or during camera station surveys on the Truckee Ranger District approximately 2 miles northeast of the project area during the winter of 1999 and 2000.

Implementation of Alternative 1 (Proposed Action) may temporarily affect foraging and denning Sierra Nevada red fox, but the probability is low, because it is unknown and unlikely that they exist within the project area.

Further, it is assumed that if the more restrictive habitat requirements of fisher, marten, willow flycatcher, and California spotted owls are provided, the habitat requirements will be met for red fox (Freel 1991).

The Alder Creek Project is not expected to have measurable negative effects to Sierra Nevada red fox for the following reasons:

- There are no historic detections of Sierra Nevada red fox within the analysis area.
- Extensive camera survey efforts did not detect Sierra Nevada red fox.
- Direct effects to Sierra Nevada red fox from thinning and burning are not expected, because it is unlikely that red foxes would be denning in and directly adjacent to treatment units, due to the existing level of human disturbance within the analysis area.
- No meadows would be affected by the proposed activities.
- Thinning may have short-term effects on potential habitat for prey species, by altering existing canopy and structure, but red foxes primary forage in meadow and riparian systems. In the long term, thinning may benefit Sierra Nevada red fox, by creating more open habitat for foraging.
- Aspen restoration in the short term would alter existing stand condition, but in the long term would benefit Sierra Nevada red fox and prey, as aspens develop more healthy structure and become a more diverse component of the forest.

- As designed, large snags, down logs, and large green trees will be retained within treatment units to provide potential cover habitat.
- Riparian treatment and aspen restoration units in the short-term would alter existing stand conditions, and may affect prey species. If present, in the long-term these treatments are expected to have beneficial effects on red foxes, as aspenst develop more healthy structure and become a more diverse component in the forest
- Prescribed fire would have a short-term effect upon prey abundance and diversity, but would benefit prey as more live vegetation returns to the forest floor. The potential for catastrophic fire is higher for Alternative 2 (No Action) than Alternative 1, and therefore Alternative 1 would reduce the potential cumulative effects from fire.
- Cumulative effects are expected to be negligible.

Determination: Implementation of the Proposed Action Alternative of the Alder Creek Project *may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability* for Sierra Nevada red fox within the planning area of the Tahoe National Forest. In the absence of a range-wide viability assessment, this viability determination is based on local knowledge of this species as discussed previously in this evaluation and professional judgment.

California Wolverine – The wolverine is considered a scarce resident in California. This species is highly dependent upon mature conifer forests for survival in winter, where food is available. Incidental sightings of wolverines have been reported on the Tahoe National Forest. The most recent sighting was in the summer of 2003 in the Granite Chief Wilderness area, south of Interstate 80 on the Truckee Ranger District. No wolverine have been detected in studies conducted by the California Department of Fish and Game (CDFG) or the Tahoe National Forest, or in joint studies with the University of California in 1977-78, 1993, and 1994. No detections of this species were recorded during baited cameral surveys during the winters of 1998 through 2004 on the Sierraville Ranger District, or on the Truckee Ranger District during the winters of 1999 and 2000. There are no confirmed reports of wolverines within the analysis area.

The Tahoe LRMP does not provide specific guidelines for this species. However, general guidelines direct the forest to improve habitat capability for mature and overmature eastside pine, mountain meadows, mature and overmature forests, and riparian habitats.

Direct: If wolverine were present during project treatments as proposed under Alternative 1, there would be the potential for disturbance. It is unlikely wolverine den or forage within the analysis area because of the extremely high levels of winter and summer public use and recreation in addition to the highly developed private land. Carrion, a known primary food source for wolverine in winter, is not known to occur in high numbers within the Alder Creek analysis area because on a typical year the Loyalton-Truckee deer herd does not winter within the Alder Creek analysis area. In addition, Grinnell (1937) noted that "ordinarily the wolverine is not known to come below 8000 feet, even in the severest storms of winter." The Alder Creek analysis area is below 8000 feet elevation. Therefore, implementation of Alternative One of the Alder Creek Project would have a very low probability of directly affecting wolverine.

Indirect: Thinning from below has some potential to affect the abundance and distribution of wolverine prey in the short term. However, these effects would not affect wolverine distribution, as it relates to prey availability and abundance for the following reasons: the wolverine is

opportunistic in its food habits, has a large home range size and extensive daily movements, wolverines are known to forage within forested and non-forested stands, and therefore the entire Alder Creek analysis area would be considered suitable wolverine foraging habitat. There are only 286 acres of older forest stands (CWHR 5S, 5P) within the Alder Creek analysis area, and the Alder Creek Project does not proposes to treat vegetation within these stands. Therefore, project implementation is not expected to change the existing structural complexity of later-seral stage habitat over the landscape within the Alder Creek analysis area. In addition, as stated above it is not believed wolverine den or forage within the Alder Creek therefore the likelihood of indirect effects is very low.

Cumulative: Approximately 90% of the Alder Creek analysis area has had some type of timber harvest completed since 1960. The more recent (past 10 years) timber harvests on NFS lands and the proposed Alder Creek Project maintains large logs, large snags, and promotes large tree development through selection cutting and thinning from below. Though trees up to 30" dbh may be removed under the proposed action, few trees greater than 24"dbh will be removed per acre. The thinning prescriptions are not expected to substantially change stand characteristics. Thinning from below is expected to achieve a larger diameter older treed forest in the future, thereby increasing the amount of large logs, large snags, increased forest health, and reduced risk of catastrophic fire. The Alder Creek project should increase the forest health and vigor within the analysis area.

The Alder Creek Project proposes to treat unhealthy overstocked riparian areas on approximately 217 acres (most of these acres are light thinning and/or hand work). The proposed riparian area treatments are expected to have long term benefits to mesocarnivore prey abundance and diversity, and therefore would benefit California wolverine.

Since wolverine are not expected to utilize the areas in and adjacent to Alder Creek Project units, and it is not likely wolverine use the forested stands adjacent to and within the proposed vegetation units for denning or foraging, there would be a low probability of directly affecting wolverine. Indirect effects to wolverine are not expected to be measurable, and cumulative effects would generally benefit wolverine in the long term if Alternative One of the Alder Creek Project were implemented.

Determination: Implementation of the Proposed Action Alternative of the Alder Creek Project may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for California wolverine within the planning area of the Tahoe National Forest. In the absence of a range-wide viability assessment, this viability determination is based on local knowledge of this species as discussed previously in this evaluation and professional judgment.

Pallid Bat –Pallid bats are most common in open, dry habitats that contain rocky areas for roosting. Day roosts may vary but are commonly found in rock crevices, tree hollows, mines, caves and a variety of human-made structures. There is a strong association with black oak, which does not exist within the analysis area. Pallid bats are also very sensitive to roost site disturbance. Night roosts are usually more open sites and may include open buildings, porches, mines, caves, and under bridges. Pallid bats are a gregarious species, often roosting in colonies of 20 to several hundred individuals. Throughout California the pallid bat is usually found in low to middle elevation habitats below 6000 ft., however, the species has been found up to 10,000 ft. in the Sierra Nevada.

The entire project area is above 6,000 feet elevation. No systematic surveys for this species have occurred in the project area. This species is not known to occur in mountainous regions of Nevada County (California's Wildlife Volume III, Mammals, California Statewide Wildlife Habitat Relationships System, April 1990). This species is known to select for oak hardwood trees with cavities. No oak hardwoods occur within 5 miles of proposed Alder Creek Project units.

It is unlikely there would be substantial detrimental direct or indirect effects to pallid bat from the proposed activities under the Alder Creek project because:

- There are no reported sightings of pallid bat in the analysis area.
- The project area is above the typical elevational range for pallid bats.
- Large snags and large trees would be retained as described above.
- Rocky outcroppings and crevices would not be affected.
- There are no mines, caves, or oaks within the analysis area.
- Prey species would not likely be adversely affected.
- If present, though unlikely, implementation of Alder Creek Project may temporarily affect foraging and roosting pallid bats, though significant cumulative effects are not expected.

Cumulative effects: Historic private and public timber harvest practices, including salvage harvesting after the Donner Ridge Fire, have significantly modified potential pallid bat habitat in the analysis area. Past timber management on both private and public lands within suitable pallid bat habitat has resulted in stands that have lower than naturally occurring levels of snags and live trees >30" dbh. It is not clear what effect past grazing practices had on the availability of flying insects (primarily grasshoppers a preferred prey species of pallid bats), but it is believed that suitable prey habitat is maintained through the SNFPA Standards and Guidelines. Allotment plans that occur in the vicinity of the analysis area require that a 4 to 6 inch plant stubble height be present at the end of each grazing season. This would provide habitat for grasshoppers, a preferred pallid bat prey item. Once implemented, the Alder Creek Project would reduce the potential loss of habitat due to a stand replacing fire. It is expected that by opening up the densely overstocked stands, there would be more abundant riparian vegetation, which would contribute to higher density/diversity of insects. This may increase foraging opportunities for pallid bat. Personal fuelwood cutting is expected to continue as it occurs today. Fuelwood cutting primarily affects dead trees near roadways. As technology improves and bat surveys are more common, it will be possible to identify primary roost sites and buffer them from ground disturbing activities.

Determination: Implementation of the Proposed Action Alternative of the Alder Creek Project may affect individuals, but is not likely to result in a trend toward Federal listing or loss of viability for pallid bat within the planning area of the Tahoe National Forest. In the absence of a range-wide viability assessment, this viability determination is based on local knowledge of this species as discussed previously in this evaluation and professional judgment.

Townsend's Big-eared Bat – In California, the species is typically found in low desert to mid-elevation montane habitats, although sightings have been reported up to 10,800 feet. Habitat

associations include desert, native prairies, coniferous forests, mid-elevation mixed conifer, mixed hardwood-conifer forests, riparian communities, active agricultural areas and coastal habitat types. Distribution of this species is strongly correlated with the availability of caves and cave-like roosting habitat. This species is highly sensitive to roost disturbance. The analysis area for potential effects to Townsend's big-eared bats for this project was considered to be the project area itself for effects to habitat and any potential occupancy by the species. This is due to the project area being compact and small (less than 800 acres). The Townsend's big-eared bat is closely tied to its roosting habitat year round.

The analysis area has not been surveyed for Townsend's big-eared bat. There are no known or expected Townsend's big-eared bat portals or roosting sights within the analysis area. Suitable habitat is not believed to be present due to the lack of caves, mines, and abandoned buildings within the analysis area. There are no caves or mines within five miles of the project, thus bats that may be present in areas outside the analysis area are highly unlikely to be affected. Although foraging habitat is present, the lack of any suitable roost sites within and adjacent to the analysis area makes it highly unlikely that Townsend's big-eared bats would use the analysis area. Because the project area lacks suitable roost sites and the species is so directly tied to roost sites, the project is not expected to affect any Townsend's big eared bat. No direct, indirect or cumulative effects would occur from the implementation of the proposed project.

Determination: Implementation of the Alder Creek Project *will not affect* the Townsend's big-eared bat.

Western Red Bat –No known populations of western red bat exist on the Truckee Ranger District. The known upper elevation range of the red-bat is 3,000 feet. The Alder Creek analysis area is above the elevational range of the western red bat. No surveys for this species have been accomplished within the analysis area, and there are no historical sightings of this bat in the project area. It is assumed that the project area is outside of the natural range of this species. Therefore, there would be no direct, indirect, or cumulative effects to western red bat from the implementation of the Alder Creek Project.

Determination: Implementation of the Alder Creek Project *will not affect* the western red bat.

Sensitive Plant Species

Alternative 1 – Proposed Action would have *no effect* on the following species listed on the Tahoe National Forest Sensitive Plant List:

Arabis rigidissma var. demota, Botrychium ascendens, Botrychium crenulatum, Botrychium lineare, Botrychium montanum, Bruchia bolanderi, Epilobium howellii, Erigeron miser, Eriogonum umbellatum var. torreyanum, Hydrothyria venosa, Ivesia aperta var. *aperta, Ivesia aperta* var. *canina, Ivesia sericoleuca, Ivesia webberi, Meesia triquerta, Meesia uliginosa, Pyrrocoma lucida and Tauschia howelii.*

The project area was surveyed by qualified botanists who found a single occurrence of the sensitive plant *Meesia uliginosa* along a tributary to Alder Creek. This occurrence of *M. uliginosa* would be avoided by flag and avoid mitigations. Though potential habitat exists in the project area for the other species, no detections of these plants were found during field surveys. Direct, indirect and cumulative impacts to any TNF Sensitive Plant species are not expected, since the only known sensitive plant occurrence can be avoided. *M. uliginosa* was found to occur

along a stream bank within the Riparian Conservation Area in Unit 6a. This occurrence can be avoided by flag and avoid mitigations, and by the 25 foot no-treatment buffer along live stream courses, in which Sporax® would not be used to preclude direct effects, indirect effects and cumulative effects to this species and its habitat. Proposed Action *may affect individuals but is not likely to cause a trend toward federal listing or loss of viability within the planning area of the Tahoe National Forest* for *M. uliginosa.* In the absence of a range wide viability assessment, this viability determination is based on local knowledge of this species and professional judgment. More details about Sensitive Plants in the Alder Creek Project area can be found in the *Biological Evaluation for Sensitive Plants Alder Creek Project* hereby incorporated by reference into this EA, and available upon request.

Determination: This project will not impact any Sensitive plant species.

Alternative 2 (No Action): Under No Action, no fuels management would take place. Because the likelihood of a high intensity fire is high within the project area, the sensitive species *Meesia uliginosa* may be vulnerable to direct, indirect or cumulative effects.

A WEED RISK ASSESSMENT

The SNFPA FSEIS (2004), Volume 1, Chapter 4: Environmental Consequences page 191 in Section 4.1.3. *Cumulative Effects for the Five Problems addressed in the FEIS* states: "The Forest Service will provide programs for reducing the spread of noxious weeds under all alternatives. When combined with the programs of other agencies and landowners, the Forest Service program will lead to better control of noxious weeds in the Sierra Nevada over time". The *Weed Risk Assessment for the Alder Creek project is hereby incorporated by reference and is summarized herein.* Noxious weed inventories have been completed. No "A" rated species have been found in the project area. The weeds that are known to occur near the project area, i.e. bull thistle, cheatgrass, and wooly mullein are "C" rated and not a priority to control, but not desireable to spread.

Alternative 1 (Proposed Action) - "A" rated species such as musk thistle (*Cardus nutans)* have not been found to occur within the project boundary, and there is a low probability of these noxious weeds becoming established and spreading within the project area, if the mitigations to use clean equipment are followed. As an added precaution, the project area should be checked in the years following the underburning to guard against the spread of musk thistle and other "A" rated noxious weeds. Bull thistle, cheatgrass, and wooly mullein probably would spread in disturbed areas within the project area after project implementation. If wooly mullein and bull thistle become established in these disturbance areas, it is expected that they will be replaced by native vegetation over the long term (5-10 years). Areas where cheatgrass becomes established or intensifies could experience a longer-term loss of biodiversity. Since at least 30% of the canopy cover would be removed, a decrease of soil cover would allow for an increase in cheatgrass, especially on south facing slopes within the project area in the long-term. Application of Sporax® is highly unlikely to cause disturbance, which would encourage the spread of noxious weeds. An accidental spill may create potential habitat disturbance for noxious weeds by killing native vegetation, or could have a beneficial fertilizing effect depending on the amount spilled. However, the careful application onto the stump surface and the prompt cleanup of spillage, as directed in the project spill plan would likely avoid effects to vegetation in close proximity to treated stumps.

Determination: There is a low risk of increasing the cover of "A" rated noxious weeds in the Alder Creek Project area if the mitigations to bring in clean equipment and underburned areas are surveyed two years after burning. The risk of spreading "C" rated noxious weeds would not change, as a result of the proposed action, and would remain high because these weeds inevitably follow fire whether the area is burned by prescribed fire or wildfire. However, the risk may be small compared to the potential for uncontrollable wildfire if the project is not implemented.

Mitigation measures designed to reduce the risk of the spread of noxious weeds include the following:

- Underburned areas would be surveyed in the years following underburning to guard against the spread of musk thistle and other "A" rated noxious weeds. If weeds were found, they would be mapped and flagged, and those weeds that are "A" or "B" rated that respond to pulling as a control measure, would be pulled (SMR 16).
- To guard against widespread cheatgrass invasion, and to protect important shrub communities for forage production, prescribed fire ignition would be avoided in shrub patches that are ½ acre or larger. Underburning of up to 30% of these shrub patches is acceptable (SMR 17).
- Where mulch is needed for ground cover and slash or wood chips are not available, certified weed free straw or rice straw will be used. Utilize road surface gravel from weed free sources. Pre-inspect gravel sources for the presence or absence of noxious weeds prior to utilization of gravel from those sources (SMR 5).
- Contractors shall ensure that all equipment that as operated off roads in areas infested with noxious / invasive weeds, that are being moved onto National Forest land is free of soil, weeds, seeds, vegetative matter or other debris that could hold or contain seeds. Equipment operating off roads will be cleaned before it moves from an infested area within the project area to another area (within or outside the project) (C6.35 – Cleaning of Equipment).
- Careful application of Sporax® to cut stumps, implementation of BMPs including a spill contingency plan, and cessation of application during periods of sustained rain.

Alternative 2 (No Action) - No changes in the current rate of spread of noxious weeds is expected. However, the risk of spreading "C" rated noxious weeds is high, because these weeds inevitably follow fire and the potential for uncontrollable wildfire would be high, if the project is not implemented.

Management Indicator Species (MIS)

Forest Service Obligations for Forest-Level Identification, Analysis, and Monitoring of MIS

The Forest Service's 1982 planning regulations at 36 CFR 219.19(a)(1) provide the criteria for identifying and selecting MIS during forest-level planning. Species selected as MIS are those whose population changes are believed to indicate the effects of management activities. Forest plan alternatives are evaluated in terms of both the amount and quality of habitat for MIS as well as MIS population trends (36 CFR 219.19(a)(2)). In addition, the regulations require the Forest Service to monitor forest-level MIS population trends, in cooperation with state fish and wildlife

agencies to the extent practicable, and determine relationships to habitat changes (36 CFR Part 219.19(a)(6)).

Tahoe National Forest Identification and Monitoring of MIS

The Final Environmental Impact Statement (FEIS) for the Tahoe National Forest Land and Resource Management Plan (LRMP, 1990) identifies 16 MIS for the Forest (LRMP FEIS, 1990, page 3-79). The Tahoe National Forest LRMP was amended in 2004 by the Sierra Nevada Forest Plan Amendment (SNFPA) Record of Decision (ROD). The 2004 SNFPA ROD adopts the Monitoring Plan presented in Appendix E of the 2001 SNFPA FEIS (2004 SNFPA ROD, page 70; AR 000722). Appendix E does not establish MIS monitoring direction. However; it does propose a multi-species monitoring protocol to be conducted at the bioregional scale. This proposed approach has not been funded or implemented. Direction for monitoring MIS in Sierra Nevada national forests is found in individual forest land and resource management plans.

The Tahoe LRMP Appendix D describes a "Ten-Year Fish and Wildlife Habitat Management Program for the Tahoe National Forest," which includes a monitoring component (page D-4). The monitoring component consists of the following three elements: (1) evaluating compliance with standards and guidelines in the Forest Plan, (2) assessing direct habitat improvement projects, and (3) monitoring trends in fish and wildlife populations or habitat conditions (LRMP, page D-4). The intent of the third element (monitoring population or habitat trends) is to provide the information needed to make adjustments to the Tahoe National Forest's Fish and Wildlife Program objectives.

In recognizing the uncertainty in funding for the monitoring program, the LRMP sets priorities for forest-level fish and wildlife monitoring efforts (LRMP, page D-4). A risk analysis (Holthausen et al. 1982) was used to place each MIS within one of four priority classes for monitoring, with highest priority given to those species with the greatest likelihood and cost for committing management errors (LRMP, pages D-5 and D-6). The LRMP states that forest-level monitoring efforts "will be completed to the level that available funding allows" (LRMP, page D-5).

MIS Assessment

The purpose of the *Tahoe National Forest MIS Project Level Assessment Parts I and II Effects of Project on MIS Habitats, Alder Creek Project* (MIS Assessment) is to evaluate landscape and project-level impacts of the Alder Creek Project to habitat conditions associated with the sixteen Management Indicator Species (MIS) identified in the Tahoe Land and Resource Management Plan Environmental Impact Statement [LRMP - EIS] in Table 3.31, Page 3-79. The Tahoe National Forest LRMP was amended by the Sierra Nevada Forest Plan Amendment, which provided that habitat condition monitoring is appropriate for low to moderately vulnerable species (see project record). All Tahoe National Forest MIS species that are not Federally listed as Threatened, Endangered, or Proposed, or Forest Service Sensitive species fall within the low to moderately vulnerable category. This MIS analysis is based on information obtained from California Fish and Game (CDFG) and the U.S. Geological Survey (USGS) and the proposed project's potential modifications to species specific habitat.

A review was conducted using the Project Level Assessment Checklist to determine: 1) if the project is within the range of any MIS, 2) if habitat for which the species is an indicator is present within the proposed project area, and 3) if there are potential direct, indirect or

cumulative effects on habitat components. MIS associated with habitats that may be affected by the project will be summarized below. A more detailed analysis of the effects of the Alder Creek Project, is found in the MIS Assessment, Parts I and II, hereby incorporated by reference, and available upon review.

Information on species natural history, including general habitat requirements, is found in the MIS Assessment in *Appendix A "Species Natural History Summary for MIS"*. Rationale for designation of MIS is found in the EIS for the Forest Plan (1990) and in the MIS Assessment in *Appendix B "LRMP MIS Selection Summary"*. See *Appendix C, MIS Project Level Assessment Part I* for habitat types and habitat trends specifically considered for each of these species.

Activities planned within the Alder Creek Project area are subject to Standards and Guidelines (S&Gs) from the Sierra Nevada Forest Plan Amendment (SNFPA), Final Supplemental Environmental Impact Statement (FSEIS), Record of Decision (ROD) (January 2004), and the Tahoe National Forest LRMP.

Potential contributing factors to the cumulative effects on wildlife are primarily considered within the project area and a set distance surrounding the project area. The analysis area was defined to be a 1.5 mile radius surrounding the project area (see Map 1, Appendix C in the Wildlife BE/BA). Because the project proposes only 778 acres of treatments in a very compact arrangement, the project area is bounded on 3 sides by private land, and there are no large vegetation management projects in the foreseeable future for at least 4 miles north of the project, it was believed that the vast majority of project effects would be within a confined area surrounding the project. The next level of analysis area was defined to be the Tahoe National Forest. The magnitude of effects to habitat quantity and quality was compared at the forest level. The timeframe for effects in this area was considered to be from the Donner Ridge Fire in 1960 on. This is because the fire was a stand replacing fire that changed a majority of the landscape and habitats to an early seral type. This area totals 13,016 acres, of which 6,660 acres are private land, and 6,356 acres are NFS land.

MIS Wildlife NOT Present in the Alder Creek Analysis Area

The following wildlife MIS are absent in the Alder Creek Project analysis area based on an absence of habitat, surveys, sightings or species biology. The species that will not be considered further in this document are: Western gray squirrel, wild turkey, and band-tailed pigeon. These species will not be considered further because the indicator habitats (hardwood and hardwood/mixed conifer) are not present within the analysis area. See Appendix C, MIS Project Level Assessment Part I.

MIS Wildlife Present in the Alder Creek Analysis Area

The following MIS wildlife analyzed in detail are either known (based on actual sightings) or suspected (based on species biology and habitat suitability) to occur within habitat potentially affected by the Alder Creek Project, as described in the *MIS Project Level Assessment Part I:* mule deer, black bear, mountain quail, and blue grouse. The evaluation of effects of the Alder Creek Project on bald eagle, a federally listed Threatened species can be found under Intensity Element # 9, and in the Wildlife BE. The effects on Region 5 Sensitive Species American peregrine falcon, California spotted owl, great gray owl, northern goshawk, willow flycatcher, Pacific fisher, American marten, and Sierra Nevada red fox are found in the previous discussion within this section (Intensity Element #10-Sensitive Terrestrial Wildlife Species), and in the

Wildlife BE. Therefore these species will not be discussed here. A general comparison of the effects of Alternatives 1 and 2 on wildlife is found under Comparison of Alternatives Considered in Detail, General Comparison of Alternatives and under the description of the cumulative effects within the analysis area, under Intensity Element #7, and the "General Cumulative Effects" section (Section V) within the Alder Creek Project Wildlife BE. *Appendix C, MIS Project Level Assessment Part I* lists the indicator habitats used for each species and trends for each of these habitats.

The analysis herein considers the Alder Creek project impacts on the indicator habitats for each species.

Mule Deer- Mule deer are known to occur within the project area. The deer herd utilizing the Alder Creek area is part of an interstate deer herd that moves seasonally between the Tahoe National Forest (east of the Sierra crest) and the Dog Skin Mountains, north east of Bordertown, Nevada (The Loyalton Truckee deer herd). The portion of the herd that uses the area is the Verdi subherd. Based on fall and spring aerial surveys completed by CDFG and Nevada Department of Wildlife (NDOW) and hunt tag information, the Verdi subherd is estimated to be declining over the long term. This is primarily due to a substantial loss of wintering range in Nevada and roadkill impacts of Interstate 80 (Letter Dated 02/10/2005, Jim Lidberg, CDFG). Although the overall Loyalton-Truckee deer herd seems generally stable, it is approximately 50% of historic levels.

Habitat within the Alder Creek area is generally described as summer range, and is used by mule deer for fawning, feeding and resting. Riparian areas and meadow stringer systems within the Alder Creek analysis area are especially important to mule deer for forage and fawning during the summer months. There is no critical winter range for deer within the Alder Creek area. Fawning areas are small and confined to stringer riparian areas. This information is based on informal surveys and anecdotal information collected over many years. Other than herd composition information (CDFG), no formal surveys have been conducted for mule deer inside the analysis area.

Foraging, fawning, and feeding habitat is widely dispersed throughout the project area. The most limiting habitat component (inside the analysis area) is associated with birthing and rearing of young. The best fawning habitat occurs inside riparian areas and stringer meadows associated with available water and abundant forage. There are 2 small meadows within project units (6b and 6c) totaling 3 acres. These meadows will either be avoided altogether or operations will occur in the winter over the snow. Many of the riparian areas proposed for treatment are not currently providing high quality habitat for deer. The canopies are closed and high levels of down logs hamper deer movement through these areas.

Effects: Project design would protect and/or buffer suitable fawning habitats during project implementation, therefore the likelihood of directly affecting fawning deer is low. Deer use of the project area is not expected to be substantially disrupted. It is believed that the existing high level of human disturbance on trails and roads within the project area would minimize the number of deer present near the area. Disturbed deer would be able to move easily away from project units during implementation. While some individuals may be temporarily displaced during project activities, no known fawning grounds are expected to be negatively affected. The proposed treatments are expected to have long term benefits to fawning areas and foraging habitat for mule deer by decreasing ground fuels and increasing riparian vegetation and diversity

within these areas. In addition, the actions proposed in riparian areas are designed to minimize disturbance of riparian ground cover and vegetation by using hand treatments in most sensitive areas, removing fewer trees, and restricting equipment use. Cumulatively, implementation of Alternative One of the proposed Alder Creek Project will be neutral to beneficial to mule deer. Increased ground vegetation is expected within the thinning units, which will benefit deer over the short term. The aspen restoration units are expected to benefit deer in the short and long term as there would be an increase in available high quality forage and increased fawning habitat. There is no new permanent road construction proposed. This project will in no way affect the availability of forage within critical wintering grounds or contribute to further fragmentation or loss of winter habitat. The small amount of temporary road construction will not further fragment habitats. These temporary roads would be decommissioned immediately post project and a further 3 existing roads will be decommissioned to improve watershed conditions. A net increase of watershed health and water quality is expected post project. Grazing standards and guidelines are expected to have beneficial long term effects to the quality of available deer forage. The proposed Alder Creek Project would not affect the current grazing practices within the analysis area. The proposed treatments in 217 acres of overstocked riparian areas are expected to have long term benefits to fawning areas and foraging habitat for mule deer by decreasing ground fuels and increasing riparian vegetation and diversity within these areas. Although a decline in habitat utility is expected in 498 acres over the long term. This is not expected to be a substantial effect because 88% (5,578 acres) of the analysis area on NFS land will not be treated, and of this, 91% (5,060 acres) are in either open grass/shrub habitat or are treed habitats with less than 40% canopy closure. This project is not expected to negatively affect the deer population throughout the Tahoe National Forest planning area or within the local deer herds directly, indirectly or cumulatively.

Determination: The Alder Creek project would have *no effect* on the Forest-wide habitat and population trends of mule deer.

Black Bear - Black bear are known to occur within the project area. Habitat in this area is used by black bear year around for denning, feeding, and resting. This information is based on anecdotal information and informal surveys conducted over many years. Bear densities in the Sierra Nevada Mountains south of Lake Tahoe and east of the Sierra crest range from 0.5 to 1.0 bears/mi2 (CDFG website). According to the CDFG website the estimated bear population in California is between 25,000 to 30,000 individuals, and according to their harvest information they estimate the population fully represents all age classes. Under natural conditions (non-urban interface), historic bear densities were similar to current bear densities in the Sierra Nevada Mountains (personal communication, Carl Lackey, NDOW). Black bear is a harvest species within the State of California.

Breeding (denning), feeding, and resting habitats are present in the project area and vicinity. The most limiting habitat component is associated with denning, particularly large down logs and large snags with hollow cavities (>30”dbh). The lack of large down logs is primarily a result of the Donner Ridge Fire and subsequent salvage logging. The Alder Creek analysis area is typically second growth forest with less than 5% of the forested stands in the CWHR 5M, 5D, and 6 size classification.

Project design would protect and/or buffer suitable feeding habitats in meadows during project implementation. If any bears are denning within the project area, there is a risk of disturbing denning bears. This risk is thought to be low however. This is because most project activities

would occur in the summer, when bears are not denning. Over the snow treatments could occur during denning season, but these treatments would not affect large down logs. In addition, the area receives a high amount of human disturbance which would likely render much of the habitat within and adjacent to project units unsuitable because of existing disturbance. Therefore the likelihood of directly affecting denning or feeding bears is low. Overall bear use of the project area is not expected to be substantially disrupted. It is believed that the existing high level of human disturbance on trails and roads within the project area would minimize the number of bears present near the area. Disturbed bears would be able to move easily away from project units during implementation.

Effects: While some individuals may be temporarily displaced during project activities, foraging sites and den sites are not expected to be negatively affected. Although a reduction in overall tree numbers is expected on 744 acres, this decline is not expected to substantially adversely affect black bears as snags and trees greater than 30" dbh would be retained and the SNFPA Standards and Guidelines would be met for snag and down log retention. Habitat quality would be maintained throughout the analysis area. This project will not affect the availability of suitable forage sites or contribute to fragmentation or loss late-seral habitat. Cumulatively, implementation of Alternative One of the proposed Alder Creek Project will be neutral to black bears. The aspen restoration units are expected to benefit bears in the short and long term as there would be an increase in available high quality forage. There is no new permanent road construction proposed. The small amount of temporary road construction will not further fragment habitats. These temporary roads would be decommissioned immediately post project and a further 3 existing roads will be decommissioned to improve watershed conditions. A net increase of watershed health and water quality is expected post project. This project is not expected to negatively affect the bear population throughout the Tahoe National Forest planning area, directly, indirectly or cumulatively.

Determination: The Alder Creek project would have *no effect* on the Forest-wide habitat and population trends of black bear.

Mountain quail- Mountain quail are known to occur within the project area. They likely occur during the spring, summer and fall. Normal snow levels may preclude use of the area in the winter. Mountain quail is a harvest species within the State of California. Information in this assessment is based on anecdotal information collected over many years. CDFG was contacted for mountain quail population information for this analysis. In the past 10 years, the Department has completed no mountain quail surveys. Models run annually by CDFG are used to set hunting seasons and bag limits for mountain quail, a harvest species. These models indicate the mountain quail population is stable (pers. com. Tom Blankenship, CDFG).

Quality mountain quail habitat includes shrubs, brush stands and trees, particularly on steep slopes. This type of habitat exists throughout the Alder Creek analysis area. The analysis area contains 5,331 acres of grass/shrub or treed habitat less than 40% canopy closure, with 3,149 acres of high quality grass/shrub/seeding stages.

Effects: Quail use of the project area is not expected to be substantially disrupted. It is believed that the existing high level of human disturbance on trails and roads, and the large number of domestic dogs off leash within the project area would minimize the number of quail present near the area. It is expected that disturbed quail would be able to move easily away from project units during implementation. Some individuals may be temporarily displaced during project activities.

In the short-term (up to 15 years), thinnings may encourage the production of plant species that improve the availability of quail forage and cover. Reducing canopy closures by 5-10% would increase the production of grasses and forbs, and may increase the spread of brush in some areas. Although a decline in habitat utility is expected in 498 acres over the long term, this decline is not expected to be substantial. This is not expected to be a substantial effect because 88% (5,578 acres) of the analysis area on NFS land would not be treated, and of this, 91% (5,060 acres) are in either open grass/shrub habitat or are treed habitats with less than 40% canopy closure.

Cumulatively, implementation of Alternative One of the proposed Alder Creek Project will be neutral to beneficial to mountain quail. Increased ground vegetation is expected within the thinning units, which will benefit quail over the short term. The aspen restoration units are expected to benefit quail in the short and long term as there would be an increase in available high quality forage and increased nesting/foraging habitat. There is no new permanent road construction proposed. The small amount of temporary road construction would not further fragment habitats. These temporary roads would be decommissioned immediately post project and a further 3 existing roads will be decommissioned to improve watershed conditions. A net increase of watershed health and water quality is expected post project. Grazing standards and guidelines are expected to have beneficial long term effects to the quality of available quail forage. The proposed Alder Creek Project would not affect the current grazing practices within the analysis area. This project is not expected to negatively affect the quail population throughout the Tahoe National Forest planning area directly, indirectly or cumulatively.

Determination: The Alder Creek project would have *no effect* on the Forest-wide habitat and population trends of mountain quail.

Blue Grouse- Blue grouse are known to occur within project area. Except for seasonal movements up and down slope, they are year around residents. This information is based on informal surveys and anecdotal information that has been collected for many years. CDFG was contacted for population information for this analysis. Prior to 1991, the CDFG conducted surveys during the spring in suitable habitat. Stops were made at designated locations and hooting individuals were recorded. Since that time, surveys were not repeated. Models run annually by CDFG are used to set hunting seasons and bag limits for blue grouse, a harvest species. These models indicate the blue grouse population is stable (pers. com. Tom Blankenship, CDF&G).

Blue grouse habitat is well distributed across the Alder Creek analysis area. Blue grouse habitat occurs in riparian areas where these areas provide a higher source of insects and water for developing chicks, as well as hiding and thermal cover. In addition, conifer (primarily fir) needles are a staple food for blue grouse during the winter, where they often spend more of their time in forested habitats. The Alder Creek analysis area is typically second growth forest with less than 5% of the forested stands in the CWHR 5M, 5D, and 6 size classification

Effects: Grouse use of the project area is not expected to be substantially disrupted. It is believed that the existing high level of human disturbance on trails and roads, and the large number of domestic dogs off leash within the project area would minimize the number of grouse present near the area. It is expected that disturbed grouse would be able to move easily away from project units during implementation. In the short-term (up to 15 years), thinnings may encourage the production of plant species that improve the availability of grouse forage (as a source of insects, leaves, twigs, flowers, fruit, etc.) and cover. Reducing canopy closures by 5-10% would

increase the production of grasses and forbs, and may increase the spread of brush in some areas. In the longer-term (15 years plus), if canopy closure increases, the availability of ground forage will be reduced. However, this is not expected to be a substantial effect because 2,012 acres of suitable habitat within the analysis area on NFS land will not be treated. Cumulatively, implementation of Alternative One of the proposed Alder Creek Project would be neutral to beneficial to blue grouse. Increased ground vegetation is expected within the thinning units, which will benefit grouse over the short term. The aspen restoration units are expected to benefit grouse in the short and long term as there would be an increase in available high quality forage and increased nesting/foraging habitat. There is no new permanent road construction proposed. The small amount of temporary road construction will not further fragment habitats. These temporary roads would be decommissioned immediately post project and a further 3 existing roads will be decommissioned to improve watershed conditions. A net increase of watershed health and water quality is expected post project. Grazing standards and guidelines are expected to have beneficial long term effects to the quality of available grouse forage. The proposed Alder Creek Project would not affect the current grazing practices within the analysis area. Some individuals may be temporarily displaced during project activities. Although a reduction in overall tree numbers is expected in 778 acres, this decline is not expected to substantially adversely affect grouse. Habitat quality will be maintained throughout the analysis area. This project is not expected to negatively affect the blue grouse population throughout the Tahoe National Forest planning area directly, indirectly or cumulatively.

Determination: The Alder Creek project would have *no effect* on the Forest-wide habitat and population trends of blue grouse.

Summary of MIS Analysis

The understanding of biological diversity of the complex old-forest ecosystems of the National Forests in the Sierra Nevada, including its composition, function, and structure, is continually growing. Given the complexities involved, management decisions necessarily will involve some degree of uncertainty. The old-growth strategy, Standards and Guides, and specific species management prescriptions included in the Tahoe National Forest Land and Resource Management Plan as amended by the SNFPA FSEIS ROD 2004, represents a balance of wildlife habitat conservation measures that consider the best available scientific information within an acceptable level of risk inherent in projecting management effects. The Alder Creek Project would provide the wildlife habitat and other ecological conditions necessary to maintain well-distributed viable populations of MIS species in the planning area, and maintain diversity of plants and animals. Therefore, implementation of Alternative 1 of the Alder Creek Project is not expected to have measurable short-term negative effects to the above listed MIS species, and may have beneficial long-term effects.

Alternative 2 (No Action)- Under this alternative forest health would continue to decline, insect activity would continue to cause substantial mortality, and hazardous fuels would continue to build. Without thinning and the removal of excessive fuels, the forested stands within the analysis area are at a high risk of complete loss from fire, which would set the development of older more mature forest structure back to early seral habitat. Aspen would continue to decline if the aspen restoration efforts were not implemented, and important habitat for over 180 species would continue to be lost. The current fire threat to the Tahoe Donner, Stony Creek, and Prosser Lakeview Estates subdivisions would continue to increase.

NATIONAL FOREST MANAGEMENT ACT

All actions proposed in all alternatives meet National Forest Management Act (NFMA) requirements detailed in 36 CFR 219.27, as defined by the 1982 planning rule, including those for:

Resource protection – The integrated design elements of Alternative 1 – the proposed action, including the Standards and Guidelines in the Tahoe National Forest LRMP as amended, and the Standard Management Requirements outlined in Appendix A provide for protection of forest resources, including riparian resources, terrestrial wildlife, aquatic and plant species and their habitat, cultural resources, air quality, soil productivity, and recreational and visual quality resources.

Vegetation manipulation – The proposed thinning from below would reduce stand density to a level that would provide for an improvement in the long-term health of the stand, and in combination with the reduction of ground fuels would reduce wildfire hazard and reduce the potential loss of forest habitat from catastrophic wildfire.

Silvicultural practices – No timber harvesting would occur on lands classified as not suited for timber production. Standard management requirements related to the use of harvesting equipment in thinning units are designed to protect soil productivity, riparian resources and water quality, fish and wildlife, recreation, and aesthetic resources.

Riparian areas – The Alder Creek Project proposed actions are designed to meet the Riparian Conservation Objectives (RCOs) outlined in the 2004 SNFPA FSEIS ROD. Approximately 261 acres of the proposed treatments are within RCAs, along ephemeral, intermittent and perennial streams. All the proposed treatments in RCAs are designed to minimize disturbance of riparian vegetation, soils, and other aquatic habitat elements. Project design features along the most sensitive areas, e.g. perennial stream RCAs include a silvicultural prescription that leaves a higher density of trees; utilization of non-ground-based harvest systems during thinning, including mechanical over-the-snow; skyline, helicopter and or hand treatment; restricting mechanical equipment use during fuels treatments; and reducing the intensity of prescribed fire. For additional information about the proposed treatments see Appendix *A* - *Standard Management Requirements* and the Alder Creek *Project RCA Treatment Summary*.

Soil and water – The Alder Creek Project proposed action is designed with Standard Management Requirements including BMPs, contract provisions, and other project specific design features to protect riparian areas, minimize soil erosion and compaction. A spill contingency plan and a no treatment buffer of 25 feet from live stream courses is proposed to ensure that borax stump treatment would minimize the risk to water quality and aquatic habitat to non-significant levels. Road maintenance has been designed to improve watershed conditions, and temporary roads, as well as 1.0 mile of non-system roads would be closed and decommissioned after harvest activities are completed. To minimize soil disturbance, the following project design features include: construction of a designated skid trail in the RCA in Unit 6b to avoid the need for additional road and landing construction; and long skidding distances in Units 2a and 6a to avoid the need for additional temporary road construction. Following use, these skid trails would be recontoured and erosion control measures would be implemented. Proposed fuel treatment would reduce the fuel hazard that contributes to catastrophic wildfires and the corresponding damage to soil and watershed resources.

Diversity – Many of the standard management requirements are designed to protect plant and animal diversity in the project area. They include measures to protect riparian resources, snags, down woody debris, unique and sensitive plants, Threatened, Sensitive and Management Indicator Species and their habitat. Proposed thinning and ground fuel reduction treatments would improve forest health and reduce the current high fuel hazard, which would result in a reduction of predicted wildfire intensity and an improvement in the long-term sustainability of forest habitat diversity.

DOCUMENTS INCORPORATED BY REFERENCE, AND AVAILABLE UPON REQUEST:

- Biological Evaluation for Sensitive Plants Alder Creek Project
- Weed Risk Assessment Alder Creek Project
- Biological Evaluation/Biological Assessment Birds, Mammals, Invertebrates (Terrestrial) Alder Creek Project
- Biological Evaluation and Assessment Amphibians, Reptile, Fish, Invertebrates Alder Creek Project
- Tahoe National Forest Management Indicator Species (MIS) Project Level Assessment Parts I and II – Effects of Project on MIS Habitat – Alder Creek Project
- Alder Creek Project Cumulative Watershed Effects
- Alder Creek Project Fire and Fuels Analysis
- Alder Creek Project Marking Guidelines
- Scoping Comment Summary

CONSULTATION AND COORDINATION

The Forest Service consulted the following individuals, Federal, State, and local agencies, tribes and non-Forest Service persons during the development of this environmental assessment:

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OTHER FOREST SERVICE PERSONNEL

Rick Toupin, Region 6 Regional Logging System Engineer
Bill Woodruff, Pathologist, PSW Region

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FEDERAL, STATE, AND LOCAL AGENCIES:

US Fish and Wildlife Service
California Department of Fish and Game
Lahontan Region Water Quality Control Board
Town of Truckee: Sanitation District, Road Dept.

TRIBES:

Washoe Tribe of California and Nevada

OTHERS:

Bill Houdyschell, Tahoe Donner Association Forester

MAILING LIST

Copies of this EA were sent to :

Individuals	Groups	Agencies
Bill Houdyschell, TDA	Forest Issues Group	Regional Water Quality Control Board – Lahontan Region
	Californian's For Alternatives To Toxics (CATs)	US Department of the Interior, Fish and Wildlife Service
	Truckee Donner Historical Society	Truckee Sanitary District
		Town of Truckee, Public Works Director, Dave Wilkens

Letters were mailed to the potentially interested parties advising them that the EA is available upon request, or available electronically on the Tahoe National Forest website. A complete mailing list of those who were sent letters is found in the project file.

REFERENCES CITED

Aho, Paul E., Gary Fiddler, Mike Srago. 1983. Logging damage in thinned young-growth true fir stands in California and recommendations for prevention. Research Paper PNW-304. Portland, Oregon. USDA Forest Service, PNW Forest and Research Experiment Station. 8 p.

Dost, Frank N., Logan Norris and Carol Glassman. 1996. Assessment of Human Health and Environmental Risks Associated with Use of Borax for Cut Stump Treatment, Draft. USDA Forest Service, Regions 5 and 6. 109 p.

Dekker-Robertson, Donna, Peter Griessmann, Dave Baumgartner, and D . Forest Health Notes: Annosus Root Disease. Washington State University Cooperative Extension. 3p.

Edmonds, Robert L., David C. Shaw, Tom Hsiang, Charles H. Driver.1989. Impact of Pre Commercial Thinning on Development of Heterobasidion annosum in Western Hemlock. General Technical Report PSW-116. USDA Forest Service. pp. 85-94.

Filip, G.M. and D.J. Morrison. 1998. Heterobasidion annosum: Biology, Ecology, Impact and Control, Chapter 23-North America. CAB International. pp. 405 -427.

Filip , Gregory M., Craig L. Schmitt, and Kevin P. Hosman. 1992. Effects of Harvesting Season and Stump Size on Incidence of Annosus Root Disease of True Fir. Western Journal of Applied Forestry 7(2): 54-56.

Froelich R.C., C.S. Hodges, Jr., S.S. Sackett. 1978. Prescribed Burning Reduces Severity of Annosus Root Rot in the South. Forest Science 24: 93-100.

James, R.L., F.W. Cobb, Jr. 1984. Spore Deposition by Heterobasidion annosum in Forests of California. Plant Disease 68: 246-248.

Kliejunas, J.T. 1989b. Incidence of Heterobasidion annosum stump infection in eastside pine type stands on the Plumas and Tahoe National Forest. USDA Forest Service, Pacific Southwest Region, San Francisco, Report Number 89-16. 9p.

Kliejunas, John and Bill Woodruff. 2004. Pine Stump Diameter and Sporax® Treatment in Eastside Pine Type Stands. USDA Forest Service, Pacific Southwest Region, Report No. R04-01. 7p.

Oliver, William W. 1995. Is Self-Thinning in Ponderosa Pine Ruled by Dendroctonus Bark Beetles? USDA FS, Pacific Soutwest Research Station, Redding, CA.. 213-218.

Reineke, L. H. 1933. Perfectiing a Stand-Density Index for Even-aged Forests. Journal of Agricultural Research. Vol. 46: 7. 627-637.

Russell, K.W., J.H. Thompson, J.L. Stewart, and C.H. Driver. 1973. Evaluation of Chemicals to control Infection of Stumps by Fomes Annosus in Precommercially thinned Western Hemlock Stands. State of Washington Department of Natural Resources, DNR Report No. 33. 17 p.

Schmitt, Craig L., John R. Parmeter, and John T. Kliejunas. 2000. Annosus Root Disease of Western Conifers. USDA Forest Service, Forest Insect and Disease Leaflet 172. 10 p.

US EPA. 1993. Boric Acid Reregistration Eligibility Facts. 8 pp.

USDA Forest Service. 1994. Forest Service Handbook 3409.11-Forest Pest Management Handbook, R5 Supplement No. 3409.11-94-1. May 17, 1994. 9 p.

USDA, Forest Service. 1994. A Borax Pesticide Fact Sheet, prepared by Information Ventures for the USDA, Forest Service. 8p.

USDA, Forest Service. 2004. Annosus Root Disease - Effects, Biology and Prevention in Southern California Recreation Areas. Pacific Southwest Region. R5-PR-006. 2 p.